

# DVS<sup>™</sup> operator manual

 **SmartMarker<sup>®</sup>**  
Technology



# **DVS<sup>®</sup> DOSE VERIFICATION SYSTEM**

## **Operator Manual**

Caution: Federal Law restricts the use of this device to sale by or on the order of a physician.



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**Part Number: 934-00553-00 rev. 08**

**Model #: DVS-R-200**

**FCCID: TS9-DVS-R-200**

**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.**

**Warning: This system is intended for use by healthcare professionals only. This system may cause radio interference or may disrupt the operation of nearby equipment. It may be necessary to take mitigation measures, such as re-orienting or relocating the DVS-R-200 or shielding the location.**

**Note: For Qualified Service Personnel Only.**

**This product is covered by one or more issued or pending U.S. patents including one or more of the following:**

**U.S. Patent Nos. 6,047,214; 6,345,203; 6,263,247; 6,402,689; 6,963,770; 6,963,771; 7,010,340, and 7,011,814.**

## TABLE OF CONTENTS

1	Welcome .....	1
1.1	Product Description .....	2
1.2	Intended Use .....	2
1.3	Contraindications, Warnings, Cautions, and Notes .....	2
	Contraindications .....	3
	Warnings .....	3
	Cautions .....	4
	Notes .....	5
1.4	Symbols .....	5
1.5	Glossary of Terms .....	7
1.6	Statement of Compliance .....	7
	Changes or Modifications to the System .....	8
1.7	Essential Performance .....	8
1.7	Equipment Supplied .....	8
1.8	User Equipment Requirements (Not Supplied) .....	9
2	Dose Verification System Overview .....	10
2.1	DVS Dosimeter .....	11
2.2	DVS Reader System .....	12
2.3	DVS Software .....	13
2.4	Bar Code Scanner .....	13
2.5	DVS Insertion Tool .....	13
3	System Configuration .....	14
3.1	Configuring the DVS Software After Installation .....	14
	Setting up the Database Connection .....	14
	Editing the Admin User .....	16
	Entering Institution Information and System Options .....	19
3.2	Setting Up the DVS Reader .....	20
	Choose a Location .....	20
	Make the Connections .....	20
	Barcode Scanner Connections .....	21
	Power on the Reader .....	21
	Connect to the DVS Dosimetry Database .....	21
4	Quick Start Instructions .....	25
4.1	Step 1 - Test Dosimeters .....	25
4.2	Step 2 – Implant Dosimeters and Record Implant Information .....	26
4.3	Step 3 – Enter Patient Information Into the Plan and Review Software .....	27
4.4	Step 4 – Measure Radiation Pre-dose and Post-dose Values Using The DVS Reader .....	29

- 5 Using the Plan and Review Software.....31
  - 5.1 Logging into the DVS Plan and Review Software .....31
  - 5.2 DVS Main Menu Overview.....32
  - 5.3 Working With Patient Information .....33
    - Adding, Editing, and Viewing Patients .....33
    - Entering Patient, Dosimeter, and Plan Information.....34
    - Entering Patient and Physician Information .....35
    - Entering Dosimeters .....36
    - Entering Plans.....39
    - Changing or Deleting Dosimeters .....39
    - Working with Measurement Fractions and Skipped Fractions .....41
      - Deleting a Fraction .....42
      - Inserting Skipped Fractions .....42
      - Changing Information for a Fraction .....43
  - 5.4 Viewing Patient Results.....44
    - Displaying a List of Patient Results .....44
    - Viewing Results Charts .....45
    - Viewing Results Reports .....48
  - 5.5 DVS System Administration .....50
    - Adding and Editing DVS Users.....50
    - Changing Institutional Information and System Options ...52
    - Changing the Database Connections .....53
    - Backing up and Restoring the DVS Database .....54
- 6 Using the DVS Reader.....56
  - 6.1 Power On the DVS Reader and Power Off.....56
  - 6.2 Log in to the DVS Reader .....57
  - 6.3 Test a Dosimeter.....59
  - 6.4 Scan a Patient .....62
    - Select a Patient .....62
    - Select a Plan/Fraction .....63
    - Take a PRE-Dose Reading .....64
    - Dose the Patient.....66
    - Take a POST-Dose Reading.....67
    - Enter Treatment Notes.....68
- 7 Troubleshooting .....70
  - 7.1 Troubleshooting the DVS Server System Software Setup.....70
  - 7.2 DVS Reader Not Operational .....70
  - 7.3 Unable to Obtain a Pre-Dose or Post-Dose Reading .....70
  - 7.4 DVS Reader Error Messages .....71
  - 7.5 Plan and Review Software Error Messages.....75

8	Maintenance and Technical Support.....	81
8.1	Reader Maintenance .....	81
8.2	Database Maintenance .....	81
8.3	Dosimeter Maintenance .....	81
8.4	Cleaning the Reader Wand and Reader Base Station .....	81
8.5	Technical Support and Product Service.....	82
8.6	Disposal and Recycling .....	83
9	Specifications.....	84



# 1 WELCOME

The Dose Verification System Operator Manual includes information about the setup and use of the DVS® (Dose Verification System). The intended users of this manual are radiation oncologists, medical physicists, dosimetrists, radiation therapists, and other personnel that may be assisting in the setup and use of DVS.

This manual is organized into the following sections:

**Section 1 Welcome** – provides a brief overview of the product, a list of indications, cautions and warnings, and summaries of the conventions, symbols and terms used in the Operator Manual and the device.

**Section 2 Dose Verification System Overview** – provides a detailed description of the components of DVS and how it is used.

**Section 3 System Configuration** – provides instructions for installing and configuring the DVS Software and setting up the DVS Reader.

**Section 4 Quick Start Instructions** – provides an overview of the workflow for testing, implanting, and scanning the DVS dosimeters.

**Section 5 Using the Plan and Review Software** – provides the instructions for using the Plan and Review Software to enter patient, dosimeter, and plan information and review patient results.

**Section 6 Using the DVS Reader** – provides the instructions for using the DVS Reader to test dosimeters and scan patients.

**Section 7 Troubleshooting** – provides guidance if you encounter issues or errors while using DVS.

**Section 8 Maintenance and Technical Support** – provides information on maintaining DVS and getting technical support.

**Section 9 Specifications** – provides the technical specification for the DVS system.



## 1.1 Product Description

DVS provides an oncologist with information about the actual radiation dose delivered to a patient's tissues and organs, and it provides charts and statistics for comparing the actual dose to the prescribed dose. DVS uses an implantable dosimeter and an external reading system to determine the absorbed dose near a tumor within a patient. DVS provides the oncologist with dose information that may be used in conjunction with other clinical information to make decisions regarding treatment plans or to identify the need for further investigation. The DVS Dosimeter is able to be visualized and used as a radio-opaque treatment area marker in IGRT (Image Guided Radiation Therapy) using ultrasound, kV planar images, kV CBCT (Cone Beam Computed Tomography), and MV CT/CBCT.

## 1.2 Intended Use

DVS is intended for use in radiation therapy to verify treatment planning and radiation dose to tissue and organs in or near the irradiated areas of a patient.

## 1.3 Contraindications, Warnings, Cautions, and Notes

See Dosimeter Instructions for Use. The following section explains the warnings, cautions and notes for DVS.

The terms Warning, Caution, and Note have specific meanings throughout this manual:

- A Warning advises against actions or situations that could result in personal injury or death.
- A Caution advises against actions or situations that could damage equipment or produce inaccurate or invalid data.
- A Note provides useful information regarding the operation or function of the system.

## Contraindications

- **The Reader Wand may not be used on patients who are already implanted with other electronic devices such as pacemakers, or insulin pumps. The impact of the potential electronic interference is unknown.**
- **Do not allow patients with a DVS Dosimeter to receive the following treatments: shortwave diathermy, microwave or therapeutic ultrasound. These could result in serious injury.**

## Warnings

**The DVS system is not intended to specify adjustments to dose.**

**Dose measurement data obtained using the DVS system should be used in conjunction with existing planning and delivery tools to verify delivered dose rather than as a stand alone tool for determining dose adjustments.**

- **Electric Shock Hazard – Do not remove the covers of the Reader or Reader Wand assemblies. Do not open the case or touch the internal parts. The DVS Reader and Reader Wand contain no user serviceable internal parts. Contact the local representative for technical support and return information.**
- **Electric Shock Hazard – The Dose Verification System is grounded with a three-conductor cable and three-prong plug. Insert the power cable only into a properly grounded three-contact outlet.**
- **Electric Shock Hazard – Do not use in wet environment. May result in electrocution.**
- **Only use the manufacturer-supplied power cord.**
- **Replace fuse only with same type and rating: 2 AMP, 250V Time-Lag Fuse. Failure to replace the fuse with the same type and rating may pose a fire hazard.**

- **The DVS system is not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.**
- **Be sure that the cables do not pose a trip hazard.**
- **The Reader Wand is not for use in direct contact with the patient – especially near wounds. Contact with gowns or other clothing is acceptable. The Reader Wand is not intended to be sterile. Clean the Reader Wand after direct skin contact using isopropyl alcohol-based disinfectants.**

### Cautions



- **Proper use of this system depends on careful reading of all instructions and labels.**
- **Do not use cellular phones or hand held two-way radios in close proximity to the DVS Reader.**
- **Keep CRTs at least 3 feet from the DVS Reader to prevent the DVS Reader from interfering with the CRT image. Interference from the CRTs may result in reduced read range.**
- **Turn OFF the system power before connecting or disconnecting any system components or accessories. Connecting components with power applied may cause damage to the connectors or connecting circuitry.**
- **If the dosimeter is tested prior to implantation, (1) do not remove the dosimeter from its package as this will compromise sterility and (2) do not place the dosimeters near metal.**
- **Do not use a dosimeter near implanted metal objects. Read range may be compromised.**
- **Do not store dosimeters near stray radiation.**
- **Enter the predicted dose in cGy, not monitor units. Entry in monitor units will cause a false error in the planned vs. actual dose report.**














- **The DVS Reader Wand should not be used within 1-2 feet of large metal objects. Using the Reader Wand close to large metal objects has the potential to reduce the read range of the Reader Wand.**
- **Do not conduct the pre-dose or post-dose reading while the patient is on a metal table. If the treatment table is metal, conduct the pre-dose reading before the patient is placed on the table and the post-dose reading after the patient is removed from the table. A metal table or other metal objects will interfere with the functioning of the DVS Reader Wand.**
- **Take the post-dose reading within 10 minutes after the end of therapy. Readings taken beyond 10 minutes decrease dose accuracy.**
- **Do not implant the dosimeter deeper than 12 cm or less than 3 cm from the surface of the skin. Implanting deeper than 12 cm may result in the inability of the Reader to communicate with the implanted dosimeter. Implanting at least 3 cm deep ensures adequate build-up and minimizes potential for mechanical damage.**

### Notes

The dosimeter is factory calibrated and does not require calibration during use.

### 1.4 Symbols

SYMBOL	DESCRIPTION
	Indicates an attention to users to consult accompanying documents (Dosimeter Instructions for Use) for more information on the device.
	Type B Equipment

	Protective earth (ground)
	ON
	OFF
	Manufacturer
	Date of Manufacture (YYYY-MM-DD or YYYY-MM)
	Catalog Number
	Do not use if package is damaged.
	Serial Number
	Fragile, handle with care.
	Consult Instructions for Use.
	Temperature Limitation
	Keep dry.
	Non-ionizing radiation

## 1.5 Glossary of Terms

**Base Station** – The main part of the DVS Reader, which contains the touch-screen display for operating the Reader.

**cGy** – Centi-Gray (hundredths of a Gray (Gy)) unit of radiation

**CT** – Computed Tomography

**Dosimetry Database** – The database used by the DVS system for storing patient, dosimeter, planning, and result information.

**Fraction** – One radiation treatment session. A treatment plan is made of one or more fractions.

**Isodose Curve** – The plot of the radiation dose plan showing lines of equal radiation dose in cGy.

**Insertion Tool** – Used for percutaneous and intraoperative implant procedures.

**Plan** – Dosimetric representation of a prescribed radiation treatment course.

**Predicted Dose** – The dose, in cGy, expected at a dosimeter for a treatment session.

**Reader** – The DVS Reader system, which is composed of the Base Station and the Reader Wand.

**Reader Wand** – The hand-held part of the DVS Reader that contains the electronics to read the dose measurement from a dosimeter.

## 1.6 Statement of Compliance

DVS has been tested and complies with the following standards:

- IEC/EN/UL 60601-1
- CSA C22.2 No. 601-1-M90
- IEC/EN/UL 60601-1-2
- FCC 47 CFR Part 15 - Subpart C
- RTT&E Directive, 1999/5/EC

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

## Changes or Modifications to the System

Changes or modifications to the DVS system not expressly approved by Sicel Technologies could void the user's authority to operate the equipment.

## 1.7 Essential Performance

The Essential Performance of the DVS System is:

- Interpretation (dose calibration algorithm) of dosimeter data for accurate dose response storage/display
- error free data transmission (dosimeter to database)
- mechanical integrity during normal use for protection from electrical hazards
- maintenance of the integrity of the protective earth connection

## 1.7 Equipment Supplied

- Reader Base Station
- Reader Wand
- Ethernet cord

- Power cord - (see Specifications section for appropriate power cord information)
- Bar Code Scanner

## 1.8 User Equipment Requirements (Not Supplied)

The following equipment and software are required to use DVS:

- Personal Computer with LAN or network access for DVS Dosimetry Database
- Operating System Requirements:
  - Windows XP Professional, Windows Vista Business, or later

The equipment must be certified for the Application and in accordance with National, State, or Local codes.

Accessory equipment connected to the analog and digital interfaces must be certified according to the respective IEC standards (i.e. IEC 60950 for data processing equipment and IEC 60601-1 for medical equipment). Furthermore all configurations shall comply with the system standard IEC 60601-1-1.

Everybody who connects additional equipment to the signal input part or signal output part configures a medical system, and is therefore responsible that the system complies with the requirements of IEC 60601-1-1. If in doubt, consult the technical services department or your local representative.



## 2 DOSE VERIFICATION SYSTEM OVERVIEW

The Dose Verification System consists of five components:

- DVS Dosimeter
- DVS Insertion Tool
- DVS Reader
- DVS Software (Plan and Review Software and Dosimetry Database)
- Bar Code Scanner

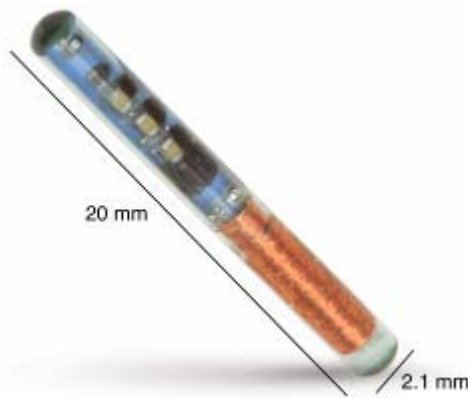
The implantable dosimeter measures *in vivo* dose from photon beam radiation therapy. The dosimeter uses a semiconductor device called a MOSFET (metal oxide semiconductor field effect transistor) to measure radiation. Radiation within the human therapeutic dose range causes a shift in the threshold voltage of the MOSFET. By measuring the threshold voltage before and after radiation dose therapy, the dose fraction can be calculated. Cumulative dose can be calculated by tabulating the radiation dose measured at each fraction.

To measure absorbed dose, a pre-dose and post-dose reading must be taken. The pre-dose reading is taken before the radiation treatment and the post-dose reading is taken after the radiation treatment. The pre-dose and post-dose threshold voltage readings are then used to calculate the daily dose fraction that is reported for each treatment session. The daily fractional dose values are stored in the Dosimetry Database and are added together to calculate a cumulative dose.

The dosimeter is powered by the Reader Wand utilizing electromagnetic energy and does not contain a battery. The dosimeter derives all power from the Reader-generated electromagnetic field. The dosimeter modulates the electromagnetic field to send the digitized threshold voltage readings back to the Reader.

## 2.1 DVS Dosimeter

The dosimeter is powered telemetrically and measures the radiation using two MOSFETs. The MOSFETs are hermetically sealed in a biocompatible glass capsule. The dosimeter is covered by a polyester surgical mesh for handling, suturing, or fixating the dosimeter *in vivo*. The dosimeter is subsequently sterilized with ethylene oxide. In the tissue, the dosimeter provides a radio-opaque image that registers on a dose planning computed tomography (CT) scan. The measured dose data can be compared with the prescribed dose plan.



**Figure 1 — DVS Dosimeter**

Each dosimeter is factory calibrated by correlating to a NIST-traceable ion chamber. The calibration information for each dosimeter is included in a bar code on pre-printed calibration labels.

Dosimeters are provided in sterile packages. The expiration date printed on the dosimeter package is the date when the dosimeter is no longer considered sterile. Electrical functionality of the dosimeter is not affected by the sterility expiration.

## 2.2 DVS Reader System

The DVS Reader system is used to take the pre-dose and post-dose readings from the dosimeter during each treatment session. The DVS Reader system consists of a Reader Wand and a Base Station (Figure 2 — DVS Reader). The Base Station includes a touch screen to view instructions and enter data. The Reader Wand sits in the cradle of the Base Station and is removed for reading a patient's radiation dose. The highlighted end of the Reader Wand under the LED indicators is the active reading area.

The DVS Reader can be used on a table top or on a pole mounted to the wall. The pole should be 1.25" in diameter and able to support 25 pounds.



**Figure 2 — DVS Reader**

## 2.3 DVS Software

The DVS Software consists of Plan and Review Software and a Dosimetry Database. The Plan And Review Software is used to enter patient treatment information and to access patient data for viewing and reporting. The Dosimetry Database is a centralized database to which the Plan and Review Software and the DVS Reader connect through a local area network (LAN) connection. All patient information and dosimeter measurements are stored in the database. A bar code scanner is used to enter calibration information for the dosimeter. Up to 25 users can simultaneously access the database.

## 2.4 Bar Code Scanner

The bar code scanner is used to read the dosimeter serial number and calibration values from a 2D bar code into the Dosimetry Database. The 2D bar code is packaged with each dosimeter so it is easy to scan the calibration values into the DVS system. The bar code scanner does not require any external power.

## 2.5 DVS Insertion Tool

The Insertion Tool is an 11 (eleven) gauge needle similar in design to a bone biopsy needle. It is used for percutaneous and intraoperative implant procedures and consists of a cannula, trocar, and plunger.



**Figure 3 — Insertion Tool**

## 3 SYSTEM CONFIGURATION

The Dose Verification System has three main components that you need to setup:

- DVS Plan and Review Software
- DVS Dosimetry Database Server
- DVS Reader

Refer to the Installation and Set Up Guide, 934-00553-02, for installing and setting up the DVS Software and Reader.

### 3.1 Configuring the DVS Software After Installation

After you have installed the DVS Plan and Review Software and the DVS Dosimetry Database, you need to configure the DVS system. Configuration steps include the following:

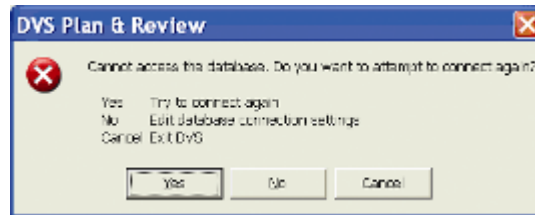
- Setting up the Database Connection (only required if the Plan and Review Software is installed on a different computer than the database server)
- Editing the Admin User
- Entering Institution Information and Preferences

#### Setting up the Database Connection

If you installed the Plan and Review Software on a different computer than the DVS Dosimetry Database Server, you must set up the connection to the database. If the Plan and Review Software is only installed on the same computer as the DVS Dosimetry Database Server, skip this section and perform the steps in Editing the Admin User and Entering Institution Information and Preferences.

On the computer (or computers) where the Plan and Review Software is installed without the database server, perform the following steps:

1. Double click the **DVS Plan and Review** icon on the Desktop or select **Start>Programs>DVS>DVS Plan and Review**. This application will launch and attempt to connect to the DVS database. If it cannot connect after a 30 second pause, the following error dialog box appears.



2. Click **No**. The **DVS Administration** window appears.



**Figure 4 — DVS Administration**

3. Click the **Database** tab.
4. Enter the name of the SQL Server instance with the DVS Dosimetry Database in the **Database Server** field. For example:

`<servername>\DVS`

By default, the **Database Server** field is set to . \DVS which indicates that the DVS Database is installed locally on the same computer as the Plan and Review Software. If the DVS Database is located elsewhere on a different computer, the name of that computer will be <servername>.

5. Click **Done**. If the application connects successfully, the **DVS Login** dialog box appears. If the application connection is unsuccessful, the error dialog box appears and steps 2-5 should be repeated with the correct information.

### Editing the Admin User

By default, an Admin login name with no password is setup in the DVS system so that you can log in to the DVS Software initially. After installation, you should login using the Admin login and set the Admin user password, user information, and authorizations.

To edit the Admin user, perform the following steps:

1. Double click the **DVS Plan and Review** icon on the Desktop or select **Start>Programs>DVS>DVS Plan and Review**. The **DVS Main Menu** and **DVS Login** dialog box appears.

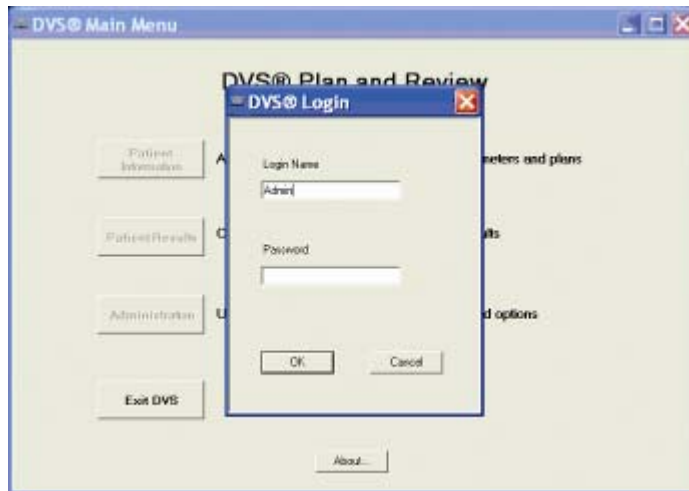
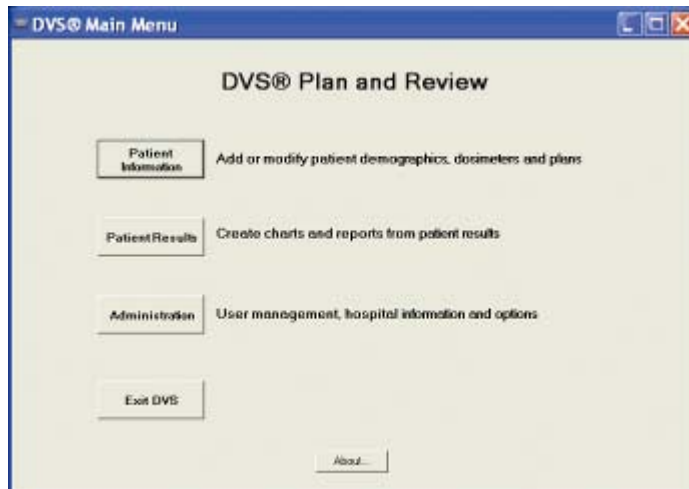


Figure 5 — DVS Login

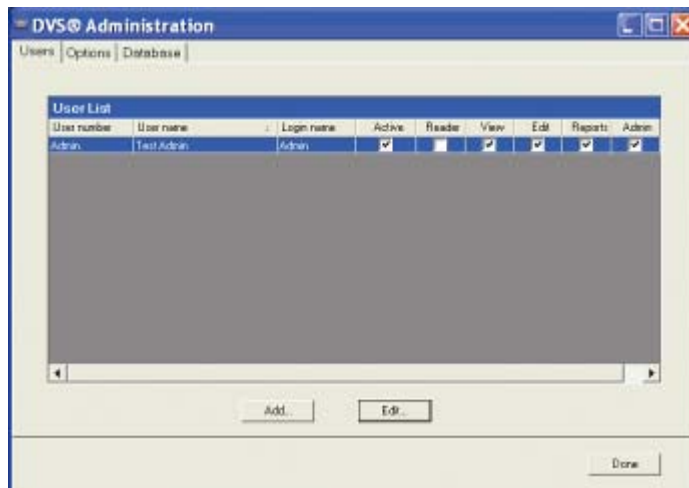
2. In the **Login** field, enter **Admin** (case sensitive) and leave the **Password** field blank.

3. Click **OK**. The **DVS Main Menu** for the DVS Plan and Review Software appears.



**Figure 6 — DVS Main Menu**

4. Click **Administration** to display the **DVS Administration** window.



**Figure 7 — DVS Administration**

5. Click the **Users** tab.



6. Select the Admin user from the **User List** and click **Edit**.

**Figure 8 — User Data Entry**

7. In the **User Data Entry** dialog box, edit the user information, password, and authorizations.
  - Password - must be numeric (0-9) and at least 4 digits long. Be sure to set a secure password for the default Admin user.
  - Authorizations – select the tasks you want the user to be able to perform. The Admin user should only have Administrator authorization. Administrator authorizations let the user access the **Administration** dialog box.
8. When you are finished editing the user, click **OK** to close the dialog box and return to the **Users** tab.
9. Click **Done**.

## Entering Institution Information and System Options

To enter institution information and set the options for DVS, perform the following steps:

1. Double click the **DVS Plan and Review** icon on the Desktop or select **Start>Programs>DVS>DVS Plan and Review**. The **DVS Main Menu** and **DVS Login** dialog box appears.
2. In the **DVS Login** dialog box, enter the Admin login name and password.
3. Click **OK**. The **DVS Main Menu** for the DVS Plan and Review Software appears.
4. Click **Administration**.
5. Click the **Options** tab.

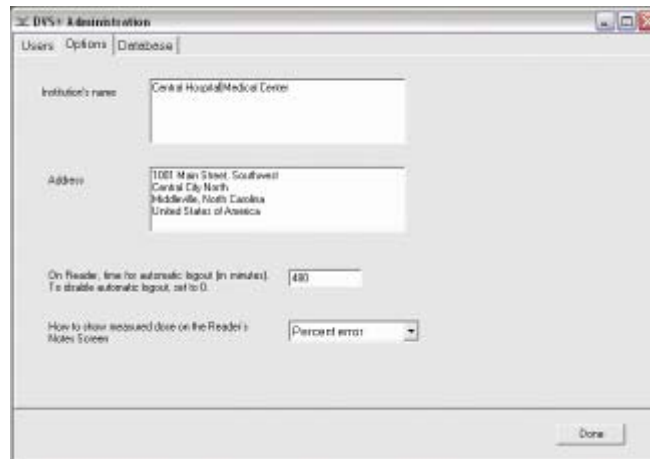


Figure 9 — Options

6. Enter the **Institution Name** and **Address**.
7. Enter the time in minutes after which you want the DVS Reader to automatically logout. To disable automatic logout, set the value to 0 (zero).

8. Select how you want to display measured doses on the **DVS Reader Notes** screen:
  - None
  - Percent Error
  - Absolute Dose
9. Click **Done** when finished.

## 3.2 Setting Up the DVS Reader

To set up the DVS Reader, perform the following steps:

- Choose a Location
- Make the Connections
- Power on the Reader
- Connect to the DVS Dosimetry Database

### Choose a Location

Find a location for the DVS Reader in or near the treatment room. The DVS Reader can be placed on a counter top or attached to a pole mounted to the wall. The pole should be 1.25" in diameter and able to support 25 pounds.

Choose a place that is:

- Near an electrical outlet
- Near a local area network (LAN) connection
- Not in the radiation path of the linear accelerator

### Make the Connections

DVS Reader Base Station Connections are three connections to the Reader Base Station that you must make:

- Reader Wand - Connect the Reader Wand cable to the back of the Reader Base Station. Turn the connector 1/4-turn to lock it in place.

- Ethernet Cable - Connect the Ethernet cable to the back of the base station and then to a LAN connection in the room.
- Power cord - Connect the power cord to the back of the base station and then to the wall outlet.

**Note:** The USB connection on the back of the Base Station is for field service.

## Barcode Scanner Connections

Connect one end of the USB cable into the end of the barcode scanner. Press the cord in firmly to assure a proper connection.

Plug the opposite end of the cable into a USB port on a computer containing the DVS Plan and Review software application.

To test the barcode scanner, depress the trigger. A red line should appear. If the redline doesn't appear, check the connection between the cable and barcode scanner.

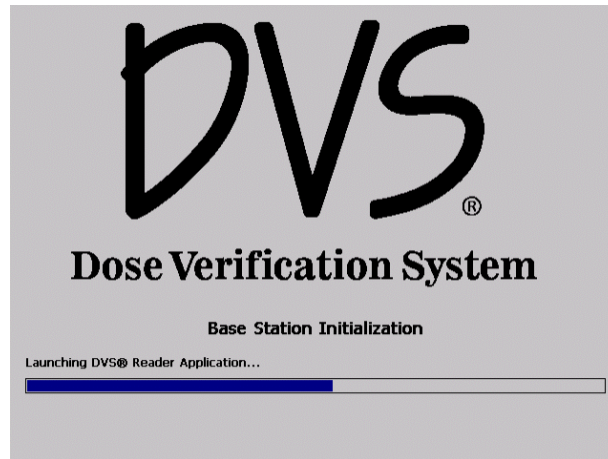
## Power on the Reader

To power on the Reader, use the switch on the back of the base station near the power cord. The Power On screen may take one to two minutes to appear.

## Connect to the DVS Dosimetry Database

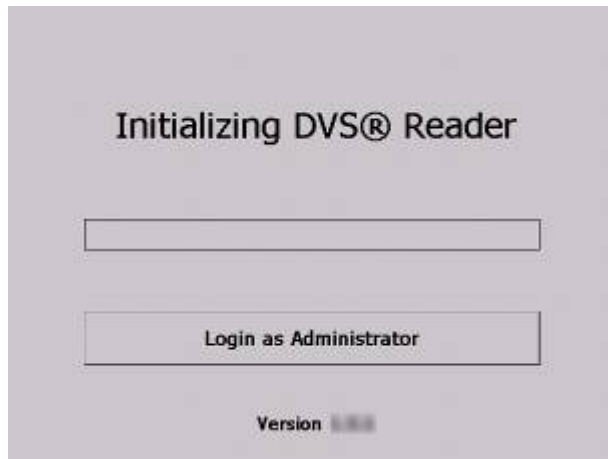
After powering on the Reader, you need to set up the connection to the DVS Dosimetry Database.

1. Contact Sicel technical support, and get the Administrator password-of-the-day.



**Figure 10 — Power On**

2. On the **Initializing DVS Reader** screen, press **Login as Administrator**.



**Figure 11 — Initializing DVS Reader**

3. Select **Administrator** in the user list.
4. Press the **Password** field to display the numeric keypad. Enter the password-of-the-day received from technical support. Press **Enter**.

- On the **Database Server** field, enter the server name and SQL server instance. For example:

<server>\DVS

where <server> is the name of the database server computer.



**Figure 12 — Administration**

- In the **Reader Administration** screen, enter the name of the server computer in the **IIS Server** field. This is typically the same as the name of the server entered in the Database Server field, but without the \DVS instance name.
- (Optional)** Determine whether **Anonymous Access** should be used to communicate with the DVS database. If **Anonymous Access** is used, verify that the checkbox is checked (default). If Anonymous Access is not required, uncheck the checkbox for web server access. Enter the username and password in the fields provided by using the onscreen keypad.
- Select the local time zone from the drop-down list box.
- (Optional)** Select the **Automatically Adjust for Daylight Savings Time** check box. The date and time is automatically set when the DVS Reader connects to the DVS Dosimetry Database Server.
- Press **Save**.



11. Wait for the **Initializing DVS Reader** screen to appear and then turn off the power to the DVS Reader.
12. Power on the DVS Reader.

## 4 QUICK START INSTRUCTIONS

This section provides an overview of the workflow for using the DVS system:

- Step 1 – Test Dosimeters (recommended)
- Step 2 – Implant Dosimeter and Record Implant Information
- Step 3 – Enter Patient Information into the Plan and Review Software
- Step 4 – Measure Radiation Pre-Dose and Post-Dose Values Using the DVS Reader

### 4.1 Step 1 - Test Dosimeters

Using the DVS Reader, you can test dosimeters before sending them to surgery. This assures that the dosimeters are working properly. This step is encouraged but not required.

**Important:** Do not remove the dosimeters from the package because this will compromise sterility. Dosimeters can be scanned through the package. Check the expiration date on the outer package to ensure sterility.

1. Log in to the DVS Reader.
2. Press **Test Dosimeter** on the **Reader Login** screen.
3. Hold the Reader Wand near the dosimeter.



4. Press and release the button on the Reader Wand to scan the dosimeter. Below the status bar, the DVS Reader displays one of the following messages:
  - **Dosimeter <number> was found** – the dosimeter is functional.
  - **No dosimeter found** – the dosimeter could not be located. Attempt to read again.
  - **Dosimeter xxxxxx found. MOSFET is not functional** – there is a problem with the dosimeter. Contact the local representative for technical support.
5. Press **Logout** to exit.

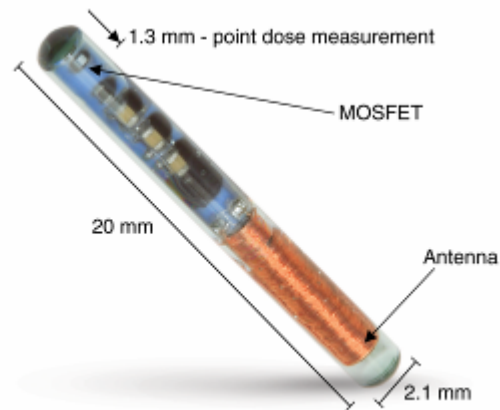
## 4.2 Step 2 – Implant Dosimeters and Record Implant Information

Verify that the DVS Dosimeter and insertion tool package sterility have not been compromised, are not expired, and that the items have not been contaminated prior to implantation.

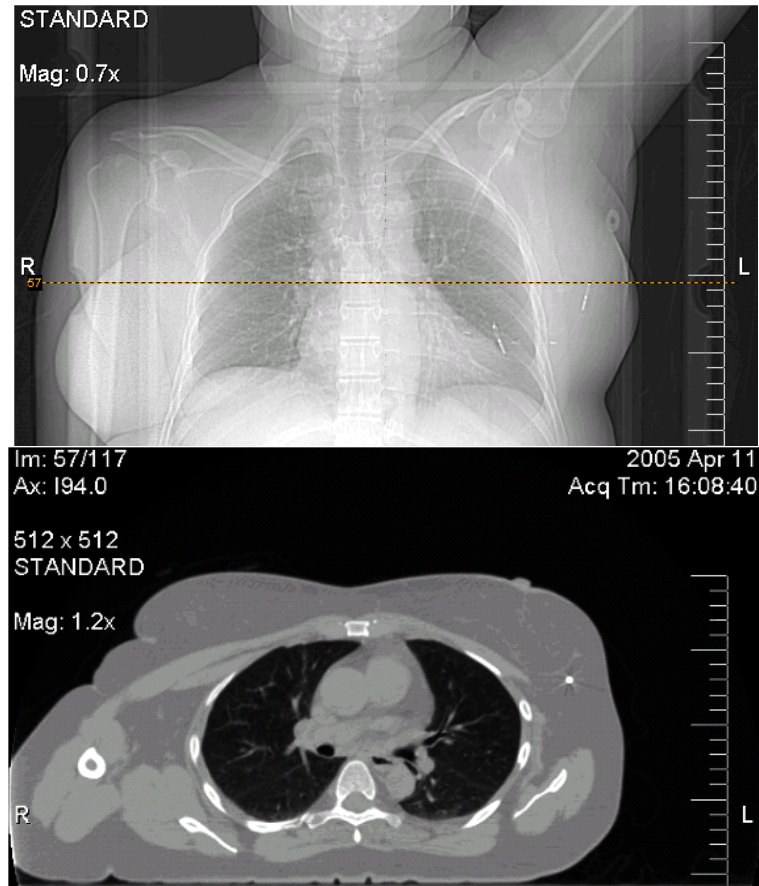
At surgery, specify the implant location of each dosimeter on the transfer labels provided. The transfer label information aids the dosimetrist in identifying the dosimeters on a CT scan. For each dosimeter, retain one transfer label in the surgical records and return the other to Radiation Oncology.

### 4.3 Step 3 – Enter Patient Information Into the Plan and Review Software

Using the Plan and Review Software, enter the patient's demographic information and dose planning information. Ensure that the predicted dose at the dosimeter was obtained by measuring the point dose 1.3 mm from the end of the capsule *opposite* the antenna (Figure 13 — DVS Dosimeter Sensitive Volume). Use a CT scout film or radiograph to determine dosimeter orientation within the patient (Figure 14 — CT Scout and Transverse Images).



**Figure 13 — DVS Dosimeter Sensitive Volume**



**Figure 14 — CT Scout and Transverse Images**

1. Log in to the Plan and Review Software.
2. Click **Patient Information**.
3. Click **Add**.
4. In the **Patient Data Entry** dialog box, enter the patient information:
  - a. Enter the patient number.
  - b. Enter the patient's name.
  - c. Enter the physician's name (this is generally the attending radiation oncologist).

5. Click **Add Dosimeter** to assign the implanted dosimeters to the patient.
  - a. Scan the dosimeter's bar code. The bar code contains the dosimeter's serial number and calibration information.
  - b. Enter the implant location for each dosimeter from the transfer labels.
6. Click **Add Plan** and add the patient's plan information:
  - a. Enter the name of each plan, and the number of fractions for each plan.
  - b. Enter the predicted dose at each dosimeter (point dose) from the planning CTs. Note that this must be in cGy (not MU). Verify the dose fraction range for the dosimeter from the dosimeter's Instruction for Use, specifications section. Values outside this range will result in an error message:

*This predicted dose is outside the typical range of xxx to xxx cGY. Are you sure you want to use this value?*

**Note:** Additional plans may be added at any time.

#### 4.4 Step 4 – Measure Radiation Pre-dose and Post-dose Values Using The DVS Reader

1. Log in to the Reader.
2. Press **Scan patient**.
3. Select the patient from the list and press **Next**.
4. Select the current plan and fraction for the patient and press **Next**.
5. Read the dosimeters' pre-dose values.
  - a. Hold the Reader Wand up to the patient.
  - b. Press then release the button on the Reader Wand.
  - c. Hold the Reader Wand near the patient's treatment area until the Reader scans and reads all the dosimeters.
6. Proceed with radiation therapy.

7. Press **Next** on the Reader to display the **POST-Dose Reading** screen.
8. Read the dosimeters' post-dose values within 10 minutes of the completion of treatment:
  - a. Hold the Reader Wand up to the patient.
  - b. Press then release the button on the Reader Wand.
  - c. Hold the Reader Wand near the patient's treatment area until the Reader scans and reads all the dosimeters again.
9. Press **Next** and enter any notes related to the therapy on the **Treatment Notes** screen.
10. Press **Save** to save the readings to the Dosimetry Database.

## 5 USING THE PLAN AND REVIEW SOFTWARE

The Plan and Review Software is used to:

- Enter patient, dosimeter, and plan information
- Review results from the patient's dosimeters
- Maintain the authorized user list
- Setup system options

### 5.1 Logging into the DVS Plan and Review Software

To log in to the Plan and Review Software:

1. Click the **DVS Plan and Review** icon on the Desktop or select **Start>Programs>DVS>DVS Plan and Review**. The **DVS Login** dialog box appears (Figure 15 — DVS Login).



**Figure 15 — DVS Login**

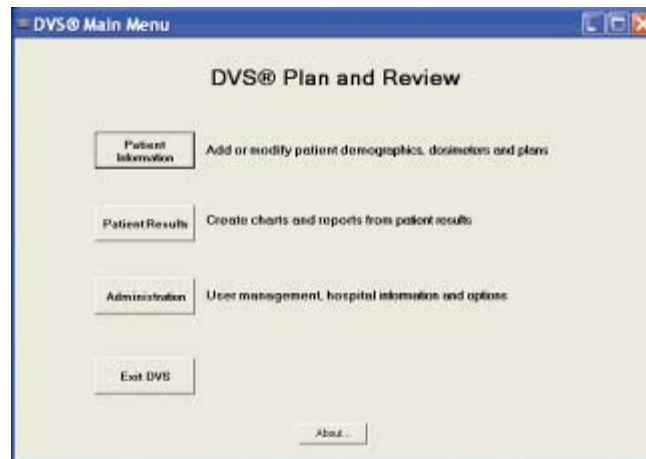
2. Enter the **Login Name** and **Password** that were assigned to you by the DVS Administrator.
3. Click **OK**.

## 5.2 DVS Main Menu Overview

The **DVS Main Menu** contains five buttons as shown in Figure 16 — DVS Main Menu:

- **Patient Information** – Enter or edit patient, dosimeter, and plan information (see *Working With Patient Information*)
- **Patient Results** – View charts and reports for the patient’s dosimeter results (see *Quick Start Instructions*)
- **Administration** – Maintain the list of authorized users, and set DVS options (see *DVS System Administration*)
- **Exit DVS** – Exit the Plan and Review Software
- **About...** – Show software version and copyright information

**Note:** Depending on the user’s authorization level, some of these buttons may be disabled. For more information, see *Adding and Editing DVS Users*.



**Figure 16 — DVS Main Menu**

### 5.3 Working With Patient Information

From the **DVS Main Menu**, click **Patient Information** to perform the following tasks:

- Adding, Editing and Viewing Patients
- Entering Patient, Dosimeter, and Plan Information
- Entering Patient and Physician Information
- Entering Plans
- Entering Dosimeters
- Changing or Deleting Dosimeters
- Working with Measurement Fractions and Skipped Fractions
- Changing Information for a Fraction

#### Adding, Editing, and Viewing Patients

To add, edit or view patients, click **Patient Information** on the **DVS Main Menu**. The **Patient Selection for Editing** window appears (Figure 17 — Patient Selection for Editing).



**Figure 17 — Patient Selection for Editing**



By default, the patient list displays only the patients that are marked to be shown in the DVS Reader. This makes it easier to manage a large list of patients. If a patient has been entered, but neither a plan nor dosimeters have been added to the patient record, then the patient is not active and will not be listed. To list all the patients in the Dosimetry Database, select the **Show all patients** check box.

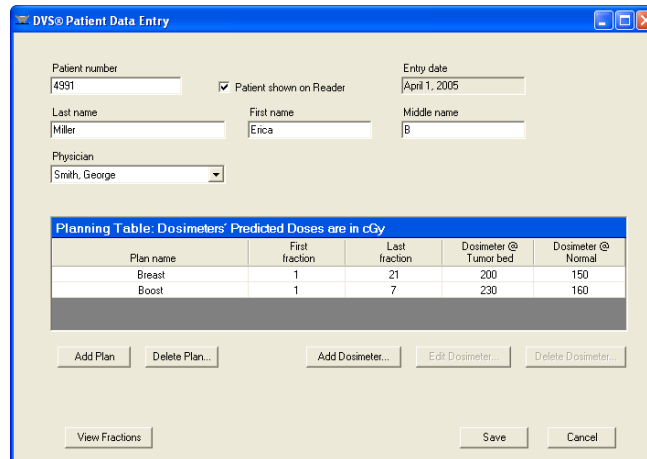
From this window, you can perform the following tasks:

- **To add a new patient**, click **Add**. The **Patient Data Entry** window appears. You can enter the new patient's information using this window.
- **To delete a patient from the list**, select the patient in the list and click **Delete**. Patients who have dosimeters with measurements cannot be deleted. To remove a patient from the list, clear the **Patient shown on Reader** check box in the **Patient Data Entry** window.
- **To edit a patient's information**, select the patient in the list and click **View/Edit**. The **Patient Data Entry** window appears. You can enter the new patient's information using this window.
- **To return to the Main Menu**, click **Done**.

For more information about the **Patient Data Entry** window, see *Entering Patient, Dosimeter, and Plan Information*.

## Entering Patient, Dosimeter, and Plan Information

To edit patient, dosimeter, and plan information, click **Add** or **View/Edit** on the **Patient Selection for Editing** window to display the **Patient Data Entry** window (Figure 18 — Patient Data Entry).



Plan name	First fraction	Last fraction	Dosimeter @ Tumor bed	Dosimeter @ Normal
Breast	1	21	200	150
Boost	1	7	230	160

**Figure 18 — Patient Data Entry**

From the **Patient Data Entry** window, you can perform the following tasks:

- Entering Patient and Physician Information
- Entering Plans
- Entering Dosimeters
- Changing or Deleting Dosimeters
- Working with Measurement Fractions and Skipped Fractions
- Changing Information for a Fraction

### Entering Patient and Physician Information

The top of the **Patient Data Entry** window has the following fields for entering patient demographic information:

- **Patient number** – (required) This must contain a unique patient number or identifier
- **Patient shown on Reader** – Select this check box to display the patient on the **Select Patient** screen on the DVS Reader. For patients that are no longer active, clear this check box.
- **Entry date** – (read-only) Displays the date the patient was entered.

- **Last name** – (required) Enter the patient’s last name
- **First name** – Enter the patient’s first name.
- **Middle name** – Enter the patient’s middle name
- **Physician** – Select a physician from the list. If you want to add a new physician, select **Add Physician** from the top of the list. The **Physician Data Entry** dialog box appears (Figure 19 — Physician Data Entry). Enter the physician’s name and unique physician number. The physician number and last name are required fields. If there is not a unique number that identifies the physician, enter their name or other identifier.



**Figure 19 — Physician Data Entry**

When finished making changes, click **Save** to save the data entered in this window and its dialog boxes. Click **Cancel** to discard all changes made for the current patient.

## Entering Dosimeters

Dosimeters assigned to the patient are shown in the planning table on the **Patient Data Entry** window.

### To add a new dosimeter:

1. Click **Add Dosimeter**. A dialog box for entering the dosimeter’s bar coded calibration values appears (Figure 20 — Dosimeter Barcode).



**Figure 20 — Dosimeter Barcode**

2. Use the bar code scanner to read the 2D bar code on the dosimeter's transfer label:
  - a. Hold the bar code scanner at a slight angle to the transfer label.
  - b. Be sure the scanner's light field completely covers the bar code from left-to-right.
  - c. Slowly scan the bar code from top-to-bottom or bottom-to-top until an audible beep is heard and numeric values are displayed in the dialog box.

3. When completed, click **OK**. The **Dosimeter Data Entry** dialog box appears (Figure 21 — Dosimeter Data Entry).

**Figure 21 — Dosimeter Data Entry**

4. Refer to the dosimeter transfer label and enter information about the dosimeter:
  - **Dosimeter ID** – (Read-only) Displays the serial number of the dosimeter.
  - **Location** – Select a location name for the dosimeter from the pull-down menu. If you want to create a new location, just type it into this field.
  - **Implant date** – (Optional) Select the implant date of the dosimeter. The default is today's date.
  - **Surgeon** – (Optional) Enter the surgeon's name.
  - **Notes** – (Optional) Enter notes about the dosimeter
  - **Dosimeter used by Reader** – To have the DVS Reader scan for this dosimeter, select this check box. To prevent the Reader from scanning for this dosimeter, clear this check box.

5. Click **OK** to save the dosimeter information. The planning table is updated with a new column for the dosimeter. The **Location** that was entered in the **Dosimeter Data Entry** dialog box appears in the new column's heading.

## Entering Plans

Use the planning table on the **Patient Data Entry** window to enter the patient's plan information. Each row in the planning table contains a plan for the patient. Each plan is made of a series of treatment fractions each at the same dose level.

### To add a new plan:

1. Click **Add Plan** and edit the new row that appears.
2. Set the following items for each plan:
  - **Plan name** – The name to use for the plan
  - **First fraction** – The number of the first fraction. This is typically 1, but can be any number greater than zero, and less than or equal to the **Last fraction**.
  - **Last fraction** – The number of the last fraction. This must be greater than or equal to the **First fraction**.

If dosimeters have been assigned to the patient, additional columns appear in the table, one for each dosimeter. For more information about assigning dosimeters to a patient, see *Entering Dosimeters*.

### To delete a plan:

1. Select the row to delete.
2. Click **Delete Plan**.

## Changing or Deleting Dosimeters

Dosimeters assigned to the patient are shown in the planning table on the **Patient Data Entry** dialog box.

### To edit dosimeter information

1. Put the cursor in the **Dosimeters** column.

2. Click **Edit Dosimeter**. The **Dosimeter Data Entry** dialog box appears (Figure 21 — Dosimeter Data Entry).
3. Change the information in this dialog box.
4. Click **OK** to save the information.

**To delete a dosimeter:**

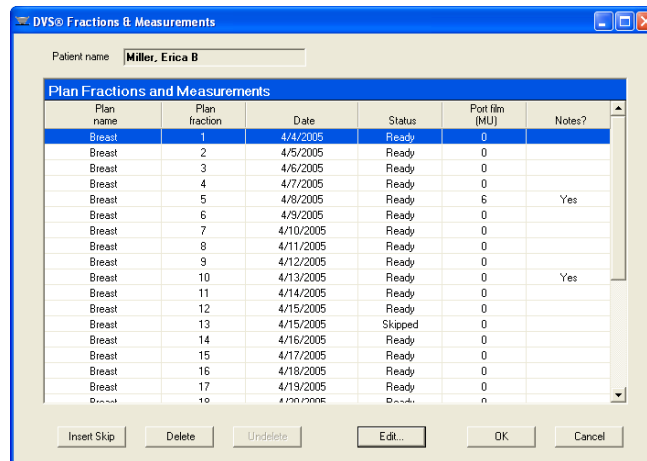
1. Put the cursor in the **Dosimeters** column.
2. Click **Delete Dosimeter**.

**Note:** Dosimeters with measurements cannot be deleted. Click **Edit Dosimeter** to display the **Dosimeter Data Entry** dialog box. Clear the **Dosimeter used by Reader** check box.

## Working with Measurement Fractions and Skipped Fractions

As measurements are collected from a patient's dosimeters, you can make changes to the information collected on the DVS Reader's **Treatment Notes** screen, and you can add, edit, or delete skipped fractions.

On the **Patient Data Entry** window, click **View Fractions** to display the **Fractions & Measurements** windows. This window lists the planned fractions and the measurements made for each fraction (Figure 22 — Fractions & Measurements).



Plan name	Plan fraction	Date	Status	Port film (MU)	Notes?
Breast	1	4/4/2005	Ready	0	
Breast	2	4/5/2005	Ready	0	
Breast	3	4/6/2005	Ready	0	
Breast	4	4/7/2005	Ready	0	
Breast	5	4/8/2005	Ready	6	Yes
Breast	6	4/9/2005	Ready	0	
Breast	7	4/10/2005	Ready	0	
Breast	8	4/11/2005	Ready	0	
Breast	9	4/12/2005	Ready	0	
Breast	10	4/13/2005	Ready	0	Yes
Breast	11	4/14/2005	Ready	0	
Breast	12	4/15/2005	Ready	0	
Breast	13	4/15/2005	Skipped	0	
Breast	14	4/16/2005	Ready	0	
Breast	15	4/17/2005	Ready	0	
Breast	16	4/18/2005	Ready	0	
Breast	17	4/19/2005	Ready	0	

**Figure 22 — Fractions & Measurements**

The columns in the **Fractions & Measurements** window are defined as follows:

- **Plan name** – The plan's name from the planning table.



- **Plan fraction** – The plan’s fraction number.
- **Date** – The measurement date.
- **Status** – The measurement status for the plan and fraction:
  - **Ready** – A normal measurement was taken.
  - **Skipped** – No measurement was taken, but treatment was given.
  - **Deleted** – The measurement is marked as deleted; it is not associated with a plan and fraction.
  - **[Blank]** – No measurement or treatment has been performed yet.
- **Port film (MU)** – The number of monitor units from port films taken during the measurement.
- **Notes?** – Whether any notes check boxes were selected for the measurement. Yes means there are notes. Blank means there are no notes.

## Deleting a Fraction

**To mark a measurement fraction as deleted** so it is not associated with a plan and fraction, perform the following steps:

1. Select the measurement.
2. Click **Delete**. The measurement is not actually deleted, but will not be used to calculate total dose administered.

**To restore a deleted measurement:**

1. Select the fraction.
2. Click **Undelete**.

## Inserting Skipped Fractions

Skipped fractions are used to record when treatment was given, but pre- and/or post-dose readings were not recorded. If a skipped fraction is used, the predicted dose is substituted automatically for the measured dose to approximate the cumulative dose. The dose appears in brackets [ ].

**To insert a skipped fraction:**

1. Select the row with the plan and fraction that was missed.
2. Click **Insert Skip**. This associates a skipped fraction with the selected plan and fraction.

**To remove a skipped fraction:**

1. Select the row with the skipped fraction.
2. Click **Delete**.

**Changing Information for a Fraction**

From the **Fractions & Measurements** window, you can change the notes or the port film monitor units for a fraction:

1. Select the fraction to edit.
2. Click **Edit** to display the **Measurement Data Entry** dialog box (Figure 23 — Measurement Data Entry).



**Figure 23 — Measurement Data Entry**

3. Edit the following information in the **Measurement Data Entry** dialog box:
  - **Plan name** – (read-only) The plan name of the selected fraction
  - **Fraction #** – (read-only) The plan's fraction number

- **Date & Time** – (read-only, except for *Skipped* fractions)  
The date and time of the measurement. For *Skipped* fractions, this can be changed; however, the date and time must stay between the fraction before and after the current fraction. This is needed to keep the measurement fractions in the proper order.
  - **Port Film (MU)** – The number of monitor units from Port films taken during this measurement
  - **Notes** – This group-box contains check boxes that record the notes entered by the user
4. Click **OK** to save the changes made in this dialog box. To discard the changes, click **Cancel**.

## 5.4 Viewing Patient Results

From the **Main Menu**, click **Patient Results** to perform the following tasks:

- Displaying a List of Patient Results
- Viewing Results Charts
- Viewing Results Reports

### Displaying a List of Patient Results

To view patient results, click **Patient Results** on the **DVS Main Menu**. The **Patient Selection for Results** window appears (Figure 24 — Patient Selection for Results).



**Figure 24 — Patient Selection for Results**

By default, the patient list displays only the patients that are marked to be shown in the DVS Reader. This makes it easier to manage a large list of patients. To list all the patients in the Dosimetry Database, select the **Show all patients** check box. From this window, you can perform the following tasks:

- **To view a chart showing the dose measurements from a patient’s dosimeters**, select the patient and click **View Chart** to display the **Results Chart** screen. For more information, see *Viewing Results Charts*.
- **To view a report showing the dose measurements from a patient’s dosimeters**, select the patient and click **View Report** to display the **Results Report** screen. For more information, see *Viewing Results Reports*.
- **To return to the Main Menu**, click **Done**.

## Viewing Results Charts

The **Results Chart** window summarizes a patient’s dosimeter measurements. There are two charts and a statistics table shown for each dosimeter (Figure 25 — Results Charts and Figure 26 — Statistics Table).

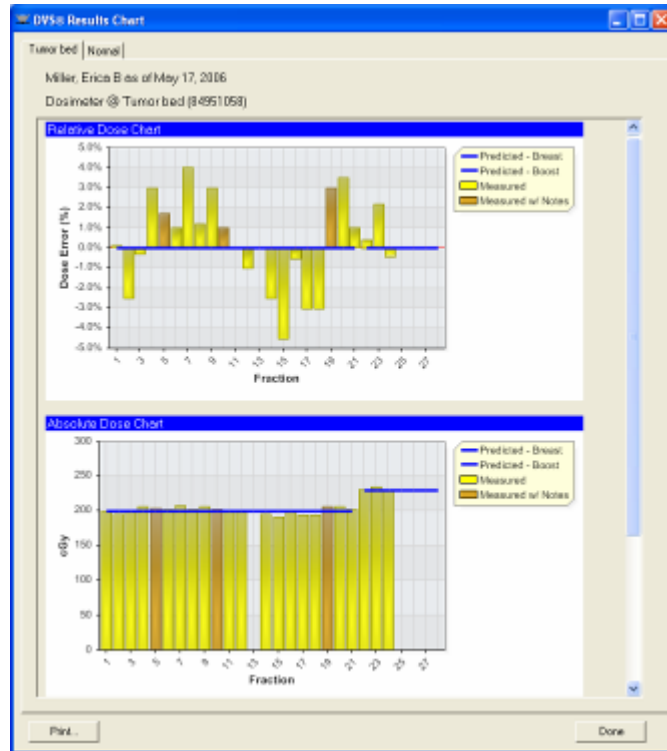


Figure 25 — Results Charts

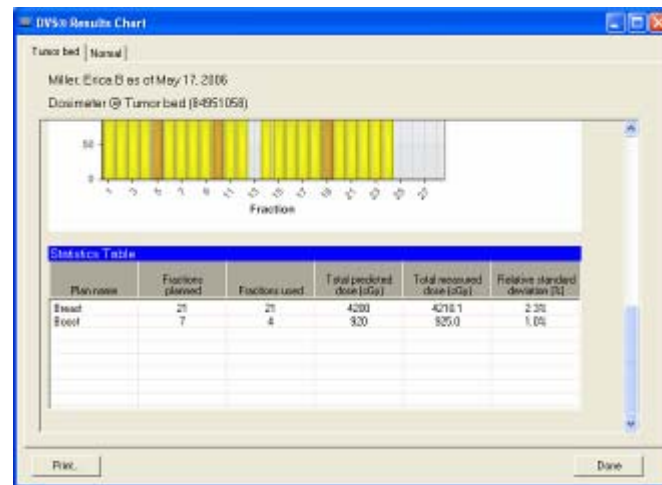


Figure 26 — Statistics Table

Dosimeter results are displayed in a tab labeled with the dosimeter location.

The first chart is the **Relative Dose Chart**. This shows the difference between each measured dose and its predicted dose as a percentage. The value shown for each bar is the measured dose relative to the predicted dose.

The second chart is the **Absolute Dose Chart**. This shows the measured doses (in cGy) as gold bars, and the predicted doses as blue lines. Each plan is shown as a separate blue line.

In the charts, the brown bars identify measurements where either a port film was taken or notes were entered by the user.

For each of the charts, the mouse can be positioned over a bar to show more information about the measurement:

- The value of the measurement
- The date of the measurement
- Who made the measurement
- The monitor units from port films that were taken
- Any notes selected during the measurement process

No bars are shown for skipped fractions or fractions where a dosimeter value could not be read. Positioning the mouse over these empty spaces will show if it was a skipped fraction or a measurement error.

The **Statistics Table** shows summary statistics for each of the patient's plans. The columns are as follows:

- **Plan name** – The name of the plan
- **Fractions planned** – The number of fractions in the plan
- **Fractions used** – The number of dose fractions administered so far
- **Total predicted dose (cGy)** – The expected dose administered for the number of fractions displayed in the Fractions used column

- **Total measured dose (cGy)** – The measured dose for the number of fractions displayed in the Fractions used column. For skipped fractions or fractions with measurement errors, the predicted dose is used instead.
- **Relative standard deviation (%)** – The standard deviation of the measurements divided by the average of the measurements. For skipped fractions or fractions with measurement errors, the predicted dose is used instead.

To print the charts for a patient, click **Print**. One page is printed for each dosimeter.

### Viewing Results Reports

The **Results Report** window summarizes a patient’s dosimeter measurements in a report format (Figure 27 — Results Report).

DVS® Results Report

DVS® Dose Report

Patient: Miller, Edwin B  
Patient ID: 4992  
Physician: Smith, George

Central Hospital of the  
Great "Southern" State  
1001 Main Street, Southwest  
Central City North  
Millsboro, North Carolina  
United States of America

Dosimeter @ Thayer Inc(8492)038

Plan name	Fraction	Date	Status	Predicted Dose (cGy)	Observed Dose (cGy)	Dose Error (%)	Fraction (M/F)	Status?
Elect	1	4/9/09		280	280.2	0.1%		
Elect	2	4/9/09		280	285.8	-2.5%		
Elect	3	4/9/09		280	289.3	-3.5%		
Elect	4	4/9/09		280	285.0	-2.0%		
Elect	5	4/9/09		280	282.3	-2.1%	S	Yes
Elect	6	4/9/09		280	282.8	-2.0%		
Elect	7	4/10/09		280	288.0	-4.0%		
Elect	8	4/11/09		280	282.3	-2.5%		
Elect	9	4/12/09		280	285.0	-2.0%		
Elect	10	4/13/09		280	282.0	-2.0%		Yes
Elect	11	4/14/09		280	280.0	0.0%		
Elect	12	4/15/09		280	280.0	-1.0%		
Elect	13	4/15/09	Skipped	280	280.01			
Elect	14	4/16/09		280	285.0	-2.5%		
Elect	15	4/17/09		280	281.0	-4.5%		
Elect	16	4/18/09		280	282.0	-3.5%		
Elect	17	4/19/09		280	284.0	-5.0%		
Elect	18	4/20/09		280	284.0	-5.0%		
Elect	19	4/21/09		280	286.0	-5.0%	S	
Elect	20	4/22/09		280	287.0	-5.5%		
Elect	21	4/23/09		280	282.0	-2.0%		
Elect	1	4/24/09		280	278.0	0.8%		
Elect	2	4/25/09		280	273.0	2.2%		
Elect	3	4/26/09		280	272.0	-4.4%		
Elect	4	4/28/09	Skipped	280	[REDACTED]			
Elect	5							
Elect	6							
Elect	7							
Total	22			4760	4433.3	0.8%		

Print \_\_\_\_\_  
May 17, 2009 3:08:38 PM Page 1 of 2

Print Zoom: 75% Page 1 of 2 Done

Figure 27 — Results Report

The report is similar to the **Fractions & Measurements** screen (see *Working with Measurement Fractions and Skipped Fractions*). However, the report also shows the dose values from each dosimeter. The measurement for each dosimeter is shown in a separate table. The columns in the tables are as follows:

- **Plan name** – The plan’s name from the planning table.
- **Fract #** – The plan’s fraction number.
- **Date** – The measurement date.
- **Status** – The measurement status for the plan and fraction. It is one of:
  - **[Blank]** – A normal measurement was taken.
  - **Skipped** – No measurement was taken, but treatment was given.
  - **Deleted** – The measurement is marked as deleted; it is not associated with a plan and fraction.
  - **Error** – An error occurred when taking the measurement from this dosimeter.
- **Predicted dose (cGy)** – The dose from the planning table.
- **Measured dose (cGy)** – The measured dose.
- **Dose error (%)** – The difference between the Measured dose and the Predicted dose, divided by the Predicted dose.
- **Port film (MU)** – The number of monitor units from port films taken during the measurement.
- **Notes?** – Whether any notes check boxes were selected for the measurement. Yes means there are notes. Blank means there are no notes.

The size of the displayed report can be changed with the **Zoom** selection. This does not affect the printed report.

To display the next page of the report, click >>. To display the previous page, click <<.

To print the report, click **Print**.



## 5.5 DVS System Administration

From the Main Menu, click **Administration** to display the **Administration** screen. This screen contains three tabs:

- **Users** – This tab contains the list of authorized users.
- **Options** – This tab contains options for the DVS system.
- **Database** – This tab contains the database connection information.

From these tabs, you can perform the following tasks:

- Adding and Editing DVS Users
- Changing Institutional Information and System Options
- Changing the Database Connections
- Backing up and Restoring the DVS Database

### Adding and Editing DVS Users

The Users tab displays the list of authorized users (Figure 28 — Users).

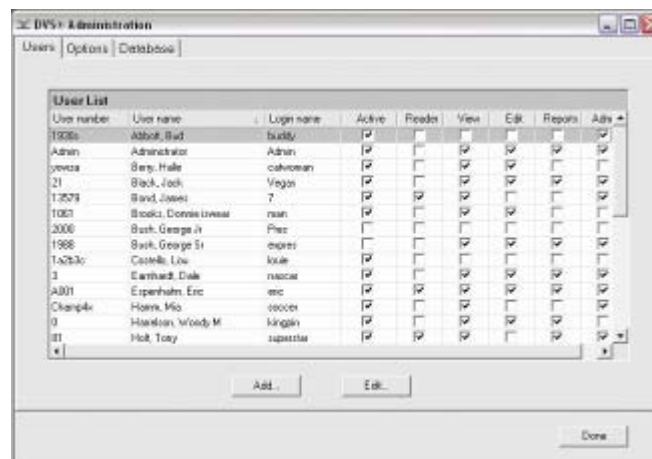


Figure 28 — Users

Each person who uses the DVS Plan and Review Software and the DVS Reader, must have a login name and password. To add a new user, click **Add**. This displays the **User Data Entry** window (Figure 29 — User Data Entry). The fields in this window are as follows:

- **Active user** – Select this check box to let the user log in. Clear this check box to disable this user.
- **User number** – (Required) Enter a unique user number or identifier.
- **Last name** – (Required) Enter the user’s last name.
- **First name** – Enter the user’s first name.
- **Middle name** – Enter the user’s middle name.
- **Login name** – (Required) Enter the user’s login name for the Plan and Review Software.
- **Password** – (Required) Enter the user’s numeric password. The password must be a minimum of 4 digits and a maximum of 8 digits.
- **Verify password** – (Required) Enter the user’s password for verification.
- **Entry date** – (Read-only) Date is entered automatically when the user is added.
- **Can use Reader** – Select this check box to allow the user to log in and use the DVS Reader. Clear this check box to prevent this user from appearing in the user list on the Reader.
- **View Patient data** – Select this check box to allow the user to select the Patient Information button and view the screens that it contains. Clear this check box to disable the Patient Information button for this user.
- **Edit Patient data** – Select this check box to allow the user to edit patient information. If this check box is selected, then the **View Patient Data** check box is selected also. Clear this check box to prevent the user from changing any patient information.

- **Create reports** – Select this check box to allow the user to select the **Patient Results** button and view the charts and reports. Clear this check box to disable the **Patient Results** button.
- **Administrator** – Select this check box to allow the user to select the **Administrator** button and perform administrative functions. Clear this check box to disable the **Administrator** button.



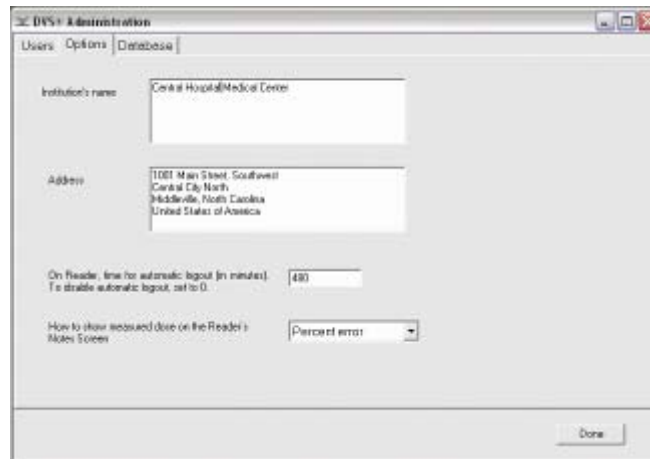
**Figure 29 — User Data Entry**

To edit an existing user, select the user in the list and click Edit. This displays the **User Data Entry** window with the user’s information.

To return to the **Main Menu**, click **Done**.

## Changing Institutional Information and System Options

The **Options** tab contains information that is typically setup once when the DVS system is installed (Figure 30 — Options).



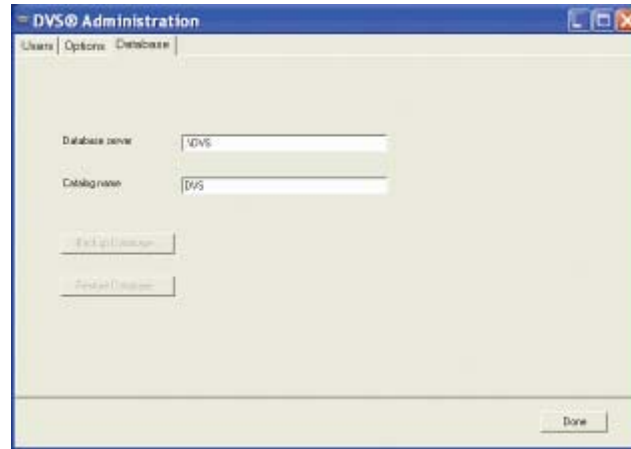
**Figure 30 — Options**

The **Options** tab contains the following fields:

- **Institution's name** – The name of the institution to print on the charts and reports
- **Address** – The address printed on the charts and report
- **On Reader, time for automatic logout** – This is the number of minutes of idle time to allow before automatically logging out of the DVS Reader
- **How to show the measured dose on the Reader's Notes Screen** –The user can choose from three options to the dose on the Reader:
  - **None** – Do not show the measured dose on the Reader
  - **Percent error** – Show the measure dose as a percentage relative to the predicted dose
  - **Absolute dose** – Show the measured dose in cGy

### Changing the Database Connections

The **Database** tab contains the connection information to the Dosimetry Database. Contact your DVS administrator to get the settings for this tab (Figure 31 — Database).



**Figure 31 — Database**

### Backing up and Restoring the DVS Database

To back up or restore the DVS Database, perform the following steps:

1. Click the **DVS Plan and Review** icon on the Desktop or select **Start>Programs>DVS>DVS Plan and Review**. The DVS Main Menu and DVS Login dialog box appears.
2. In the **DVS Login** dialog box, enter the Admin login name and password.
3. Click **OK**. The Main Menu of the DVS Plan and Review Software appears.
4. Click **Administration**.
5. Click the **Database** tab.

6. To back up the database:
  - a. Click **Backup Database**.
  - b. In the **Backup DVS Database** dialog box, select a location to save the backup file.
  - c. Click **Save**. The database backup file is saved using the current date and time in the file name. For example: DVS DB Backup 20Apr2006 15.20.32.bak
  - d. When the database is successfully backed up, a message box appears. Click **OK**.
7. To restore a database:
  - a. Click **Restore Database**.
  - b. In the **Restore DVS Database** dialog box, select the backup file you want to restore. DVS Database files are saved using the current date and time in the file name. For example: DVS DB Backup 20Apr2006 15.20.32.bak
  - c. Click **Open**.
8. Click **Done**.

## 6 USING THE DVS READER

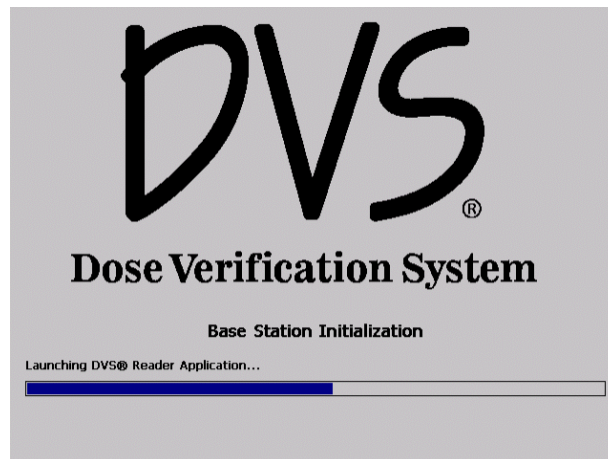
Use the DVS Reader to perform the following tasks:

- Power on the DVS Reader and Power off the Reader
- Log in to the DVS Reader
- Test a Dosimeter
- Select a Patient
- Select a Plan/Fraction
- Take a Pre-Dose Reading
- Take a Post-Dose Reading
- Enter Treatment Notes

In order to use the DVS Reader, the patient, dosimeter, and plan information must have been entered using the Plan and Review Software.

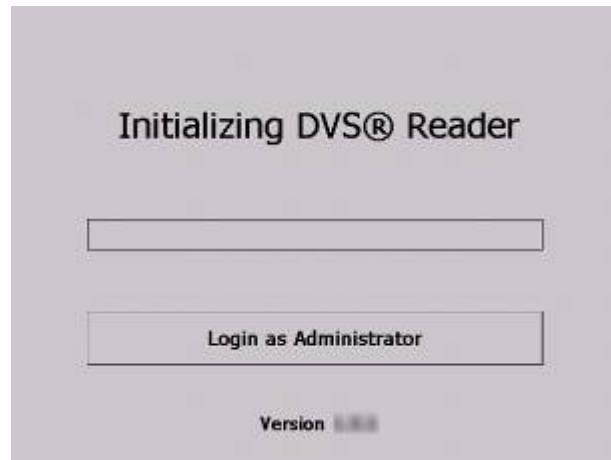
### 6.1 Power On the DVS Reader and Power Off

1. Power on the Reader. The **Power On** screen appears briefly.



**Figure 32 — Power On**

The **Initializing DVS Reader** screen appears indicating that the Reader is starting up (Figure 33 — Initializing DVS Reader).



**Figure 33 — Initializing DVS Reader**

The Reader performs tests to verify the connection to the Dosimetry Database, software compatibility, and that the Reader Wand is functioning.

If you need to set up the DVS Dosimetry Database, you can log in using the **Administrator Login** screen by clicking **Login as Administrator**. You need to get the Administrator password-of-the-day from technical support. All other users should wait until initialization is complete and the **DVS Reader Login** appears.

**Note:** If there are any errors, see *Troubleshooting* for a resolution.

2. To power off the Reader, turn the power switch OFF
3. To remove power from the System, unplug the power cord.

## 6.2 Log in to the DVS Reader

To log in to the DVS Reader, perform the following steps:

1. Select a username from the list (Figure 34 — Reader Login ).





Figure 34 — Reader Login

Tap the **Password** field and a numeric keypad appears.

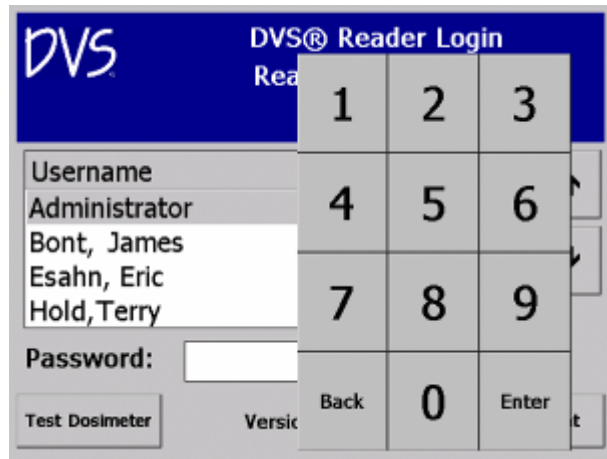


Figure 35 — Keypad

2. Enter the password using the touch-screen keypad and then press **Enter** on the keypad.
3. Choose whether you want to test a dosimeter or scan a patient:
  - Press **Test Dosimeter** to test a dosimeter’s functionality before implantation.

- Press **Scan Patient** to begin the process of reading a patient's dose.

### 6.3 Test a Dosimeter

Dosimeters may be tested prior to implant to assure functionality or to verify dosimeters that have already been implanted. The dosimeter may be tested by either entering the dosimeter's serial number and scanning using the Reader Wand, or by simply scanning using the Reader Wand without entering a serial number.



**Figure 36 — Test Dosimeter**

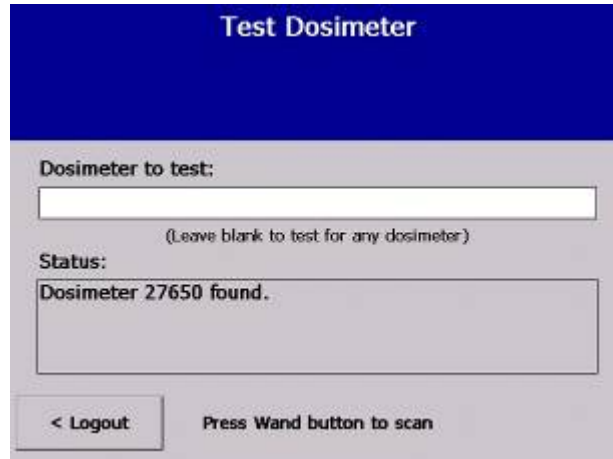
If there are two or more dosimeters in the read range, then you need to enter each dosimeter's serial number one at a time. If you do not enter a dosimeter's serial number, then only one dosimeter is allowed in the read range volume. If there is only one dosimeter in the read range, make sure the **Dosimeter to test** field is blank so the Reader searches for any dosimeter.

- **To read a dosimeter without knowing its serial number,** leave the **Dosimeter to test** field blank (Figure 36 — Test Dosimeter ), then hold the dosimeter near the Reader Wand and press the button on the Reader Wand. The Reader searches for any available dosimeters within the read range.

- **To scan for a specific dosimeter**, tap the **Dosimeter to test** field and a numeric keypad appears. **Enter** the dosimeter number in the field and press Enter. Next, hold the dosimeter near the Reader Wand and press the button on the Reader Wand.

Number 1: If the dosimeter is functional, a message appears indicating that the dosimeter was found. For example:

*Dosimeter 27650 was found.*



**Figure 37 — Dosimeter Found**

Number 2: If the dosimeter could not be read, an error message appears:

*No Dosimeter found.*



The screenshot shows the 'Test Dosimeter' interface. At the top is a blue header with the text 'Test Dosimeter'. Below the header is a text input field labeled 'Dosimeter to test:' with the instruction '(Leave blank to test for any dosimeter)'. Underneath is a 'Status:' section containing a red message: 'No dosimeter found.'. At the bottom left is a '< Logout' button, and at the bottom right is the text 'Press Wand button to scan'.

**Figure 38 — No Dosimeter Found**

Number 3: If the dosimeter is not functional, a message appears:

*Dosimeter xxxxxx found.*

*MOSFET is not functional.*



The screenshot shows the 'Test Dosimeter' interface. At the top is a blue header with the text 'Test Dosimeter'. Below the header is a text input field labeled 'Dosimeter to test:' with the instruction '(Leave blank to test for any dosimeter)'. Underneath is a 'Status:' section containing a red message: 'Dosimeter 27650 found. MOSFET is not functional.'. At the bottom left is a '< Logout' button, and at the bottom right is the text 'Press Wand button to scan'.

**Figure 39 — Dosimeter Not Functional**

When finished testing, press **Logout** and the Reader returns to the **Login Screen**.

## 6.4 Scan a Patient

To scan a patient, log in to the DVS Reader and press **Scan Patient**. The scan patient screens are set up like a wizard. You can move forward and backward through the series of screens by pressing **Next** or **Back**.

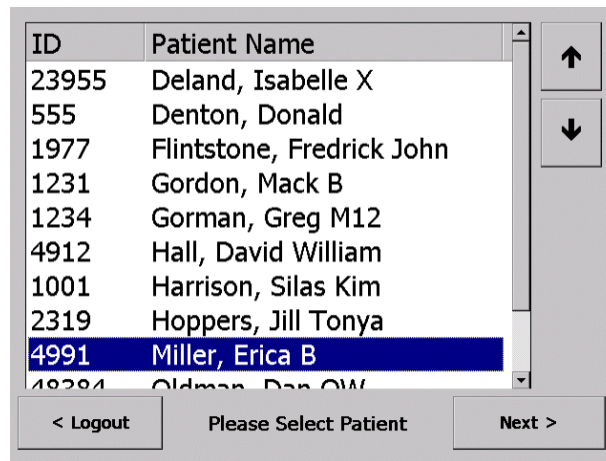
The workflow for scanning a patient is as follows:

- Select a Patient
- Select a Plan/Fraction
- Take a PRE-Dose Reading
- Dose the Patient
- Take a POST-Dose Reading
- Enter Treatment Notes

### Select a Patient

To select a patient:

1. Press **Scan Patient** on the **Login Screen**. The **Select Patient** screen appears (Figure 40 — Select Patient ). Patient names appear in alphabetical order. To find a patient, tap the up and down arrows on the right side of the screen to move between pages of patients.



**Figure 40 — Select Patient**

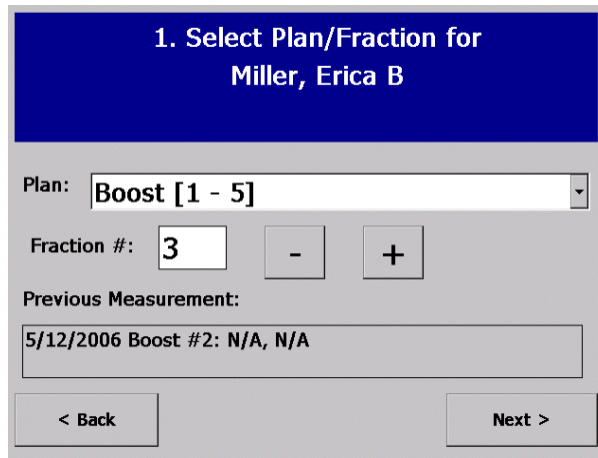
2. Select the patient to be scanned by pressing the patient's name on the touch screen, then press **Next**.

Press **Logout** and the system returns to the **Login Screen**.

### Select a Plan/Fraction

After a patient is selected and the patient data is retrieved from the database, the **Select Plan** screen appears for the selected patient (Figure 41 — Select Plan ).

**Important:** Always verify that the correct patient is being treated by verifying the name at the top of the screen.



1. Select Plan/Fraction for  
Miller, Erica B

Plan: Boost [1 - 5]

Fraction #: 3 - +

Previous Measurement:  
5/12/2006 Boost #2: N/A, N/A

< Back Next >

Figure 41 — Select Plan

The **Select Plan/Fraction** screen displays the current plan, treatment fraction, and previous dose measurements. If more than one plan was set up for the patient, you can select a new plan by tapping the **Plan** pull-down menu and selecting the new plan. If the fraction needs to be changed, press the – button or the + button to decrease or increase the fraction number. You can also tap the **Fraction** field and enter the fraction number using the keypad.

**Note:** You cannot use a fraction that is not part of the patient's plan, use a fraction that has been skipped, or re-use a fraction that already has measurements.

If the selected plan and fraction number is advanced beyond the initial value, then the following message appears:

*Are you sure you wish to add Skip Fraction(s)?*

This is a reminder that one or more skipped fractions will be added to the Dosimetry Database. These skipped fractions serve as markers that measurements were not made for some of the planned fractions. Press the **OK** button to accept the skipped fractions. Press the **Cancel** button to return to the **Select Plan** screen and choose another plan or fraction.

Later, the skipped fractions can be edited using the Plan and Review Software. For information about skipped fractions in the Plan and Review Software, see *Working with Measurement Fractions and Skipped Fractions*.

When the correct plan and fraction are selected, press **Next** to go to the **PRE-Dose** screen.

To cancel the treatment at this point, press **Back** and to return to the **Select Patient** screen where you can press **Logout**.

## Take a PRE-Dose Reading

The **PRE-Dose** screen is used to scan the patient's dosimeters before being treated (Figure 42 — PRE-Dose ). If the plan and fraction are correct, position the Reader Wand next to the patient where the dosimeters are implanted. Press and release the button on the Reader Wand to activate the Reader Wand.

2. PRE-Dose Reading for Miller, Erica B	
Plan: Boost	Fraction: 3
Dosimeter	Status
Tumor bed	
Normal	

< Back      Press Wand button to scan      Next >

**Figure 42 — PRE-Dose**

As the Reader Wand begins scanning for dosimeters, the blue light on the Reader Wand is on and steady, indicating that it is searching for dosimeters. When the Reader Wand detects a dosimeter, the blue and green lights on the Reader Wand will flash briefly. On the **PRE-Dose** screen, the following message appears next to each dosimeter as it is read:

*Scanning...XX%*

where *XX%* is the percentage of the data from the dosimeter that has been read.

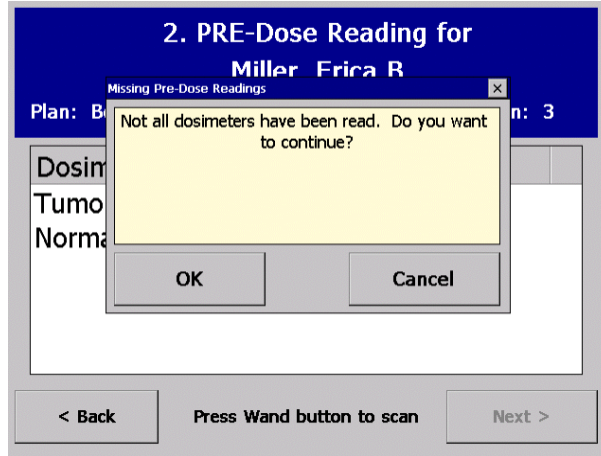
When each dosimeter has been completely read, the **Status** for the dosimeter changes to *Complete*. When all of the dosimeters have been found, the light on the Reader Wand stops blinking. Press **Next** to go on to **POST-Dose** screen.

#### **All Dosimeters Not Read**

If all dosimeters were not read during the pre-dose operation, the following message appears:

*Not all dosimeters have been read. Do you want to continue?*





**Figure 43 — Dosimeters Not Read**

Press **OK** to skip the dosimeters that were not read and go on to **POST-Dose** screen. However, if *no* dosimeters have been read (none are *Complete*), the **Treatment Notes** screen appears instead of the **POST-Dose** screen. Press **Cancel** to cancel the operation and stay on the **PRE-Dose** screen.

#### **Discard Readings**

If you want to discard the readings just made, press **Back** and the following message appears:

*Do you want to discard these Pre-dose readings?*

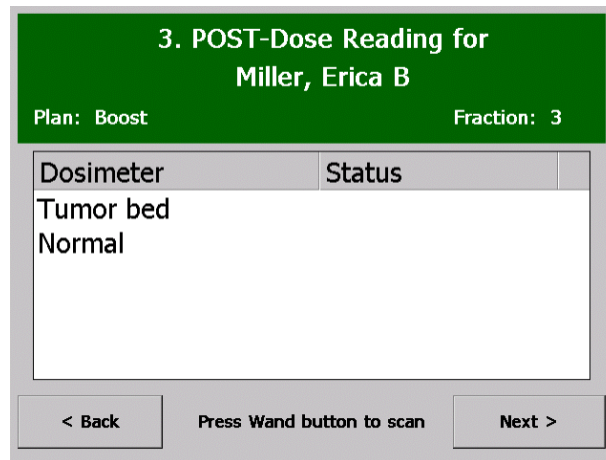
Press **OK** to discard the pre-dose readings and return to the **Select Plan** screen. Press **Cancel** to cancel the operation and stay on the **PRE-Dose** screen.

#### **Dose the Patient**

When the pre-dose operation is complete, the patient is ready for radiotherapy. Treat the patient as usual. Within ten (10) minutes of completing radiation therapy, scan the patient again to obtain a post-dose reading (Optimal post-dose reading is 2.5 minutes following irradiation).

## Take a POST-Dose Reading

The **POST-Dose** screen is used to scan the patient's dosimeters after being treated (Figure 44 — POST-Dose ).



3. POST-Dose Reading for Miller, Erica B	
Plan: Boost	Fraction: 3
Dosimeter	Status
Tumor bed	Normal
<div style="display: flex; justify-content: space-between; align-items: center;"> <span>&lt; Back</span> <span>Press Wand button to scan</span> <span>Next &gt;</span> </div>	

**Figure 44 — POST-Dose**

Position the Reader Wand next to the patient where the dosimeters are implanted. Press the button on the Reader Wand to activate the Reader Wand. As the Reader Wand begins scanning for the dosimeters, the lights on the Reader Wand blink indicating that it is looking for the dosimeters. On the **POST-Dose** screen, the following message appears:

*Scanning...XX%*

When each dosimeter has been completely read, the **Status** for the dosimeter changes to *Complete*. When all of the dosimeters have been found, the light on the Reader Wand stops blinking. Press **Next** to display the **Treatment Notes** screen.

### All Dosimeters Not Read

If all dosimeters were not read during the post-dose operation, the following message appears:

*Not all dosimeters have been read. Do you want to continue?*

Press **OK** to skip the dosimeters that were not read and go on to the **Treatment Notes** screen. Press **Cancel** to cancel the operation and stay on the **POST-Dose** screen.

### Discard Readings

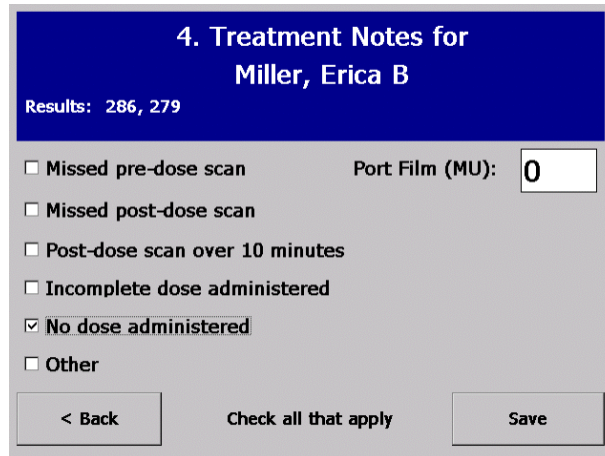
If you want to discard the readings just made, press the **Back** button and the following message appears:

*Do you want to discard these Post-dose readings?*

Press **OK** to discard the post-dose readings and return to the **PRE-Dose** screen. Press **Cancel** to cancel the operation and stay on the **POST-Dose** screen.

### Enter Treatment Notes

Use the **Treatment Notes** screen to record information about the treatment session (Figure 45 — Treatment Notes ).



4. Treatment Notes for  
Miller, Erica B

Results: 286, 279

Missed pre-dose scan      Port Film (MU): 0

Missed post-dose scan

Post-dose scan over 10 minutes

Incomplete dose administered

No dose administered

Other

< Back      Check all that apply      Save

Figure 45 — Treatment Notes

## DVS Dose Verification System

Select any of the check boxes in this screen, or enter the number of monitor units (MU) from a port film that the patient received. To enter the number of monitor units, tap the **Port Film** field to display the keypad. The port film's monitor units will not be incorporated into the calculated daily or cumulative dose.

When you have completed this screen, press **Save**. A dialog box asks if you want to save the results. Press **OK** to save the results, or **Cancel** to stay on the **Treatment Notes** screen.

After the data is saved, the **Select Patient** screen appears again, so you can start scanning the next patient.

## 7 TROUBLESHOOTING

This section provides a list of common issues and error messages and the steps you can take to resolve them.

- Troubleshooting the DVS Server System Software Setup
- DVS Reader not operational
- Unable to obtain a pre-dose or post-dose reading
- DVS Reader error messages
- Plan and Review Software error messages

### 7.1 Troubleshooting the DVS Server System Software Setup

If the window below appears more than two or three times while installing the DVS Dosimetry Database Server, close it and click **Stop** on the **DVS Server System Software Setup** window. Click **Setup Server Components** to restart the setup program. If this problem continues, remove ALL components from system, reboot the computer, and restart the setup program.

### 7.2 DVS Reader Not Operational

Check that the power cord is fully seated in the electrical outlet and in the back of the Reader Base Station.

### 7.3 Unable to Obtain a Pre-Dose or Post-Dose Reading

1. Check that the Reader Wand is connected to the Base Station.
2. Make sure metal objects are clear of the patient and Reader Wand.
3. Re-position the Reader Wand to another area near the implanted Dosimeters.
4. Hold the Reader steady over the area with the implanted Dosimeters.

## 7.4 DVS Reader Error Messages

The error messages displayed by the Reader are listed in this section in alphabetical order.

**Cannot access the Dosimetry Database. Please check connections, or contact your IT Department, then press OK to try again.**

If you encounter this error, perform the following troubleshooting steps:

- Make sure the LAN (local area network) cable is firmly connected to the Reader.
- Make sure that the Windows XP Firewall is turned OFF on the database server computer or create an exception to allow access to the computer over Port 80 (HTTP).
- Make sure the computer with the Dosimetry Database is running and is connected to the LAN.
- Contact the IT Department to make sure they did not change the setup of the Dosimetry Database.

To have the Reader try the operation again, press the **OK** button.

If the problem remains, turn off the Reader then wait 15 seconds and turn it on again. Try the operation again. If the problem remains, contact the local representative for technical support.

**Cannot communicate with the Wand. Please refer to the trouble-shooting guide, and then press OK to try again.**

If you encounter this error, make sure that the Reader Wand's green power-on light is lit. If it is not, then make sure the Wand cable is firmly connected to the back of the Base Station.

To have the Reader try the operation again, press the **OK** button.

If the problem remains, turn off the Reader then wait 15 seconds and turn it on again. Try the operation again. If the problem remains, contact the local representative for technical support.

**The data for this Patient is invalid. Please select another patient.**

This message means that the patient's data was likely changed without using the DVS Software. Contact your DVS Administrator to resolve this problem.

**The Dosimetry Database has changed. Contact technical support.**

This message means that the Dosimetry Database was likely changed without using the DVS Software. Contact the local representative for technical support to resolve this problem.

**The dosimetry database is not compatible with this Reader. Please correct and press OK to try again.**

Verify that all software upgrades needed for the Reader, the Dosimetry Database, and the Plan and Review Software have been implemented. Then press the **OK** button to try this operation again.

**This patient has no more Fractions. Please verify that the Plans are correct.**

This message means that all the planned fractions for this patient have been used. That is, each planned fraction has dosimeter measurement data.

To collect more dosimeter measurements, more fractions must be added to the patient's **Planning Table** (see *Entering Plans*).

**This Plan & Fraction # cannot be found. Please select another.**

This message means that the selected plan and fraction number are not in the patient's **Planning Table**.

You can either select another plan and fraction # that is in the **Planning Table**, or add more fractions to the patient's **Planning Table** (see *Entering Plans*).

**This Plan & Fraction # has already been used. Please select another.**

This message means that the selected plan and fraction number have dosimeter measurement data already.

You can either select another plan and fraction number that is in the **Planning Table**, or add more fractions to the patient's **Planning Table** (see *Entering Plans*).

**Wand field current <current> A is outside the acceptable range. Place the Wand in its Base, then press OK to try again.**

If you encounter this error, perform the following troubleshooting steps:

- Check the connection of the Reader Wand cable to the back of the Base Station.
- Make sure the Reader Wand is not near any metal objects. It is recommended that the Wand is placed in the Base Station during initialization.

To have the Reader try the operation again, press the **OK** button.



If the problem remains, turn off the Reader then wait 15 seconds and turn it on again. Try the operation again. If the problem remains, contact the local representative for technical support.

**Wand not operating properly. Place the Wand in its Base, then press OK to try again.**

If you encounter this error, perform the following troubleshooting steps:

- Check the connection of the Reader Wand cable to the back of the Base Station.
- Make sure the Reader Wand is not near any metal objects. It is recommended that the Reader Wand is placed in the Base Station during initialization.

To have the Reader try the operation again, press the **OK** button.

If the problem remains, turn off the Reader then wait 15 seconds and turn it on again. Try the operation again. If the problem remains, contact the local representative for technical support.

**Wand resonant frequency <freq> kHz is outside the acceptable range. Place the Wand in its Base, then press OK to try again.**

If you encounter this error, perform the following troubleshooting steps:

- Check the connection of the Reader Wand cable to the back of the Base Station.
- Make sure the Reader Wand is not near any metal objects. It is recommended that the Reader Wand is placed in the Base Station during initialization.

To have the Reader try the operation again, press the **OK** button.

If the problem remains, turn off the Reader then wait 15 seconds and turn it on again. Try the operation again. If the problem remains, contact the local representative for technical support.

## 7.5 Plan and Review Software Error Messages

The error messages displayed by the Plan and Review Software are listed in this section in alphabetical order.

### **A Patient cannot have more than 8 Dosimeters.**

The limit on the number of dosimeters assigned to a patient is eight. Delete a dosimeter to add a new one.

### **A Patient cannot have more than 8 plans.**

The limit on the number of plans for a patient is eight. Delete a plan to add a new one.

### **Barcode misread. Please scan the Dosimeter barcode again.**

The verification check of the dosimeter checksum data failed. Try to read the dosimeter's bar code again.

### **Cannot access the database. Do you want to attempt to connect again?**

This message may appear when the Plan and Review Software starts and a connection to the Dosimetry Database cannot be made. To try to connect again, press the **Yes** button. If the problem continues, perform the following steps:

- Make sure the LAN (local area network) cable is firmly connected to the Reader.
- Make sure the computer with the Dosimetry Database is running and is connected to the LAN.

- Contact the IT Department to make sure they did not change the setup of the Dosimetry Database.

To try the operation again, press the **OK** button. If the problem remains, contact your DVS Administrator or the IT Department.

**Cannot access the database. Please check connections, or contact your I.T. Department, then press OK to try again.**

If you encounter this error, perform the following steps:

- Make sure the LAN (local area network) cable is firmly connected to the Reader.
- Make sure the computer with the Dosimetry Database is running and is connected to the LAN.
- Contact the IT Department to make sure they did not change the setup of the Dosimetry Database.

To try the operation again, press the **OK** button. If the problem remains, contact your DVS Administrator or the IT Department.

**Cannot delete a patient with Dosimeter measurements.**

Patients who have dosimeters with measurements cannot be deleted. Instead, open the **Patient Data Entry** window for the patient and clear the **Patient shown on Reader** check box (see *Entering Patient, Dosimeter, and Plan Information*).

**Cannot delete this Dosimeter because it has measurement data.**

Dosimeters with measurements cannot be deleted. Instead, open the Dosimeter Data Entry dialog box for the dosimeter and clear the **Dosimeter used by Reader** check box (see *Entering Dosimeters*).

**Cannot insert a Skipped measurement here.**

A skipped fraction cannot be within two minutes of the most recent fraction. Try to add the skipped fraction between two other fractions in the list.

**Cannot save Database settings to the registry.**

This message means that you do not have permission to write to the registry on the computer. Contact your system administrator to correct this problem.

**Checksum error reading <table>. This data cannot be loaded.**

This message means that the Dosimetry Database was changed without using the DVS Software. Contact your DVS Administrator to resolve this problem.

**In plan '<plan>', the Last fraction # cannot be less than the First fraction #.**

The last fraction number must be greater than or equal to the first fraction number. Make the last fraction number greater to correct this problem.

**Login name <login name> is already assigned to User '<user name>'. Please correct before saving this User's data.**

The **Login name** entered is already used by another person. Enter a different **Login name** for this user.

**More than 100 Patients cannot be shown on the Reader. Please reduce the number of Patients shown on the Reader before adding more Patients.**

At most, 100 patients at a time can be shown on the DVS Reader. The patients shown on the Reader are those with the **Patient shown on Reader** check box selected.

To correct this problem, clear the **Patient shown on Reader** check box for inactive patients.

**Password fields do not match. Please enter Passwords again.**

When setting up a new user, the fields **Password** and **Verify** password must be the same. Type the same password into these two fields again and press **OK**.

**Password must be at least 4 digits long.**

Make sure the user's numeric password is at least four digits and no greater than eight digits.

**Patient number <patient num> is already assigned to patient <patient>. Please correct before saving this patient's data.**

The **Patient number** entered is already used by another patient. Enter a different **Patient number** for this patient.

**Physician number <physician num> is already assigned to Physician '<physician>'. Please correct before saving this Physician's data.**

The **Physician number** entered is already used by another physician. Enter a different **Physician number** for this physician.

**Plan/Fraction '<plan name, fraction #>' is duplicated. Please correct before saving the plans.**

In the **Planning Table**, the displayed plan and fraction # are listed more than once. Remove this duplication from the **Planning Table**.

**The dosimetry database is not compatible with this software.**

Verify that all software upgrades needed for the Reader, the Dosimetry Database, and the Plan and Review Software have been implemented. Then press the **OK** button to try this operation again.

**There are <x> more measurements than planned fractions for this Patient. Please adjust the plans/fractions so that all the measurements will have a planned fraction.**

This message means that there are not enough planned fractions for all the measurements made so far. Each dosimeter measurement needs to have a planned fraction that it is associated with. Adjust the number of fractions in the **Planning Table** to correct this problem.

**There cannot be more than 99 total fractions. Please correct before saving the plans.**

There are more than 99 planned fractions in the **Planning Table**. Reduce the number of fractions to correct this problem.

**There is nothing to view because no measurements have been made from this Patient's Dosimeters.**

The **Fractions & Measurement** window cannot be used until at least one dosimeter measurement has been taken for the patient.

**This Dosimeter is already assigned to patient '<patient name>'. Please use another Dosimeter.**

Each dosimeter can only be assigned to one patient. The dosimeter scanned is already assigned to another patient. Either delete the dosimeter from the other patient or select another dosimeter for this patient.

**This record was updated by someone else during this editing session. Please reload this data and make the changes again.**

This message means that someone else changed the same data (for example, patient or user) that you were editing. Press the **Cancel** button to discard your changes, and then make the changes again.

**Since this patient has either no plans or no dosimeters, he/she will not be shown on the DVS Reader.**

In order to scan a patient's dosimeters using the DVS Reader, there must be both plans and dosimeters assigned to the patient. If one or the other of these is not assigned yet, the patient cannot be used by the Reader. This message is a notice that the Plan and Review Software will clear the **Patient shown on Reader** check box, so the patient will not appear in the Reader's patient list.

**User number <user num> is already assigned to User '<user name>'. Please correct before saving this User's data.**

The user number entered is already being used by another person. Enter a different user number for this person.

## 8 MAINTENANCE AND TECHNICAL SUPPORT

### 8.1 Reader Maintenance

The Reader does not require any routine user maintenance or preventive maintenance for components or the system other than cleaning. Prior to use, inspect the Reader for damage such as frayed power cords or visible damage of external surfaces.

### 8.2 Database Maintenance

Refer to document 934-00553-04 “Archiving the DVS Dosimetry Database”.

### 8.3 Dosimeter Maintenance

**DO NOT SEND DOSIMETERS TO A RE-PROCESSING FACILITY FOR RE-STERILIZATION OR RE-STERILIZE USING A HOSPITAL OR LABORATORY STERILIZER.**

### 8.4 Cleaning the Reader Wand and Reader Base Station

- Turn off all power to the Reader and its components prior to cleaning. If the Reader Wand or Base Station is in direct contact with skin or bodily fluids, clean by wiping the contact surface with a standard isopropyl alcohol-based disinfectant. More frequent cleaning is not required otherwise.



## 8.5 Technical Support and Product Service

For technical support or to request product servicing, contact the local representative or

Sicel Technologies, Inc.  
Telephone: 1-888-DVS-6697 (1-888-387-6697) / Outside the  
US: 1-919-465-2236, ext. 361  
E-mail: [helpdesk@siceltech.com](mailto:helpdesk@siceltech.com)

Sicel Technologies, Inc.  
3800 Gateway Centre Blvd.  
Suite 308  
Morrisville, NC 27560  
USA

## 8.6 Disposal and Recycling



When the product has reached the end of its useful life, contact the local representative for information concerning recycling or disposal per local, state, county, or country directives.

## 9 SPECIFICATIONS

Parameter	Rating
<b>Time to Read Dosimeter</b>	Up to 10 minutes following radiation therapy. Optimal read time is 2 to 3 minutes following irradiation.
<b>Power</b>	110V-240V~, 50-60 Hz 1A @ 120V~, 0.5A @ 240V~
<b>RF Frequency</b> <b>Transmission</b> <b>Effective Radiated Power (ERP)</b>	133 kHz Backscatter modulation 12.1 dBm (16.2mW)
<b>Inputs/Outputs</b>	1-Ethernet port 1-Wand Cable Assembly Connection 1-USB Connection (For Field Service Use Only)
<b>Power Cord – 10ft (3.05m) maximum length</b>	<p>US &amp; Canada – Hospital Grade cordset 10A/120V/60Hz with NEMA 5-15 plug &amp; IEC 60320 C13 connector</p> <p>UK, Ireland, Cyprus, &amp; Malta – International style cable 10A/230V/50Hz with BS 1363 plug &amp; IEC60320 C13 connector</p> <p>France, Spain, Belgium, Czech Republic, &amp; Slovakia – International style cable 10A/230V/50Hz with CEE7/7 plug and IEC 60320 C13 connector</p> <p>Italy – International style cable 10A/230V/50Hz with CEI 23-16/VII plug &amp; IEC60320 C13 connector</p> <p>Denmark – International style cable 10A/230V/50Hz with Afsnit 107-2-D1 plug &amp; IEC 60320 C13 connector</p> <p>Switzerland – International style cable 10A/230V/50Hz with SEV1011 plug &amp; IEC60320 C13 connector</p> <p>Remaining members of the European Union –International style cable 10A/230V/50Hz with CEE7/7 plug &amp; IEC 60320 C13 connector</p> <p>Please contact Technical Support with any questions regarding power cords</p>
<b>Operating Conditions</b>	<p>Temperature: 10°C to 40°C (50°F to 104°F).</p> <p>Humidity at 10% to 95%, non-condensing</p> <p>Pressure: 700 hPa – 1060 hPa</p>

	System not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide
<b>Storage and Transport Conditions</b>	Temperature: -18°C to 55°C Humidity at 10% to 95%, non-condensing Pressure: 700 hPa - 1060 hPa
<b>Fuse</b>	Type T2AL250V ; 5x20mm or 3AG- ¼”X 1 ¼”
<b>Classification</b>	Class I equipment, Type B Applied Part IPX0
<b>Mode of Operation</b>	Continuous Operation



Dose Verification System

Manufactured by: Sixel Technologies®, Inc. 3800 Gateway Centre Blvd, Suite 308 Morrisville, NC 27560  
Toll-free tech support (US): 1-888-DVS-6697 Fax: (919) 465-0153 [www.dvssmartmarker.com](http://www.dvssmartmarker.com)