Integration with DoseControl® Dosimetry Software - User Guide

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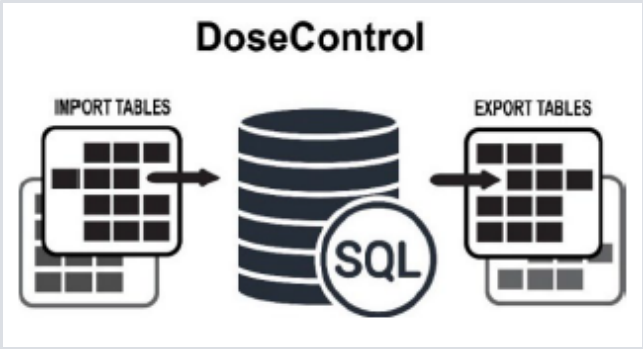
1 DESCRIPTION

This document provides instructions for how to import and export data into DoseControl® software from other systems (ERP, MES, QMS, SAP, NetSuite, PeopleSoft, etc.).

DoseControl software has a built-in structure to simplify and minimize costs to integrate with other systems - the standard Import and Export tables that are separate from the application database. If you upgrade to a newer version of DoseControl software, your integration remains intact.

Use a database professional within your own organization to push data into the SQL import tables and pull data from the SQL export tables.



Some integration examples:

- **Import process and product data into DoseControl software:** Make it easy for the operator to simply click and open the imported dosimetry report and begin measurements. Imported information reduces input errors.
  - Dosimeter IDs that were included in the irradiation process run.
  - Min and max dose specifications and correlation ratios.
  - Process-specific information such as Catalog Number, Product Description, etc.
- **Export process, product, and dosimeter measurement data from the DoseControl software:** Send dosimetry information to other systems for product release processes, process control, process data analysis, and the analysis of dosimetry related metrics.

1.1 Compliance and Validation

GEX has validated the functions of the tables and the population of data into these tables as a standard function of DoseControl. It is up to the user to validate the integration with these tables and the introduction of integrated data into and, if applicable, out of the software. This includes validation that the integrated data is both used and displayed within DoseControl, as applicable.

1.2 Definitions

Dosimeter: A device that, when irradiated, exhibits a quantifiable change in some property of the device that can be related to absorbed dose in a given material using appropriate analytical instrumentation and techniques. Dosimeters are packaged in a pouch, and a pouch may contain 1 dosimeter replicate (dosimeter A), 2 dosimeter replicates (dosimeter A and B), 3 dosimeter replicates (dosimeter A, B and C), or 4 dosimeter replicates.

Dosimeter ID: Unique ID for a dosimeter. DoseControl software enforces the rule that all Dosimeter IDs must be unique in the system.

Absorbance (A): The absorbance value measured by the spectrophotometer. Ao is the original (background) absorbance of an unirradiated dosimeter. Ai is the average Absorbance value for the measured absorbance.

Thickness (T): Dosimeter thickness value.

Response (R) : The Calculated Response value for the dosimeter (Ai – Ao / T) where Ai is the average absorbance of dosimeter replicates A through D. The software calculates Dose from Response.

Dose: A quantity of ionizing radiation energy imparted per unit mass of a specified material. The software calculates dose as Response = f(Dose).

Adjusted Dose: Also called “corrected dose”. The Adjusted Dose is the Dose multiplied by the correction factor of the Calibration. Adjusted Dose = Dose*Correction Factor (if any).

Calibration (of a dosimetry system): The Calibration is the dosimeter batch calibration (dosimetry system calibration), whose calibration curve coefficients are used by the software to calculate Dose. The Calibration is a set of operations that establish, under specified conditions, the relationship between values of quantities indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material, and the corresponding values realized by (dose) standards.

Calibration curve: Mathematical expression of the relation between dosimeter response and corresponding value of dose certified traceable to a national or international standard dose. The Calibration configuration stored in DoseControl software has a unique name and ID and has curve coefficients used to calculate the Dose for the specific dosimeter ID.

Correction Factor: A correction factor is used to make a linear correction factor for the Adjusted Dose calculation. Correction factor is typically not used and is a “1”. The Calibration configuration contains the Correction Factor field value.

Pathway (Irradiation Pathway): A “pathway” is the client’s facility, irradiator, or pathway within a given irradiator.

Batch (Dosimeter Batch): The dosimeter “batch” refers to a specific dosimeter film batch produced by the manufacturer. The batch has a consistent thickness and quality. GEX B3 dosimeters are identified by a 2 letter ID, for example batch ‘EA’ or ‘EB’.

Instrument: Refers to the spectrophotometer or reader used to measure dosimeter absorbance.

Report: Dosimetry report. Dosimeters are measured into a dosimetry report. The report contains information for the measurement session, such as the Calibration, Pathway, Batch, instrument (reader), etc. used to make the dosimeter measurements in the report. The report may have header fields with information specific to the client’s irradiation process. These fields are set up by the client and are specific their dosimetry process, such as process ID, process date/time, customer name, product name, process specification information, etc.

2 GENERAL INSTRUCTIONS

2.1 Before You Begin

The process of integrating with other systems will require the user to populate the DoseControl import tables with data from those systems. GEX has provided some suggested SQL scripts snippets, but customers may use any SQL methods they have experience with for extracting, transforming, transferring and loading data. To date, we have customers integrating with other SQL-based systems as well as Oracle-based systems. You may need some help and guidance along the way. Keep in mind that GEX is not in the custom integration business. However, we can and will try our best to answer questions. We simply encourage this discussion well in advance of the need for assistance as we cannot predict our response times for initial configuration issues.

2.2 Turning on this Feature in DoseControl

2.2.1 Enterprise License

2.2.1.1 Integration with DoseControl requires a specific module to be installed as part of your DoseControl Enterprise license.

2.2.2 Setup "GEX Client Repository"

2.2.2.1 Login to DoseControl with global admin or System Admin user access. Go to the System (hammer/wrench icon) screen and expand the Application Settings.

2.2.2.2 Click the Integration Service[1] dropdown and select “GEX Client Repository” option. This will activate the Import/Export tables and allow you to integrate. See *Figure 1*.

2.2.2.3 Do not enter a connection string in the ‘Connection String’ field unless you are instructed by GEX. Leave the field blank.

[1] In versions earlier than DoseControl v 2.0.0, Integration Service is called “Client Report Service”.

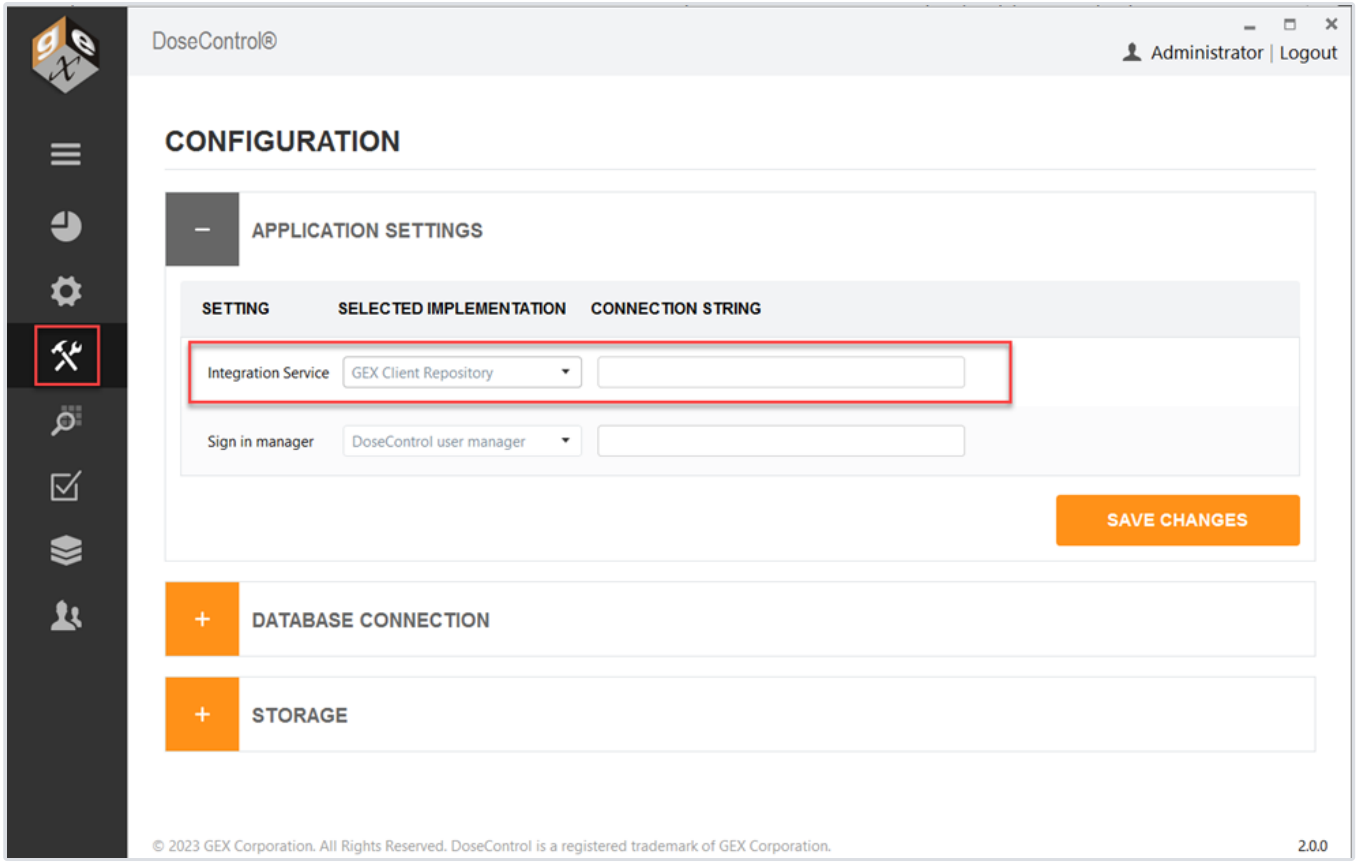


Figure 1

2.3 DoseControl software setup

2.3.1 **Use the EXTERNAL ID fields**

2.3.1.1 Importing reports uses the EXTERNAL ID field values in DoseControl - See *Figures 2, 3 and 4 below*. For details about importing reports, see Section 3.3 Import Process.

2.3.1.2 Login to DoseControl as the global admin or Application Administrator. Go to the Setup (sprocket icon) screen. Setup all areas and ensure that the item's ID, Identifier or Name matches the EXTERNAL ID for all configurations in DoseControl software - See *Figures 2 and 3.*

2.3.2 **Setup the Pathway, Batch and Report Type as the "default"**

2.3.2.1 DoseControl uses the active "default" Pathway, Batch and Report Type for importing reports - See *Figures 2, 3 and 4 below*. Example: If your integration processes use Pathway=Production Loop, Batch=EA, and Report Type=Production Report v2, these items must be active and the default in the software.

2.3.3 **Setup the Report Type header fields as "Is Editable"**

2.3.3.1 In the Report Type configuration for each report header field, check the box titled "Is Editable". See *Figure 4.*

2.3.3.2 Avoid import errors by ensuring "Is Editable" value is checked for each required report header field. See Report Types setup screenshots below. There is no supported way of removing a report from DoseControl or re-importing it - (see section 3.4.3 Import Errors).

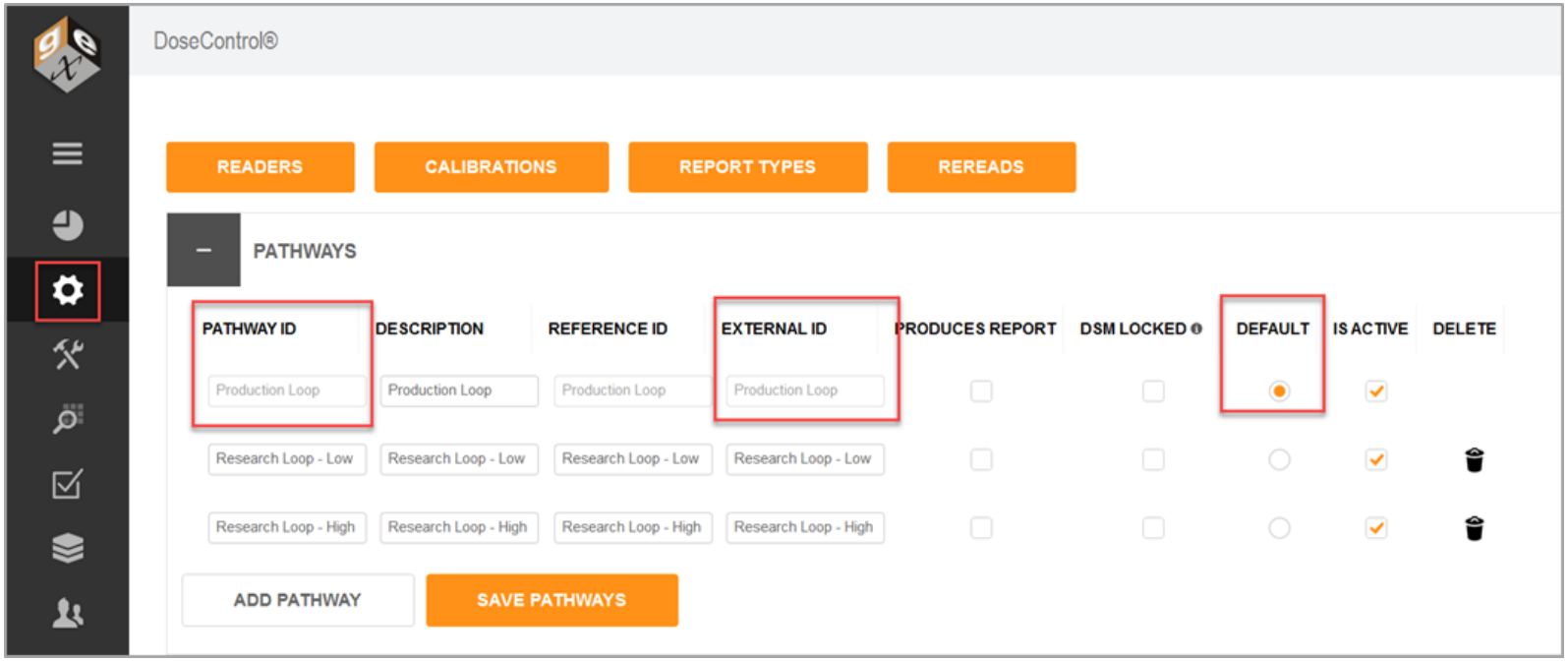


Figure 2: Pathways setup. Pathway ID matches EXTERNAL ID. Pathway is the "default"

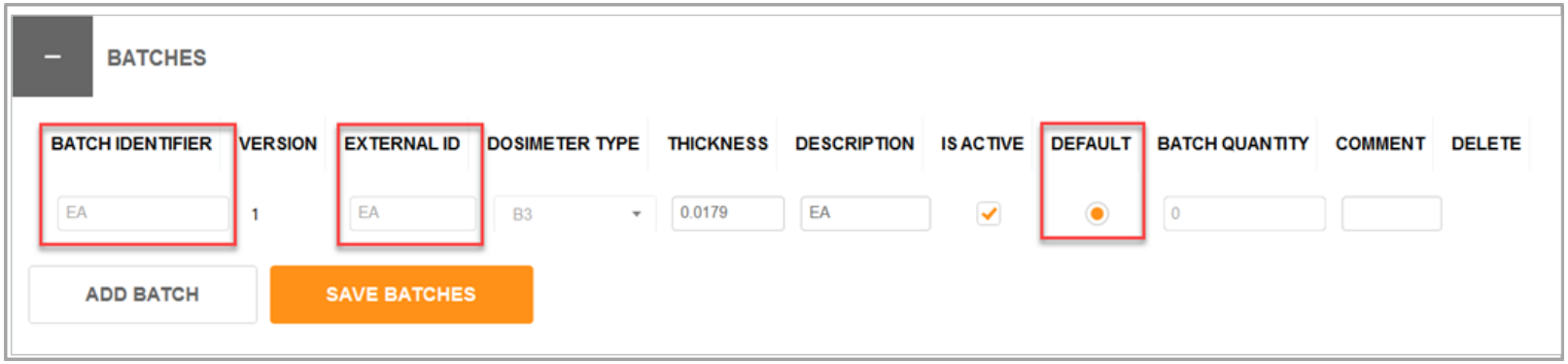


Figure 3: Batches setup. Batch Identifier matches EXTERNAL ID. Batch is the "default"

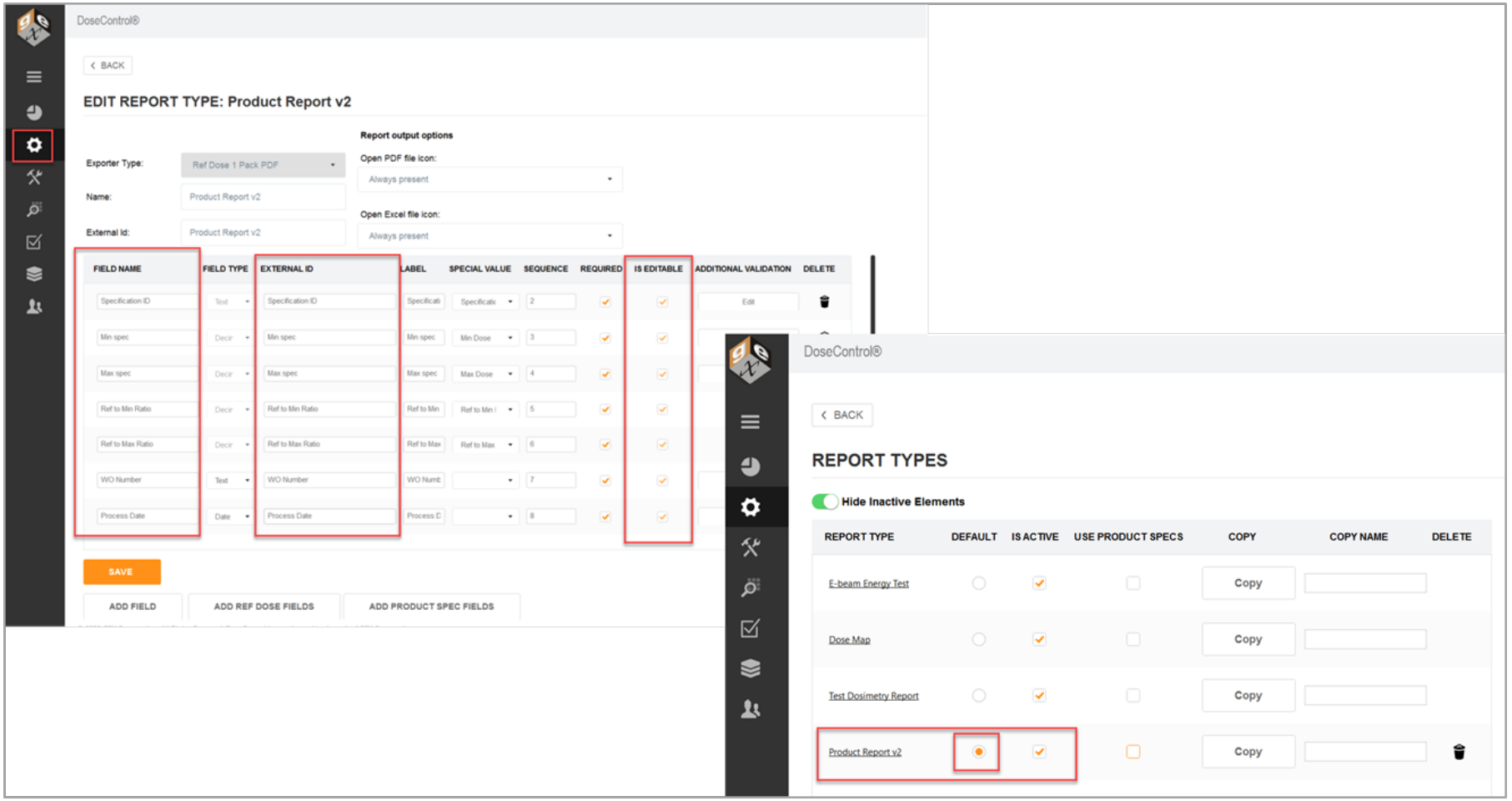


Figure 4: Report Types setup (top image – report header fields match EXTERNAL ID, all fields marked "Is Editable" checkbox; lower image – Report Type is default

3 DATA IMPORT

3.1 Description of Import Tables

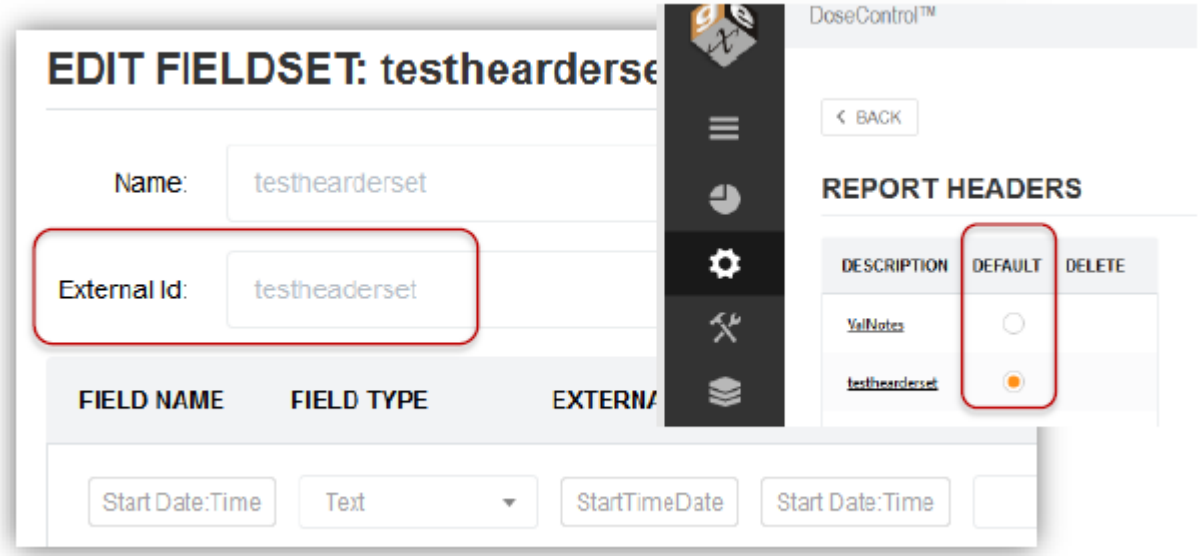
There are three (3) tables that are used for importing data into DoseControl and they are named:

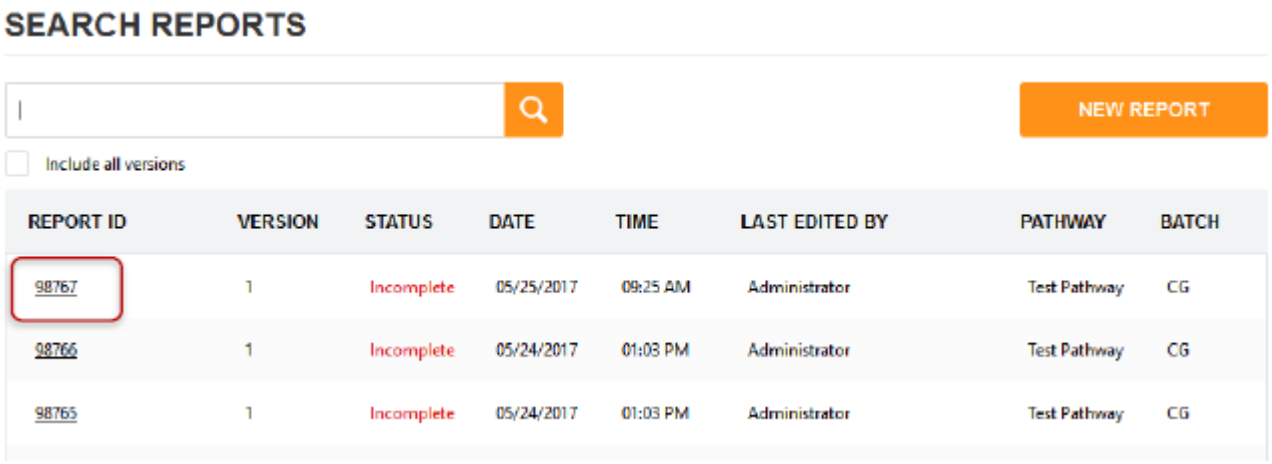
- **ImportReports**
  - This table is populated with data that tells DoseControl the key information needed to select a report type and dosimeter calibration to initiate a report with imported data. It is the equivalent to the create new reports screen.
- **ImportReadings**
  - This table will be populated with the direct dosimeter information such as ID and position.
- **ImportReportHeaderFieldValues**
  - This table must be populated with all product and process information that is required to be on-screen within any output that DoseControl produces (PDF, etc.).

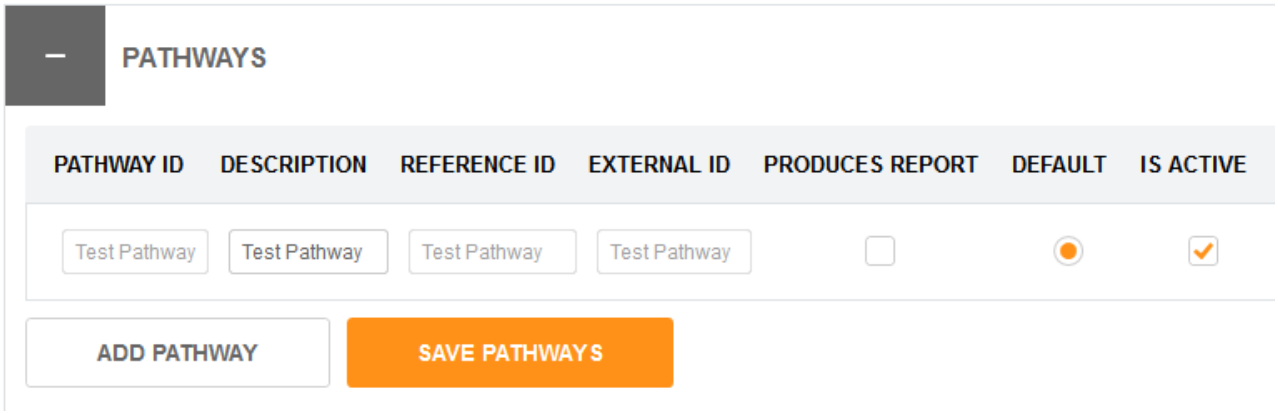
3.2 Design Specification - Import Tables

Table name *dbo.ImportReports*

Column Name	Data Type	Notes
Id	bigint	A database-generated unique ID.
CreatedDate	datetime	Allows to specify when the report was created. It is used for ordering reports before they are imported and is not displayed in the application.

Column Name	Data Type	Notes
HeaderSetIdentifier	nvarchar (110)	Specifies the header set that the newly imported report should use. The value inserted in this column must be identical with the EXTERNAL ID field in 'Report Headers' configuration in DoseControl (see image below). If the value is not provided the default header set will be used. 

Column Name	Data Type	Notes
ReportIdentifier	nvarchar(440)	**Report ID. Each Report ID must be unique in the software.** This value will be used as the key identifier of the report for users to select the DoseControl home screen; must be unique – duplicates will be treated as the same report. If you have a 'process run ID' that is the perfect value to insert here as the 'ReportIdentifier'. 

Column Name	Data Type	Notes
IrradiationPathwayId	nvarchar(440)	Pathway ID. Specifies the irradiation pathway the imported report should use. The value inserted in this column must be identical with the EXTERNAL ID field in 'Pathways' configuration in DoseControl (see image below). If no value is provided the default pathway will be used; use a static value in scripts to populate this column if the value is not part of your run data set. 

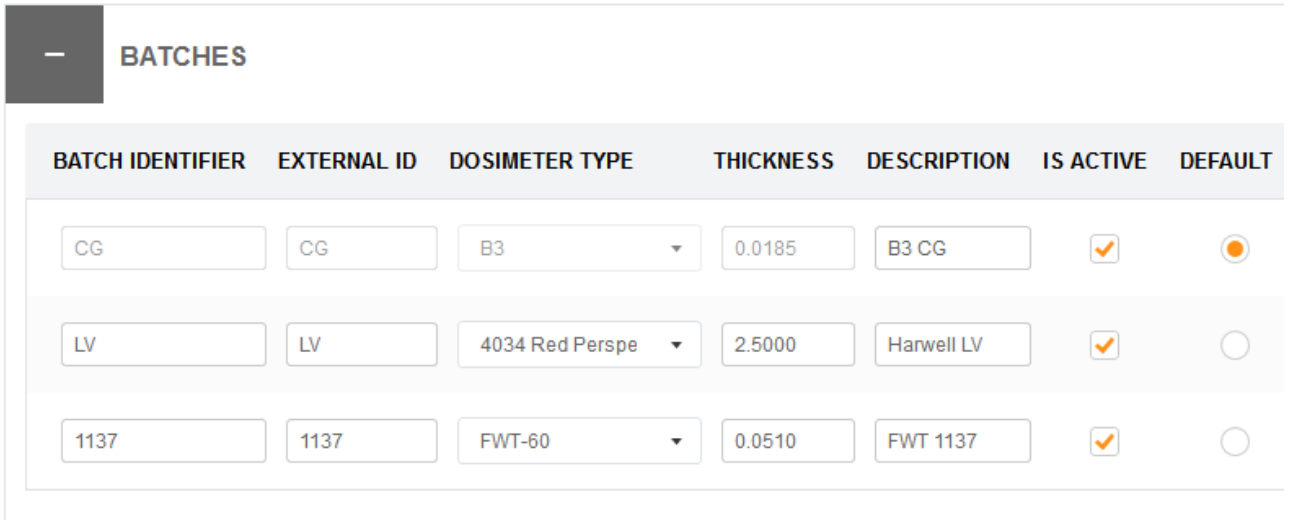
Column Name	Data Type	Notes
BatchIdentifier	nvarchar(440)	Specifies the batch the imported report should use. The value inserted in this column must be identical with the EXTERNAL ID field in 'Batches' configuration in DoseControl (see image below). If no value is provided the default batch will be used; use a static value in scripts to populate this column if the value is not part of your run data set. 

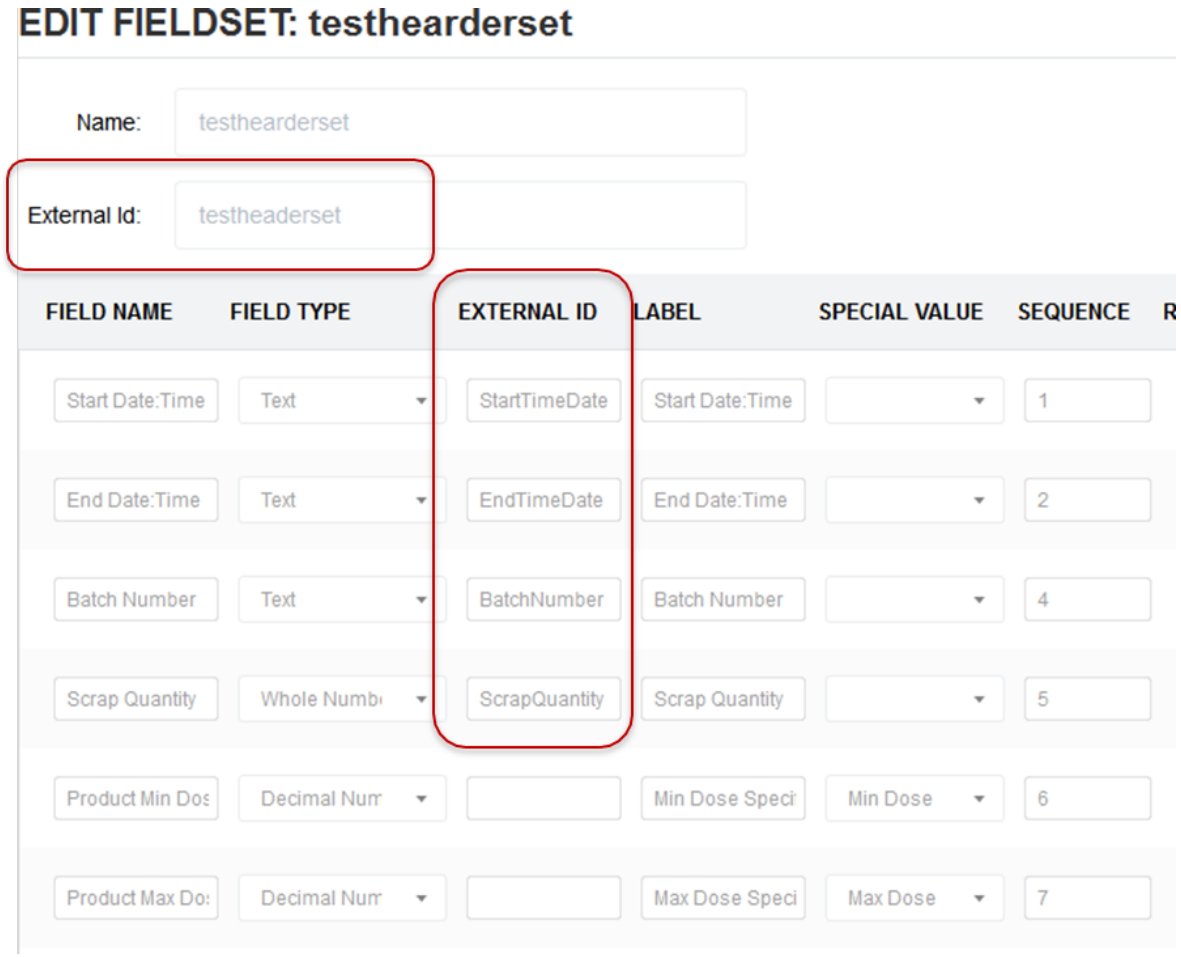
Table name *dbo.ImportReadings*

Column Name	Data Type	Notes
Id	bigint	Database-generated unique ID.
ImportReportId	bigint	The ID column value from the ImportReport table to which the reading belongs.

Column Name	Data Type	Notes
DosimeterIdentifier	nvarchar(max)	**Unique Dosimeter ID.** Value to identify the dosimeter packet (packet may contain more than one dosimeter); needs to be unique; can be a barcode value or any value used to uniquely identify each dosimeter processed through the irradiation system.
Position	nvarchar(max)	**Position identifier**; optional; identifies the position of the dosimeter in the 'tote' identified in 'ToteIdentifier' below.
ToteIdentifier	nvarchar(max)	**Tote identifier**; optional; may be a carrier, tray, etc., or it may be an identifier of a unique fixture used as the routine monitoring position.
Sequence	int	Value is used in determining the order of the readings inside of the report; optional; if no value is provided the database order will be used to sequence the DosimeterIdentifiers within DoseControl .

Table name *dbo.ImportReportHeaderFieldValues*

Column Name	Data Type	Notes
Id	bigint	Database-generated unique ID.
ImportReportId	bigint	The ID column value from the ImportReport table to which the header field belongs.

Column Name	Data Type	Notes
FieldIdentifier	nvarchar(200)	A name used for identification of the field and is not the value from the run data. The value inserted in this column must be identical with the EXTERNAL ID field in the Header Set configured in 'Report Headers' and must match the report's HeaderSetIdentifier in the ImportReports table. In case no matching field is found, the field will be skipped, and no error will be returned. 

Column Name	Data Type	Notes
Value	nvarchar(max)	The value assigned to a given field upon import. For example, if the Field Name is 'Product Description' then the value would be the actual description (e.g., "5mL Syringe 100pk").

3.3 Import Process

Import tables serve as a queue for the reports to be imported from the application. Once a report is imported from the application it cannot be

3.3.1 Ensure DoseControl is ready

3.3.1.1 See *Section 2.2 Turn on integration feature in DoseControl*, and *Section 2.3 Setup DoseControl software*.

3.3.2 Use a Single Transaction per Report

Each Report contains information from each of the three 3 Import tables (ImportReport, ImportReadings, ImportReportHeaderFieldValues) listed in section 3.2. GEX strongly suggests that you use one transaction to fill all three Import tables for each Report.

If you do not use a single transaction for each Report, a partial report import could occur causing errors. See section 3.4 Import Errors.

See *Figure 5* below for an example of the code used for a single transaction.

> ***IMPORTANT*! –** *Your code will be different than the example below based on INSERT statements needed for your specific data sets.*

```
USE [GEXApp]
GO

SET XACT_ABORT ON
BEGIN TRANSACTION;
    -- insert report
    DECLARE @importReportid BIGINT
    INSERT [dbo].[ImportReports] ([ReportIdentifier], [IrradiationPathwayId], [BatchIdentifier], [HeaderSetIdentifier],
[CreatedDate]) VALUES (N'ABD', N'S8', N'CA', N'8B5E5B74-AEB9-4D36-9190-FB45F020DCE7', CAST(N'2017-01-01T00:00:00.000' AS datetime))
    set @importReportid = SCOPE_IDENTITY()
    --insert readings
    INSERT [dbo].[ImportReadings] ([ImportReportId], [DosimeterIdentifier], [Position], [ToteIdentifier], [Sequence]) VALUES
(@importReportid, N'ABC123', N'1', N'1', 1)
    INSERT [dbo].[ImportReadings] ([ImportReportId], [DosimeterIdentifier], [Position], [ToteIdentifier], [Sequence]) VALUES
(@importReportid, N'ABC124', N'2', N'2', NULL, 2)
    --insert header fields
    INSERT [dbo].[ImportReportHeaderFieldValues] ([ImportReportId], [FieldIdentifier], [Value]) VALUES (@importReportid,
N'ProductDescription', N'Some description')
    INSERT [dbo].[ImportReportHeaderFieldValues] ([ImportReportId], [FieldIdentifier], [Value]) VALUES (@importReportid,
N'TimerSetting', N'')
COMMIT
SET XACT_ABORT OFF
```

Figure 5: Example script – the script writes data into the 3 Import tables (ImportReport, ImportReadings, ImportReportHeaderFieldValues) in a single transaction.

3.3.3 The Report appears in the reports lists on the main screen

3.3.3.1 The DoseControl home screen lists the reports to be imported with a **status=New**. Until the report is imported, its status will be displayed as '**New**' and no additional information (Date, Time, Edited By, Pathway, Batch) will be available. See *Figure 6*.

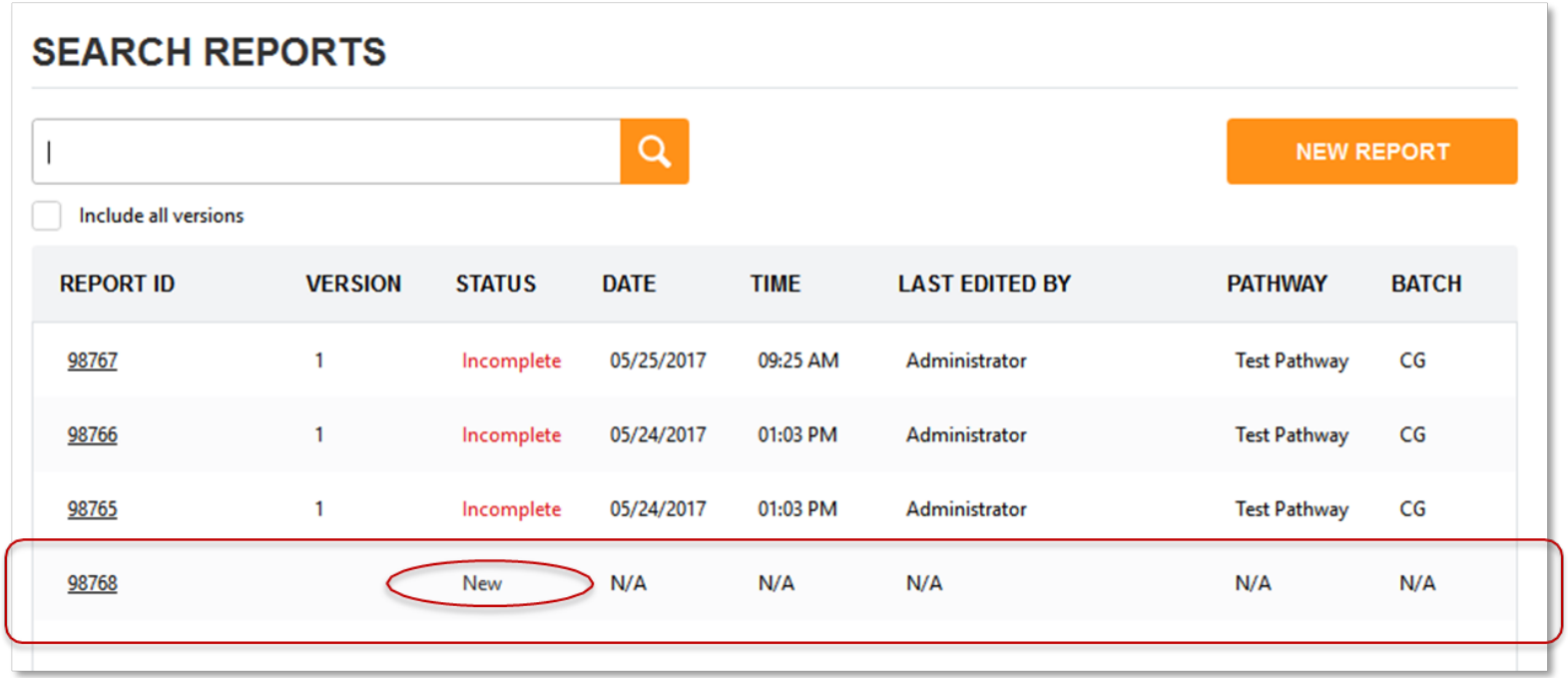


Figure 6

3.3.3.2 The user must click the Report ID to import this report, and this action brings the Report information from the Import tables to the main application database. Once imported, the report will change its status to '***Incomplete***'. The Date and Time display when the report import occurred, Last Edited by is the user that imported the report, and the Pathway and Batch are associated with the report. See *Figure 7*.

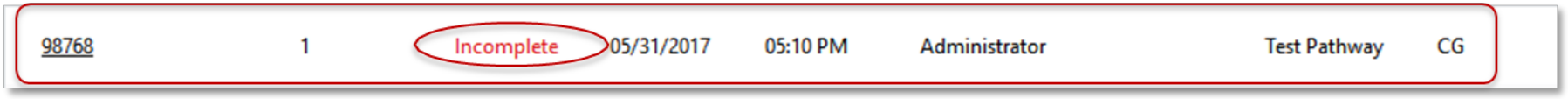
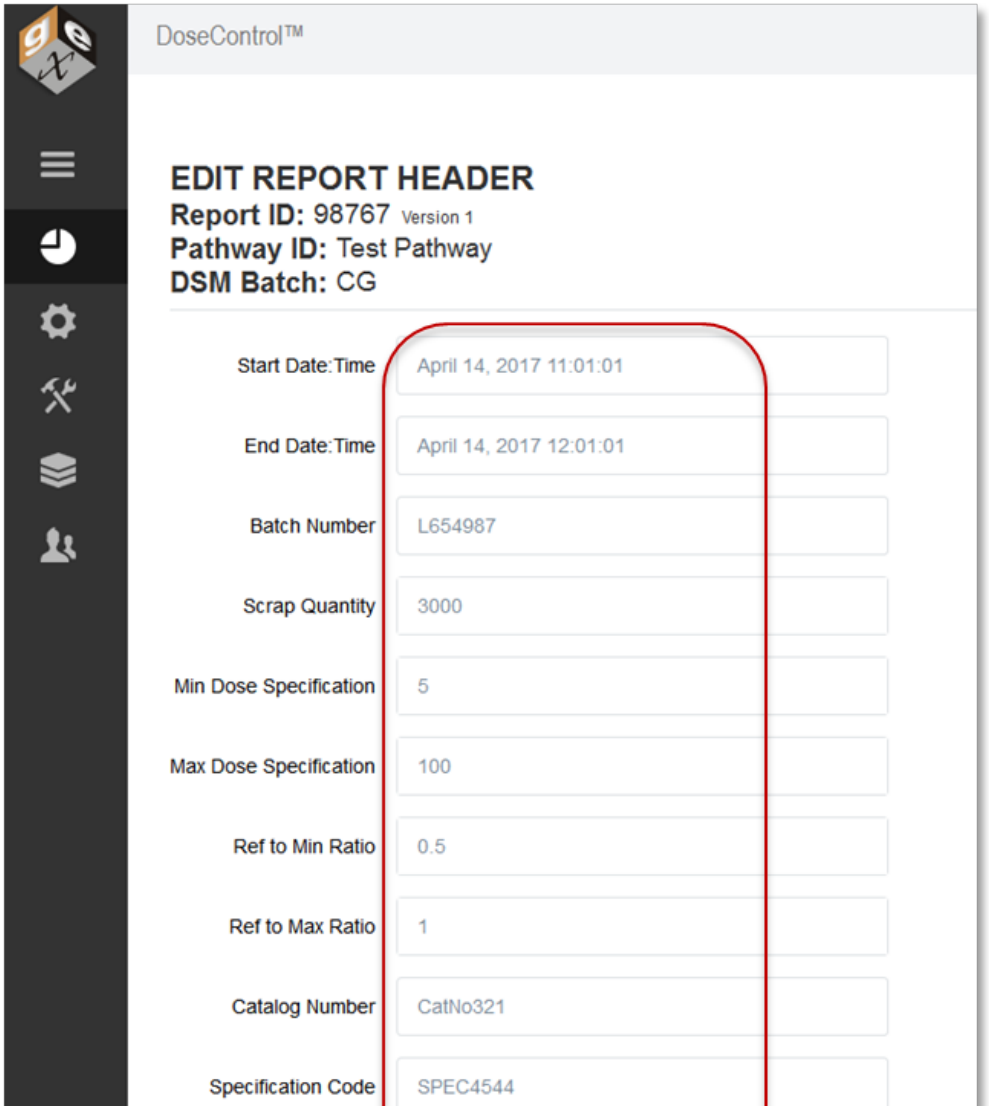


Figure 7

3.3.3.3 The user can click the Report ID to open the report. The software will display all the report header fields (the header fields where the value was provided in the import table will be filled in, while any other header fields will remain empty). See *Figure 8*.



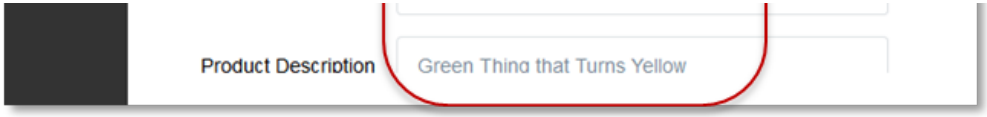


Figure 8: Example imported report's header field values

3.3.4 Managing the Import Table Data

You must manage the data in the import tables.

The records in the Import tables are not managed by DoseControl (or GEX) in any way. Once a report has been imported into DoseControl, its original records remain in the import tables but can be safely removed. The import table records will not be referenced or used in any way after they are imported into DoseControl.

3.4 Import Errors

3.4.1 Duplicate Dosimeter IDs

DoseControl requires Dosimeter IDs to be globally unique in the system. DoseControl software will not allow duplicate dosimeter IDs. If a user attempts to import (open) a newly imported report that contains duplicate dosimeter IDs, the user will be required to change the Dosimeter ID within the application using the screen below before proceeding - see *Figures 9 and 10*.

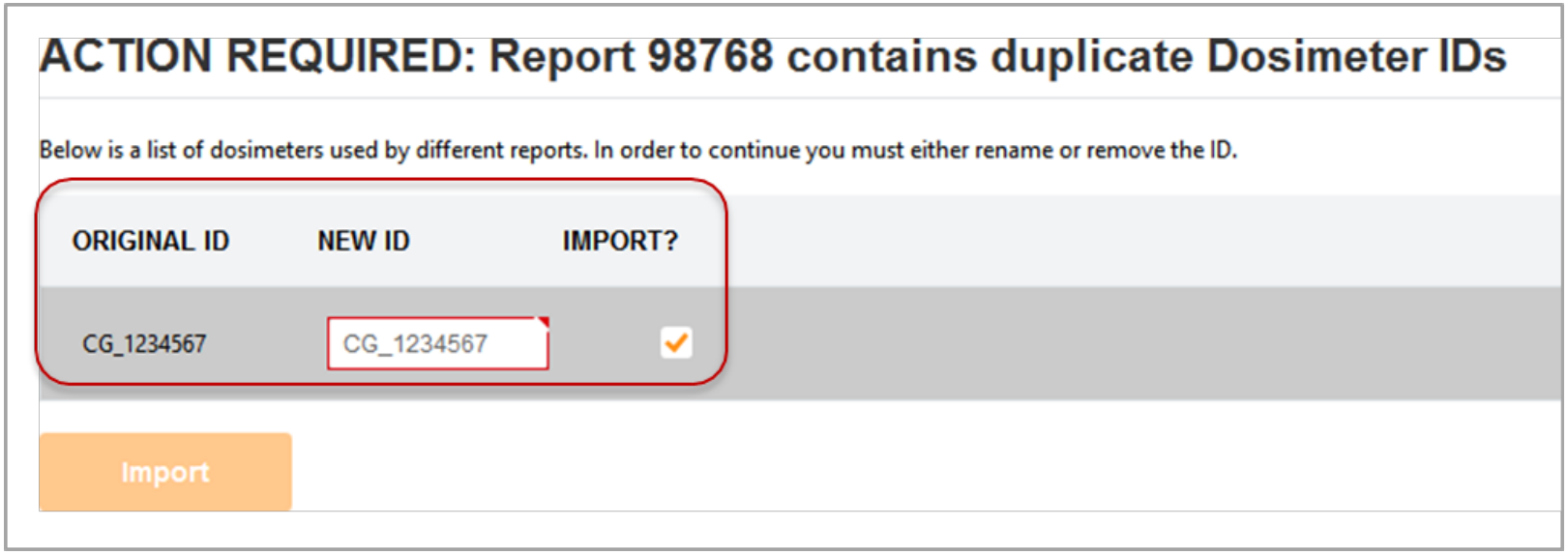


Figure 9: Action Required prior to import of Report. Use can choose to change the dosimeter ID or not import the dosimeter.

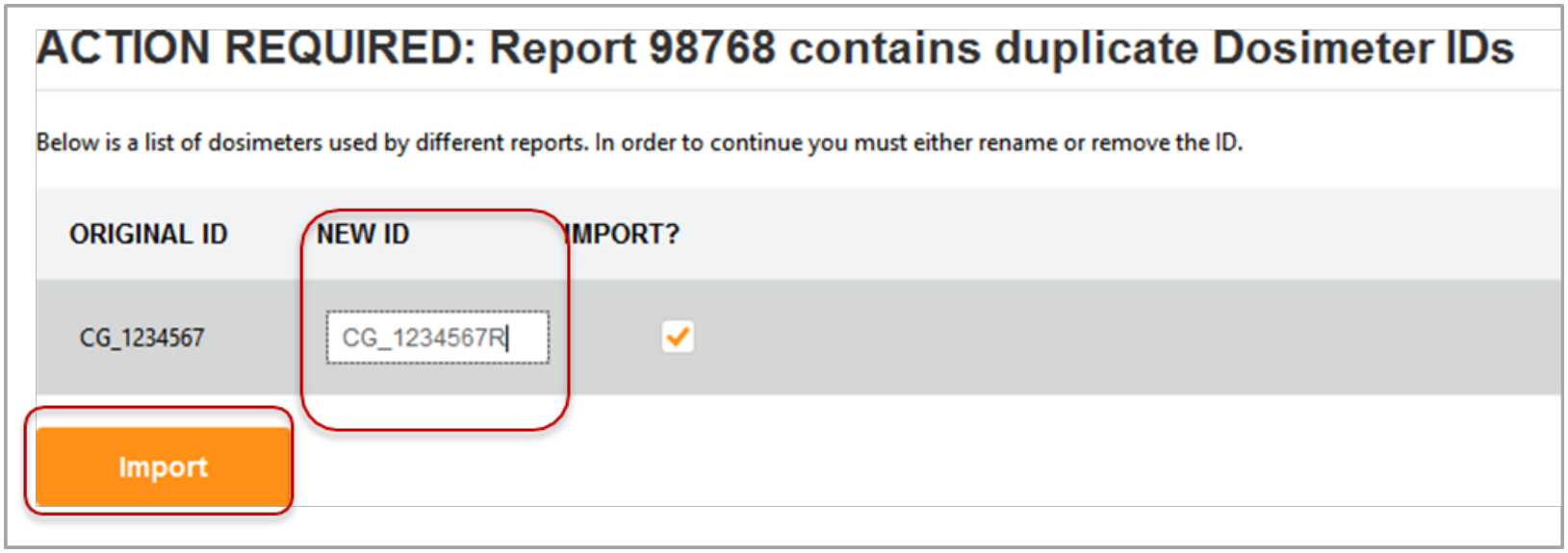


Figure 10: User changes the dosimeter ID to a unique ID and is allowed to proceed importing the report

3.4.2 Wrong Batch/Pathway/Headerset

If a Batch, Pathway, or the Report Type (report header set) specified to DoseControl in the ImportReports table does not exist in the software dosimetry configuration, or is inactive in the software, or is not the “default” in the software, an error message will be displayed. See *Figure 11*.

This error can also occur if the application has not been configured yet by the administrator. See Section 3.3.1 Ensure DoseControl is Ready.

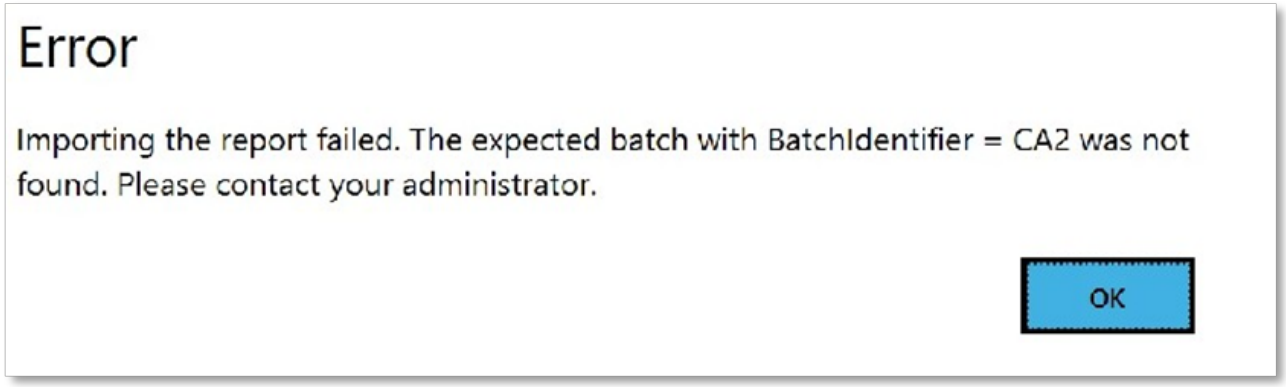


Figure 11

3.4.3 Imported Report Missing Necessary Values

If you make a report header field “Required” you also should make this field “Editable”. In the Report Types configuration, for each report header field, click the box titled “Is Editable”. Ensure this value is checked to allow the routine user to edit the imported values or fill them the report fields if they are imported as empty.

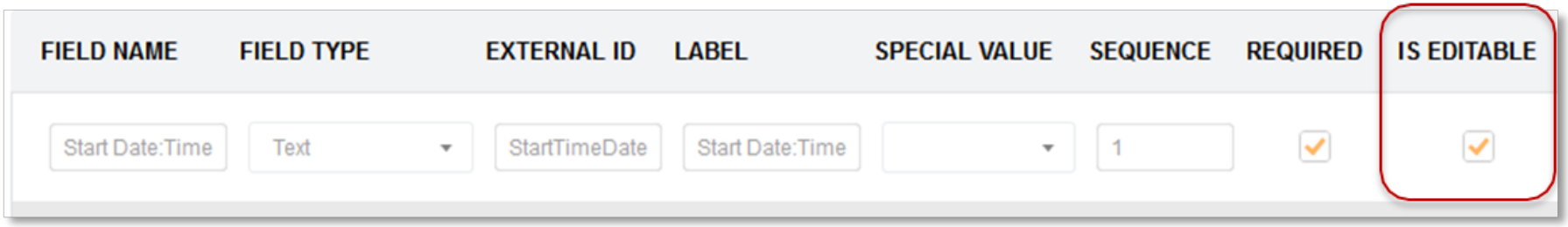


Figure 12: Ensure ‘Is Editable’ box is checked for the report header field.

> ⚠ ***IMPORTANT! There is no supported way of removing a report from DoseControl or re-importing it.*** *If you do not allow fields to be editable, a report experiencing this problem will not ever be allowed to be processed and will become an eternally incomplete record. We suggest creating another report with the same Report ID suffixed with a sequence number, and then manually import or send the data again on import with the suffixed ID.*

3.4.4 Date Time values must be in valid regional format

Imported report header field date and time values must be in a valid format for the importing system (the importing PC's regional settings).

For example, if these values are created on an English-US computer (10/26/2017 1:14:29 PM for example) and then imported on a computer that formats dates and times differently, say English-Austria that uses DD/MM/YYYY, then the import will fail.

3.5 Practical Example - Import

Below are examples of data in the import tables:

Table name dbo.ImportReports

GEX-LT09\SQLEXPR...bo.ImportReadings | GEX-LT09\SQLEXPR...dbo.ImportReports | GEX-LT09\SQLEXPRE...HeaderFieldValues

	Id	ReportIdentifier	IrradiationPath...	BatchIdentifier	HeaderSetIden...	CreatedDate
▶	2	98765	NULL	NULL	NULL	2017-04-12 15:37:17.710
	11	98766	NULL	NULL	NULL	2017-04-13 15:37:17.710
	12	98767	NULL	NULL	NULL	2017-04-14 15:37:17.710
	13	98768	NULL	NULL	NULL	2017-04-15 15:37:17.710
*	NULL	NULL	NULL	NULL	NULL	NULL

Figure 13: ImportReports table example

Table name dbo.ImportReadings

GEX-LT09\SQLEXPR...bo.ImportReadings | GEX-LT09\SQLEXPR...dbo.ImportReports | GEX-LT09\SQLEXPRE...HeaderFieldValues

Id	ImportReportId	DosimeterIden...	Position	ToteIdentifier	Sequence
1	2	CG_1234567	Ref	10	NULL
3	2	CG_1234568	Ref	20	NULL
4	2	CG_1234569	Ref	30	NULL
5	11	CG_1234570	Ref	42	NULL
6	11	CG_1234571	Ref	52	NULL
7	11	CG_1234572	Ref	62	NULL
8	12	CG_1234575	Ref	8	NULL
9	12	CG_1234576	Ref	15	NULL
10	13	CG_1234577	Ref	16	NULL
11	13	CG_1234578	Ref	26	NULL
12	13	CG_1234579	Ref	36	NULL
13	13	CG_1234567	Ref	40	NULL
NULL	NULL	NULL	NULL	NULL	NULL

Figure 14: ImportReadings table example

Table name dbo.ImportHeaderFieldValues

GEX-LT09\SQLEXPR...bo.ImportReadings | GEX-LT09\SQLEXPR...dbo.ImportReports | GEX-LT09\SQLEXPRE...HeaderFieldValues

Id	ImportReportId	FieldIdentifier	Value
1	2	CatalogNumber	CatNo123456
2	2	StartTimeDate	April 12, 2017 12:01:01
3	2	EndTimeDate	April 12, 2017 13:01:01

	4	2	BatchNumber	Q1234567
	5	2	ScrapQuantity	0
	6	2	QuantityReceived	10000
	7	2	QuantityUnloaded	10000
	9	2	ProductDescripti...	Very Neat Device that Some Guy Invented and We Manufacture
	10	11	CatalogNumber	CatNo9999
	11	11	StartTimeDate	April 13, 2017 12:01:01
	12	11	EndTimeDate	April 13, 2017 14:01:01
	13	11	BatchNumber	Q33443344
	14	11	ScrapQuantity	1000
	15	11	QuantityReceived	300000
	17	11	QuantityUnloaded	299000
	18	11	ProductDescripti...	Very Different Device boxed for International
	19	12	CatalogNumber	CatNo321
	20	12	StartTimeDate	April 14, 2017 11:01:01
	21	12	EndTimeDate	April 14, 2017 12:01:01
	22	12	BatchNumber	L654987
	23	12	ScrapQuantity	3000
	24	12	QuantityReceived	30000
	25	12	QuantityUnloaded	27000
	26	12	ProductDescripti...	Green Thing that Turns Yellow
	27	13	CatalogNumber	CatNo123456
	32	13	StartDateTime	April 15, 2017 10:01:01
	36	13	EndDateTime	April 15, 2017 12:01:01
	37	13	BatchNumber	Q1234568
	38	13	ScrapQuantity	0
	39	13	QuantityReceived	200000
	40	13	QuantityUnloaded	200000
*	41	13	ProductDescripti...	Very Neat Device that Some Guy Invented and We Manufactured

Figure 15: ImportHeaderFieldValues table example

Below is an example of the Report Type configuration and Product Specification configuration for the import data, as structured in the table above:

FIELD NAME	FIELD TYPE	EXTERNAL ID	LABEL	SPECIAL VALUE	SEQUENCE
Catalog Number	Text	CatalogNumber	Catalog Number	Catalog Number	1
Product Description	Text	ProductDescription	Product Description	*NULL*	2
Batch Number	Text	BatchNumber	Batch Number	*NULL*	3
Quantity Received	Whole Number	Quantity Received	Quantity Received	*NULL*	4
Scrap Quantity	Whole Number	ScrapQuantity	Scrap Quantity	*NULL*	5
Quantity Unloaded	Whole Number	Quantity Unloaded	Quantity Unloaded	*NULL*	6
StartDate:Time	Date	StartTimeDate	StartDate:Time	*NULL*	7
EndDate:Time	Date	EndTimeDate	EndDate:Time	*NULL*	8
Specification Code	Text	*NULL*	Specification Code	Specification Id	9
Product Min Dose Spec	Decimal Number	*NULL*	Min Dose Specification	Min Dose	10
Product Max Dose Spec	Decimal Number	*NULL*	Max Dose Specification	Max Dose	11
Ref to Min Ratio	Decimal Number	*NULL*	Ref to Min Ratio	Ref to Min Ratio	12
Ref to Max Ratio	Decimal Number	*NULL*	Ref to Max Ratio	Ref to Max Ratio	13

3.6 Helpful Reminders

Match the EXTERNAL ID value with the appropriate Import table column name:

- 'HeaderSetIdentifier' value inserted in this column must be identical with the EXTERNAL ID field in 'Report Type' configuration in DoseControl.
- 'FieldIdentifier' value inserted in this column must be identical with the EXTERNAL ID field in the report header fields configured in 'Report Type' and must match the report's HeaderSetIdentifier in the ImportReports table. In case no matching field is found, the field will be skipped, and no error will be returned.

- 'PathwayId' Value inserted in this column must be identical with the EXTERNAL ID field in 'Pathways' configuration in DoseControl.
- 'BatchIdentifier' value inserted in this column must be identical with the EXTERNAL ID field in 'Batches' configuration in DoseControl.
- All report header fields except 'CatalogNumber' that are imported into a report from the Product Specification Module do not require an EXTERNAL ID in header configuration.

Report Type setup:

- If you have a custom PDF report (provided by GEX), the Report Type's header 'Field Name' must be exact. GEX will give you the Field Names for the Report Type configuration.
- For the Report Type setup, you may use any text in the 'Label' column. The 'Label' is the on-screen displayed report fields and are modifiable before the report header is first used. Make sure you like the 'Label' name before importing reports.
- About report header field sequence – In the report type setup in section 3.5, the report header fields are listed in a sequence that was preferred by the customer. You may change the sequence of the report header fields before importing reports.
- Mark report header fields 'Required' if the data is required for that field before the user is allowed to 'Process Report' (i.e., export).
- If you are using a Report Type setup with Product Specifications fields, follow the guidelines in the DoseControl User Guide (GEX Doc. 100-266)[1].

> ⚠ ***IMPORTANT***! Ensure any report header field marked 'Required' is also marked 'Is Editable' for all fields. *See section 3.4.3 Import Errors.*

1. https://gexcorp.atlassian.net/wiki/spaces/DS/pages/2485223425/Rev.+O+DoseControl+Software+-+User+Guide+100-266

4 DATA EXPORT

4.1 Description of Export Tables

4.1.1 On 'Process a Report': Exporting a Complete Report all dosimeter measurement information in the report

When the **user presses the 'Process Report' button**, the report's data is stored in four (4) tables, ExportReports, ExportComments, ExportDosimeters, ExportHeaderValues. These tables are separate from the master records in the application database.

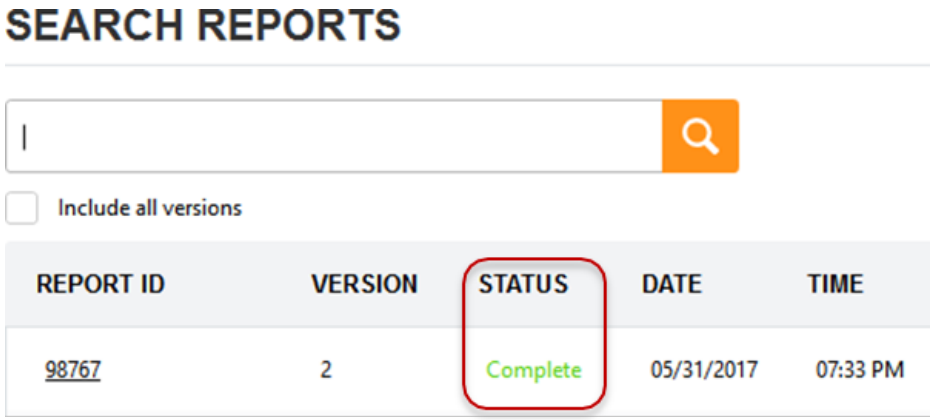
- ***ExportReports:*** DoseControl exports top level report information into this table such as the irradiation pathway and batch along with the key identifier, the Report ID, and its version number. The same Report ID can occur multiple times in this table but will be identifiable by the version number.
- ***ExportComments:*** DoseControl exports comments from reports into this table. Since the software has a versioning system for reports, different comments may be propagated into this table at different times depending on when a different version of a report is processed.
- ***ExportDosimeters:*** This table contains all the dosimetry details: absorbance, dose, thickness, and response of the dosimeter to the username that measured it, and the instrument serial number used for measurements.
- ***ExportHeaderValues:*** This table contains header field values that are associated with the report. Whatever fields are configured in the header will be posted here for retrieval. This includes header field whose values originate in the software and those that were imported into the software.

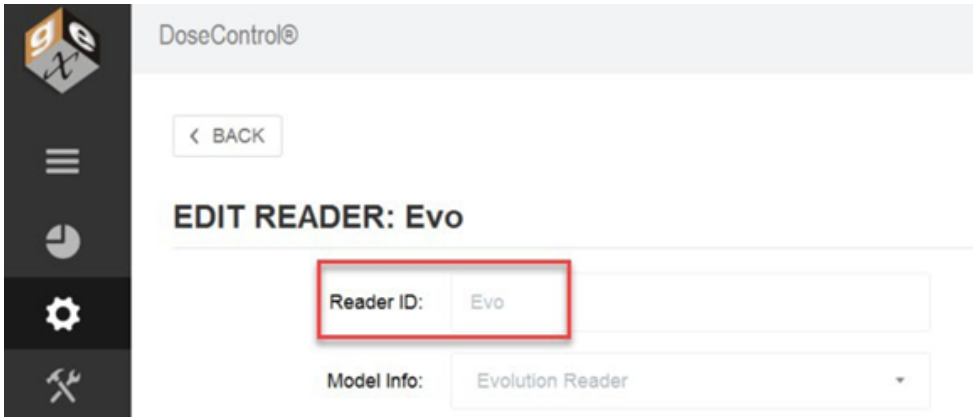
4.1.2 On 'Measure a dosimeter': Exporting single dosimeter measurement information

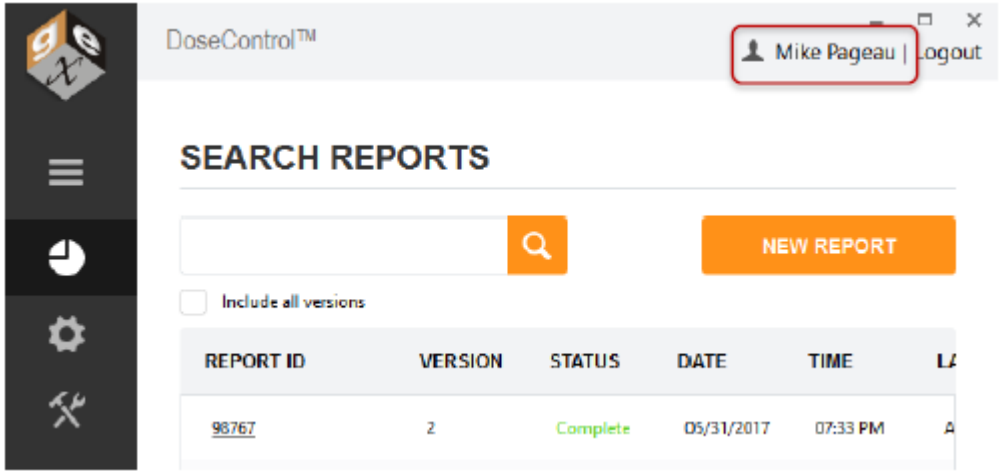
When the user presses the 'Measure' button on the measurement screen, the ExportMReadings table stores single measurement event values and the associated dosimetry information for that measurement event (Calibration, Batch, Reader, etc.) for a Dosimeter ID. This table is separate from the master records in the application database.

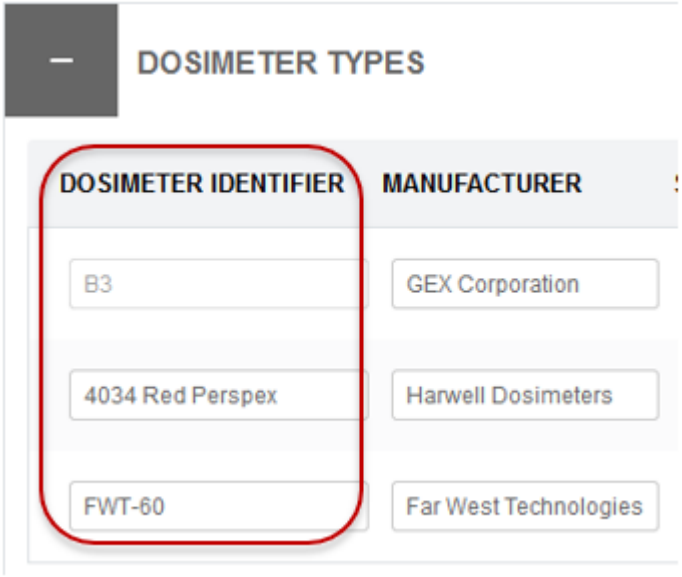
4.2 Design Specification - Export Tables

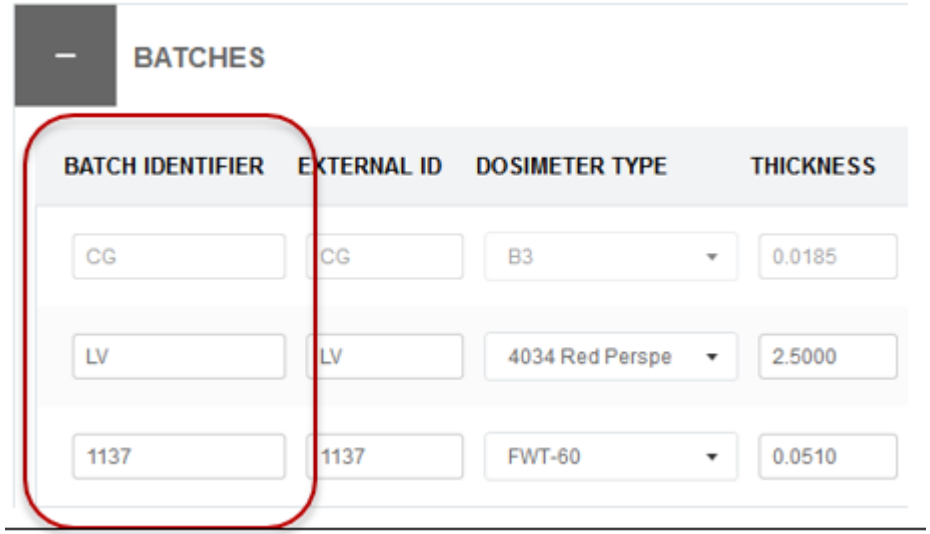
Table name dbo.ExportReports

Column Name	Data Type	Notes
Id	bigint	Database-generated unique ID.
DosimetryReportId	nvarchar(40)	Report ID. This is identical to the 'ReportIdentifier' field that is explained in the imports section.
Version	int	Version of the report; the DosimeterReportId and Version pair is unique. 
MeasurementInstrumentSn	nvarchar(40)	Spectrophotometer or Reader's serial number 

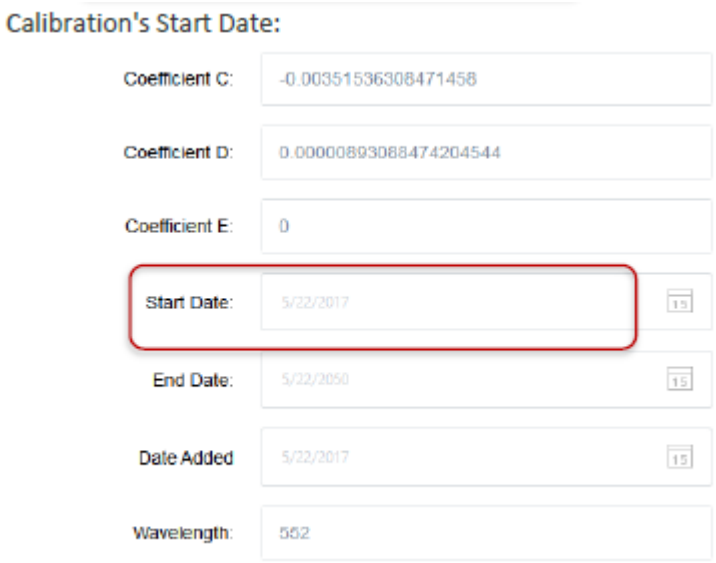
Column Name	Data Type	Notes
MeasurementInstrumentId	nvarchar(440)	Spectrophotometer or Reader's Spectrophotometer unique ID 
MeasurementInstrumentWorkstationId	nvarchar(max)	Name of the PC to which the reader was assigned.
MeasurementInstrumentCalibrationDate	datetime	Spectrophotometer or Reader's last calibration date.
ReportCompleteDateTime	datetime	UTC formatted timestamp when the report was processed.

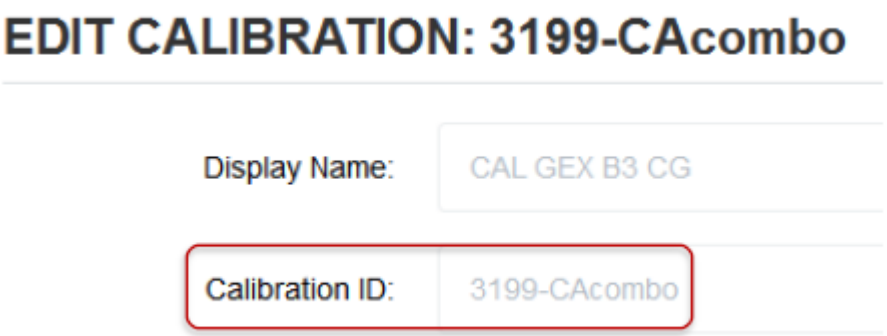
Column Name	Data Type	Notes
ReportUserName	nvarchar(max)	Display name of the user processing the report. 
ReportUserId	nvarchar(max)	Username of the user logged into the PC that is processing the report.

Column Name	Data Type	Notes
DosimeterType	nvarchar(max)	The trade name or similar of the dosimeter used in the report. 

Column Name	Data Type	Notes
DosimeterBatchId	nvarchar(max)	Batch Identifier is the dosimeter batch ID. 

Column Name	Data Type	Notes
NumberOfDosimeterReplicates	int	'Absorbance count' of the calibration used in the report. This is how many dosimeters are used for each Dosimeter ID (e.g., 1 per pouch, 2 per pouch). 

Column Name	Data Type	Notes
BatchCalibrationDate	datetime	Calibration's Start Date: 

Column Name	Data Type	Notes
CalibrationResponseFunctionId	nvarchar(max)	Calibration Identifier: 
CalculatedRunMinimumDose	float	CalculatedRunMinimumDose is the report's overall Minimum adjusted dose (in kGy) of all measured dosimeters contained in the report. Adjusted dose = Dose * Ref:Min Ratio
CalculatedRunMaximumDose	float	CalculatedRunMaximumDose is the report's overall Maximum adjusted dose (in kGy) of all measured dosimeters contained in the report. Adjusted dose = Dose * Ref:Max Ratio
PathwayId	int	The database's unique identifier for the irradiation 'Pathway'.

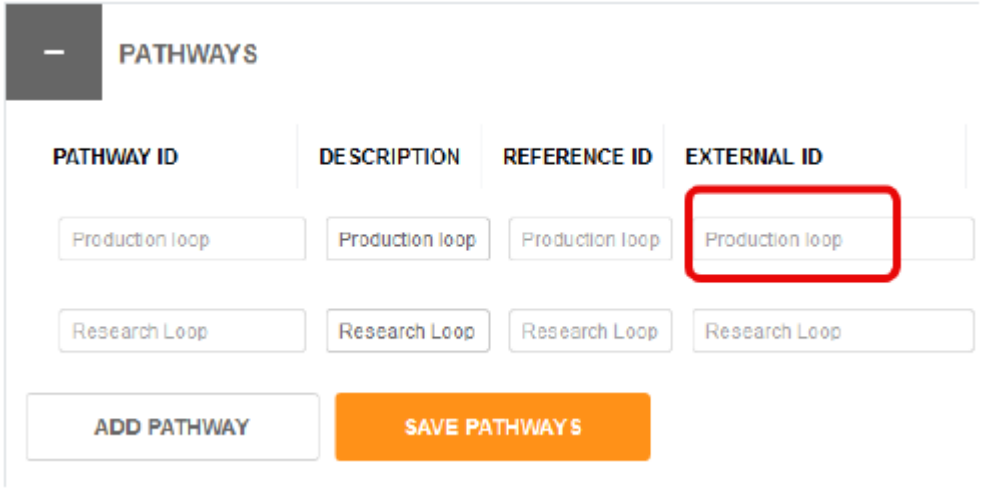
Column Name	Data Type	Notes
IrradiationPathwayId	Nvarchar(440)	The name of the 'Pathway', or Pathway ID for the Pathway configured. 

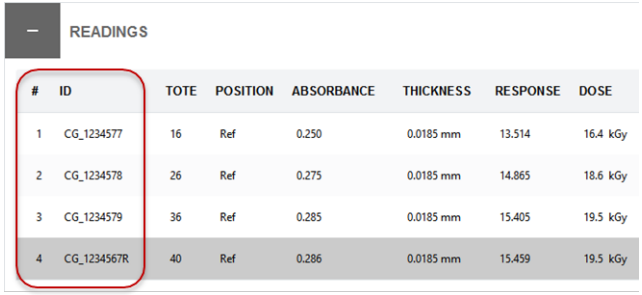
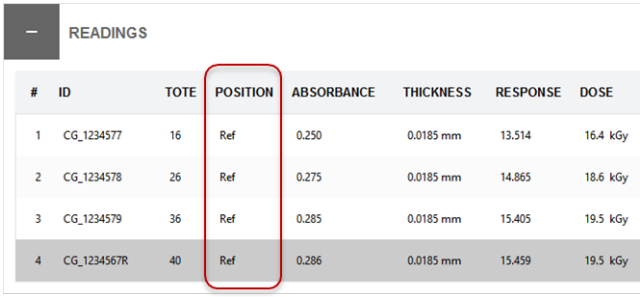
Table name dbo.ExportComments

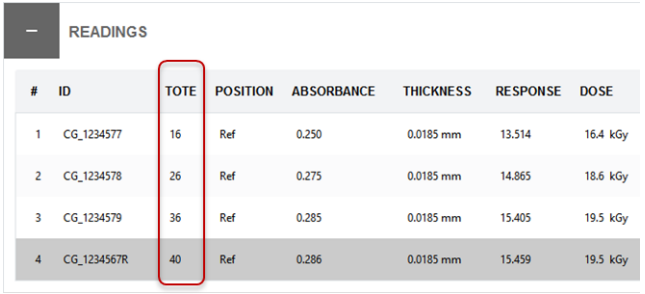
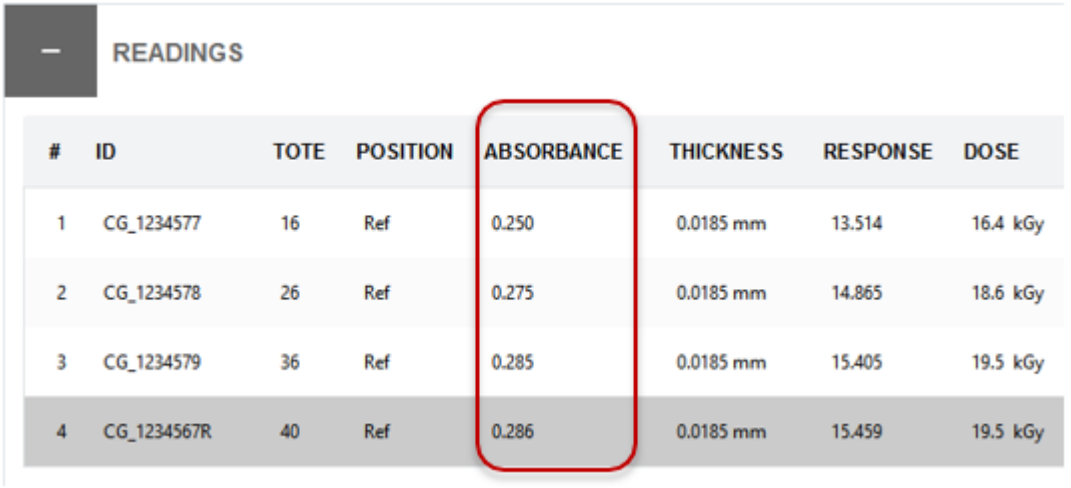
Column Name	Data Type	Notes
Id	bigint	Database-generated unique ID.

Column Name	Data Type	Notes
Comment	nvarchar(max)	Content of the comment from a particular version; includes both posted comments and skipped dosimeter information, if any. 
ReportVersion	int	Version of the Report ID the comment belongs to.
ExportReportId	bigint	Id column value of the ExportReport the comment belongs to.

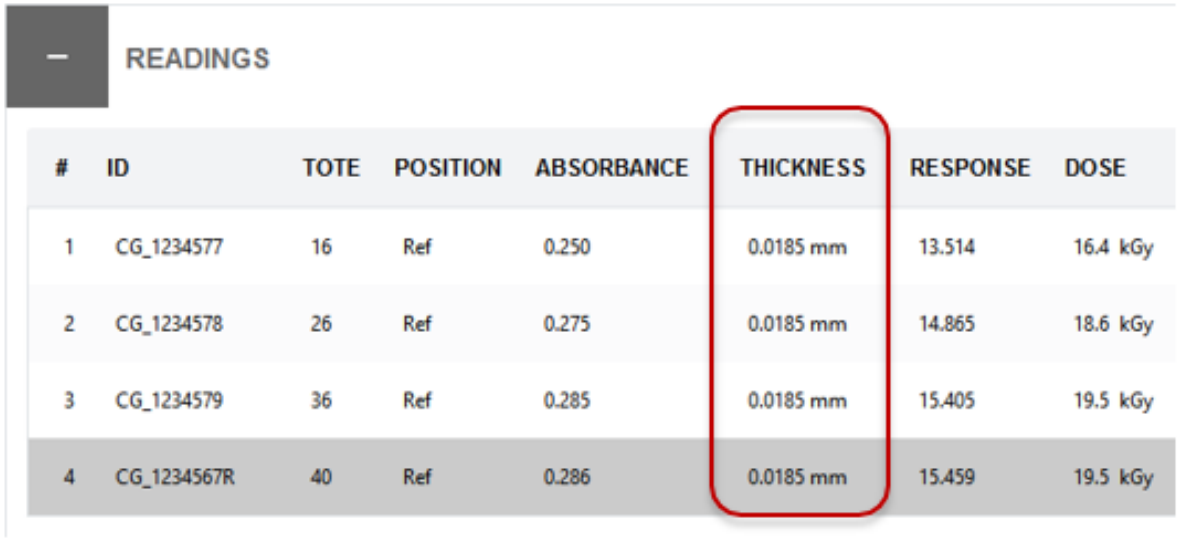
Table name dbo.ExportDosimeters

Column Name	Data Type	Notes
Id	bigint	Database-generated unique ID.

Column Name	Data Type	Notes
Identifier	nvarchar(max)	Dosimeter ID number:  READINGS \# ID TOTE POSITION ABSORBANCE THICKNESS RESPONSE DOSE 1 CG_1234577 16 Ref 0.250 0.0185 mm 13.514 16.4 kGy 2 CG_1234578 26 Ref 0.275 0.0185 mm 14.865 18.6 kGy 3 CG_1234579 36 Ref 0.285 0.0185 mm 15.405 19.5 kGy 4 CG_1234567R 40 Ref 0.286 0.0185 mm 15.459 19.5 kGy
Position	nvarchar(max)	Dosimeter position information:  READINGS \# ID TOTE POSITION ABSORBANCE THICKNESS RESPONSE DOSE 1 CG_1234577 16 Ref 0.250 0.0185 mm 13.514 16.4 kGy 2 CG_1234578 26 Ref 0.275 0.0185 mm 14.865 18.6 kGy 3 CG_1234579 36 Ref 0.285 0.0185 mm 15.405 19.5 kGy 4 CG_1234567R 40 Ref 0.286 0.0185 mm 15.459 19.5 kGy

Column Name	Data Type	Notes
Tote	nvarchar(max)	Tote ID:  READINGS \# ID TOTE POSITION ABSORBANCE THICKNESS RESPONSE DOSE 1 CG_1234577 16 Ref 0.250 0.0185 mm 13.514 16.4 kGy 2 CG_1234578 26 Ref 0.275 0.0185 mm 14.865 18.6 kGy 3 CG_1234579 36 Ref 0.285 0.0185 mm 15.405 19.5 kGy 4 CG_1234567R 40 Ref 0.286 0.0185 mm 15.459 19.5 kGy
AbsorbanceValue	float	Average absorbance used for calculation the dose; can be 'null' for readings computed by statistical re-reads (not shown in image below):  READINGS \# ID TOTE POSITION ABSORBANCE THICKNESS RESPONSE DOSE 1 CG_1234577 16 Ref 0.250 0.0185 mm 13.514 16.4 kGy 2 CG_1234578 26 Ref 0.275 0.0185 mm 14.865 18.6 kGy 3 CG_1234579 36 Ref 0.285 0.0185 mm 15.405 19.5 kGy 4 CG_1234567R 40 Ref 0.286 0.0185 mm 15.459 19.5 kGy

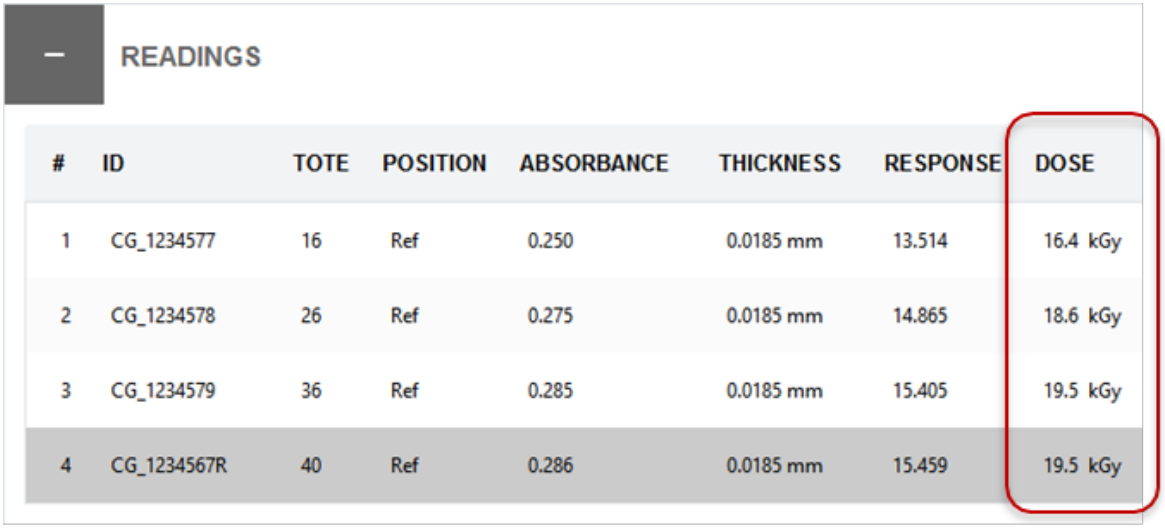
Column Name	Data Type	Notes
Thickness	float	Average thickness of all absorbances. Depending on the configuration it can reflect manually entered thickness, measured thickness (if micrometer is configured), or the thickness value specified for the batch:



READINGS

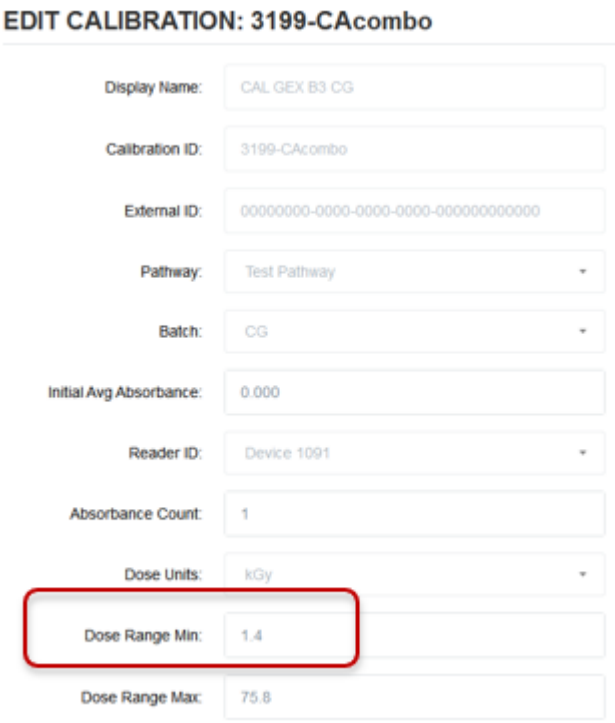
#	ID	TOTE	POSITION	ABSORBANCE	THICKNESS	RESPONSE	DOSE
1	CG_1234577	16	Ref	0.250	0.0185 mm	13.514	16.4 kGy
2	CG_1234578	26	Ref	0.275	0.0185 mm	14.865	18.6 kGy
3	CG_1234579	36	Ref	0.285	0.0185 mm	15.405	19.5 kGy
4	CG_1234567R	40	Ref	0.286	0.0185 mm	15.459	19.5 kGy

Column Name	Data Type	Notes
Background	float	Initial Average Absorbance of the calibration: 
TotalNumberOfMeasurements	int	Total number of absorbance measurements for the Dosimeter. For example, if the dosimeter is measured once, value='1'. If the dosimeter is reread one time, value='2', etc.

Column Name	Data Type	Notes
FinalDose	float	Adjusted dose for the dosimeter ID that is the final value after any rereads, according to user configured reread policy. 
ExportReportId	bigint	ID column value of the ExportReport the dosimeter belongs to.

READINGS

#	ID	TOTE	POSITION	ABSORBANCE	THICKNESS	RESPONSE	DOSE
1	CG_1234577	16	Ref	0.250	0.0185 mm	13.514	16.4 kGy
2	CG_1234578	26	Ref	0.275	0.0185 mm	14.865	18.6 kGy
3	CG_1234579	36	Ref	0.285	0.0185 mm	15.405	19.5 kGy
4	CG_1234567R	40	Ref	0.286	0.0185 mm	15.459	19.5 kGy

Column Name	Data Type	Notes
DoseIsUnderRange	bit (not null)	Boolean value. True = reading is under the range of the calibration specified in the Calibration configuration. Otherwise, false. 

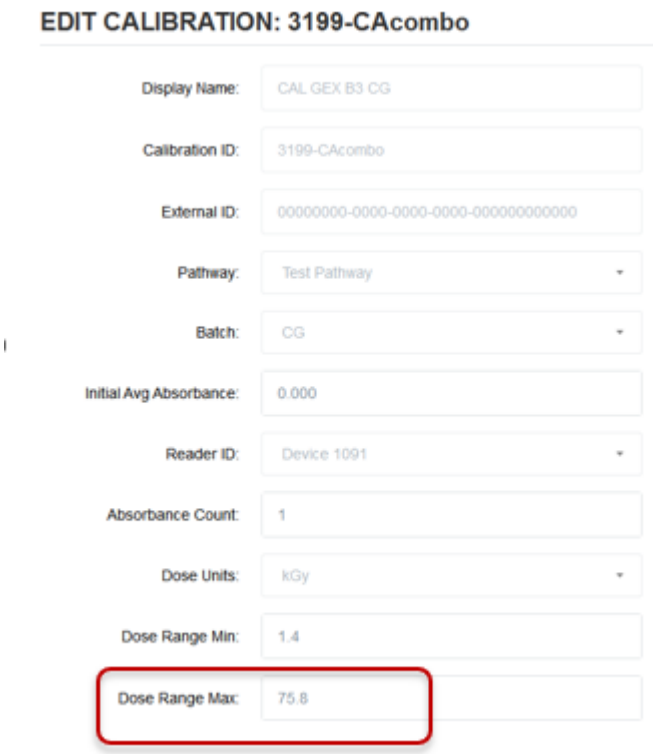
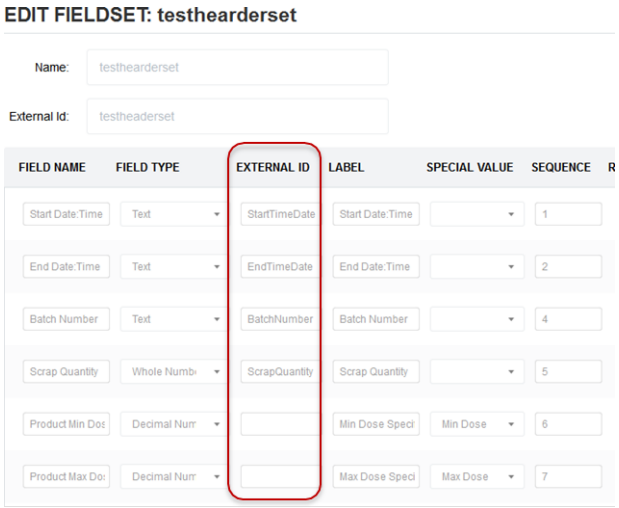
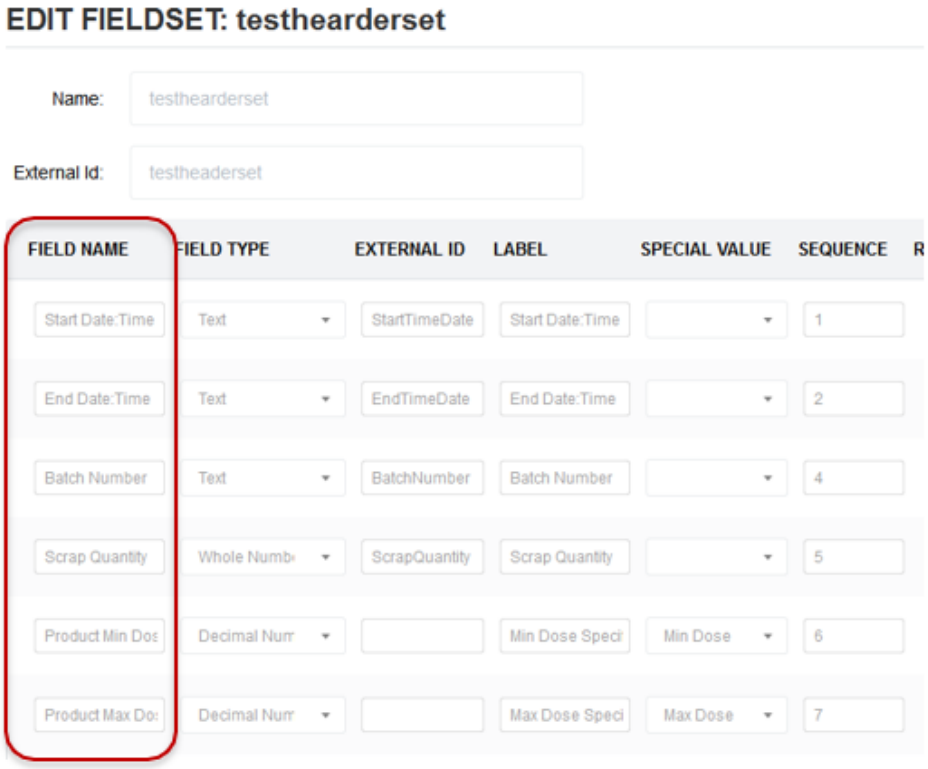
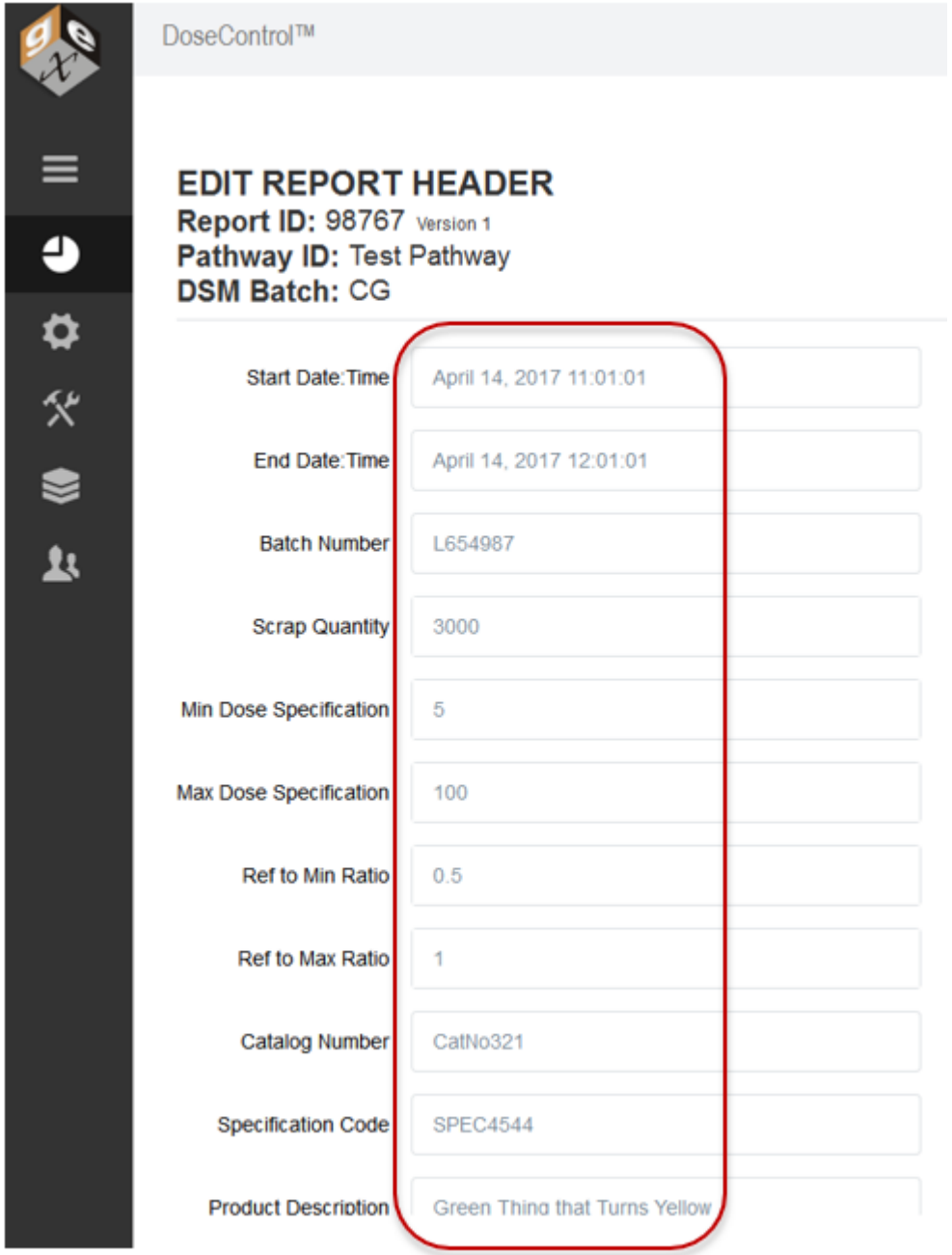
Column Name	Data Type	Notes
DoseIsOverRange	bit (not null)	Boolean value. True = reading is over the range of the calibration specified in the Calibration configuration. Otherwise, false 

Table name dbo.ExportHeaderValues

Column Name	Data Type	Notes
Id	bigint	Database-generated unique ID.
ExportReportId	bigint	ID column value of the ExportReport the dosimeter belongs to.
ExternalIdentifier	nvarchar(max)	EXTERNAL ID of the header field. This value is used during the import process to match imported fields with their appropriate field in configured report headers. Depending on configuration this value can be 'null': 

Column Name	Data Type	Notes
FieldName	nvarchar(max)	Name of the field. Value will always be provided: 

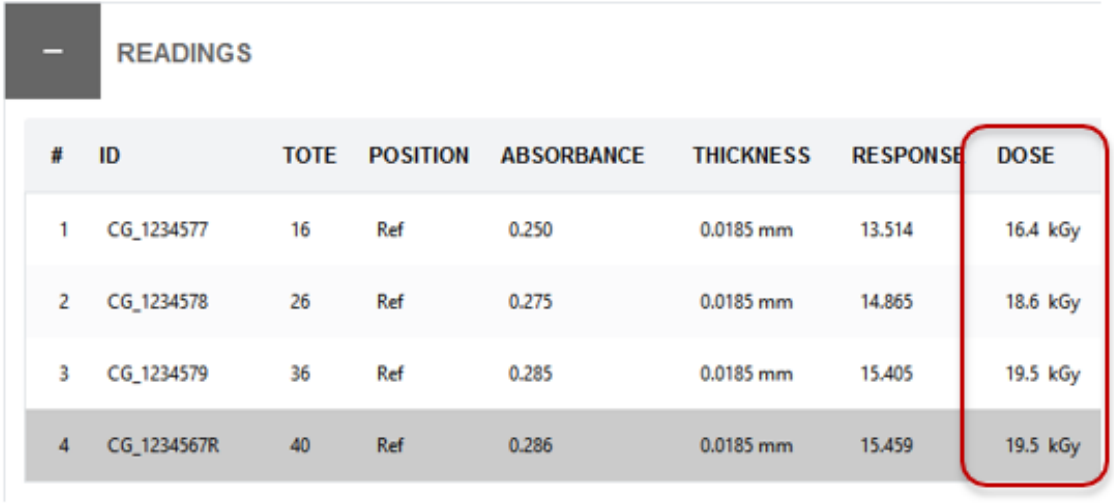
Column Name	Data Type	Notes
Value	nvarchar(max)	The value of the header field

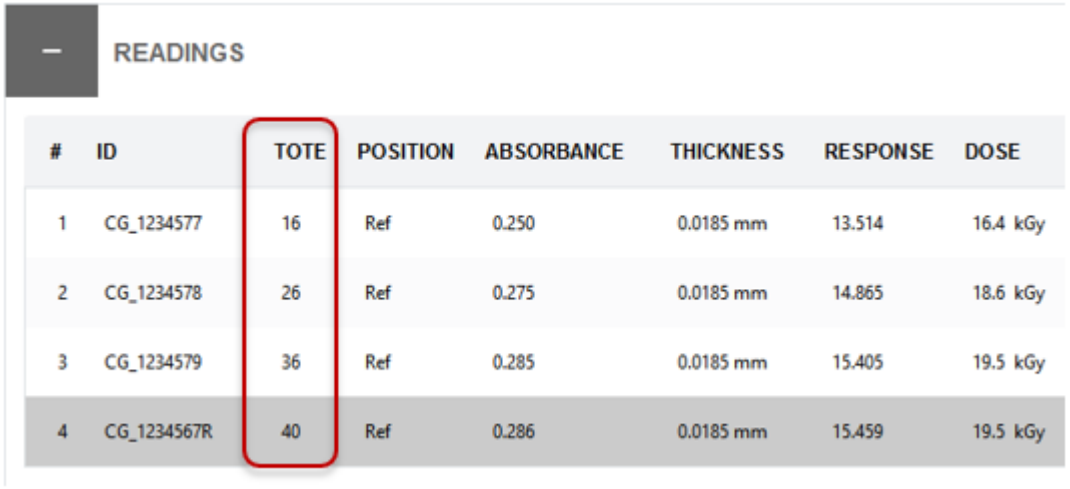
Column Name	Data Type	Notes
		

Column Name	Data Type	Notes

Table name dbo.ExportMReadings

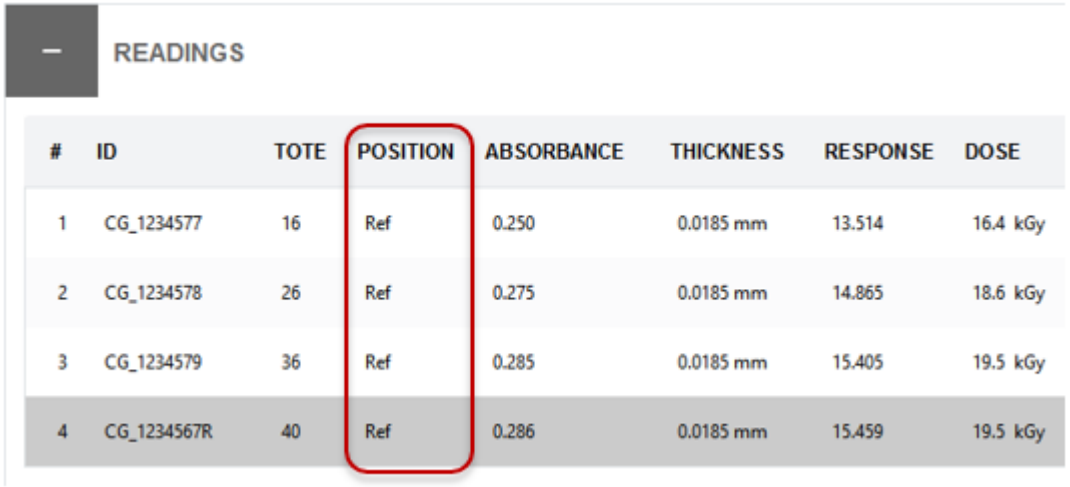
Column Name	Data Type	Notes
Id	bigint	Database-generated unique ID.
DSM_SN	nvarchar(max)	The unique number of the dosimeter. DoseControl cannot output two identical numbers unless all the configuration fields match. Specifically, there cannot be a duplicate ID from a different irradiation pathway, dosimeter batch, or measurement instrument. There should not be a need for the end-user to screen for duplicates ever existing in this field.

Column Name	Data Type	Notes
CDose	float	CDose is the “adjusted dose”. See Definitions. CDose=MDose*Correction Factor. 
Rev	Int (not null)	Rev is an Integer value indicating the dosimeter’s reading version . The dosimeter’s (DSM_SN) Rev value increases anytime that a measurement event, reread event, or skip measurement event occurs.
Valid	Bit (not null)	Boolean value. True = reading is within the range of the calibration specified in the Calibration configuration. False = reading is outside the Calibration dose range.
User	nvarchar(max)	The username of the user from application login. Varies depending on the login method configured and the individual user typology used.
Name	nvarchar(max)	The full name of the user from application login. Varies depending on the login method configured and the individual user typology used but is designed for the user’s first and last name.

Column Name	Data Type	Notes
Comment	nvarchar(max)	When a user skips a reading in the application a comment is required for that event. That comment will appear here, if applicable.
Tote	nvarchar(max)	From the field by same name in user interface of measure screen. The user can enter a Tote number, or you can use this field for another purpose. 

READINGS

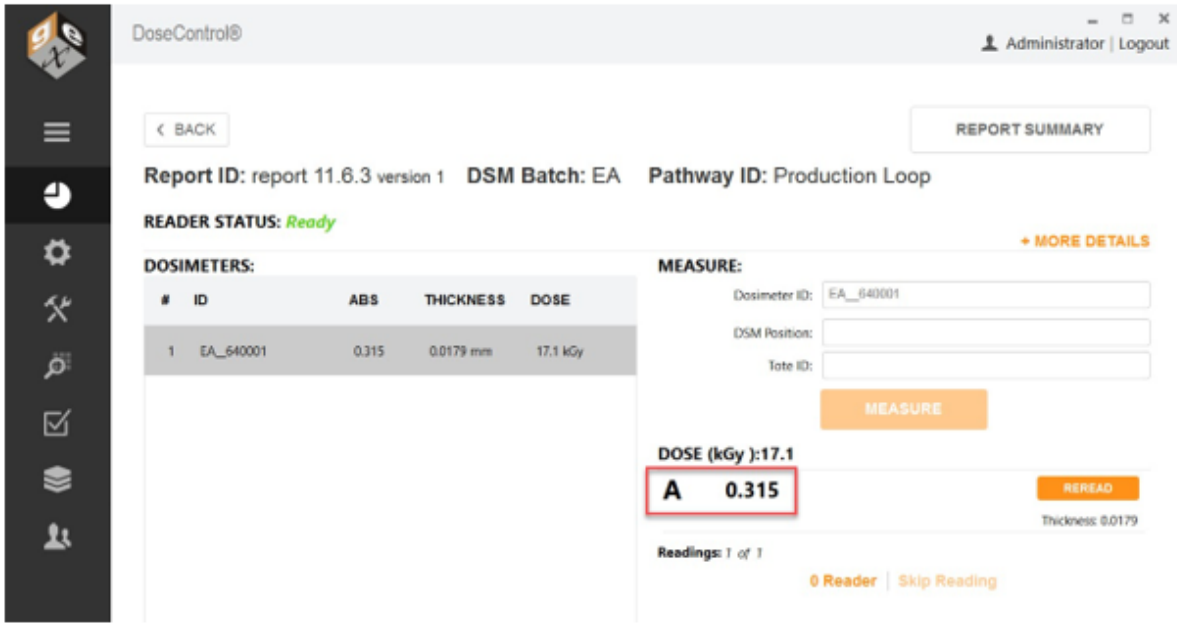
#	ID	TOTE	POSITION	ABSORBANCE	THICKNESS	RESPONSE	DOSE
1	CG_1234577	16	Ref	0.250	0.0185 mm	13.514	16.4 kGy
2	CG_1234578	26	Ref	0.275	0.0185 mm	14.865	18.6 kGy
3	CG_1234579	36	Ref	0.285	0.0185 mm	15.405	19.5 kGy
4	CG_1234567R	40	Ref	0.286	0.0185 mm	15.459	19.5 kGy

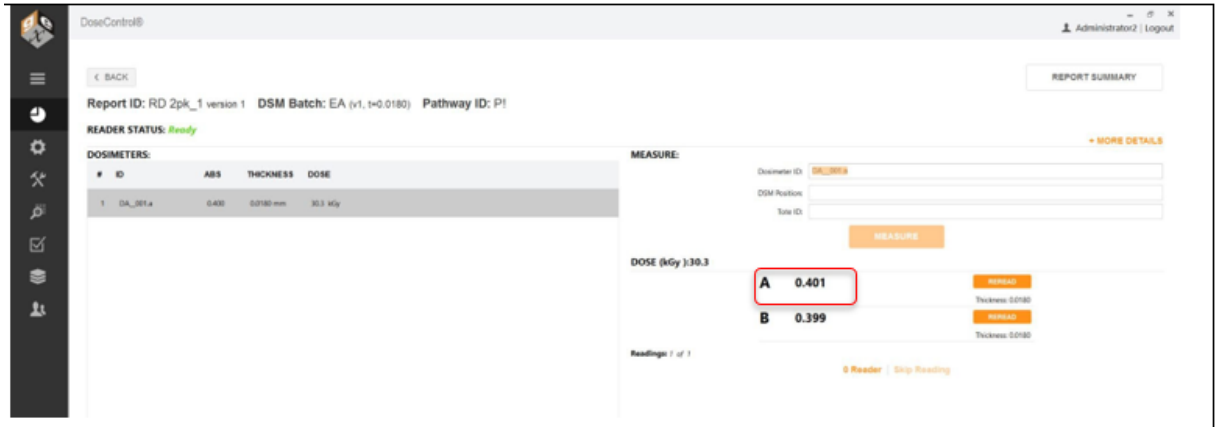
Column Name	Data Type	Notes
Pos	nvarchar(max)	From the field by same name in user interface of measure screen. The user can enter a Position number, or you can use this field for another purpose. 

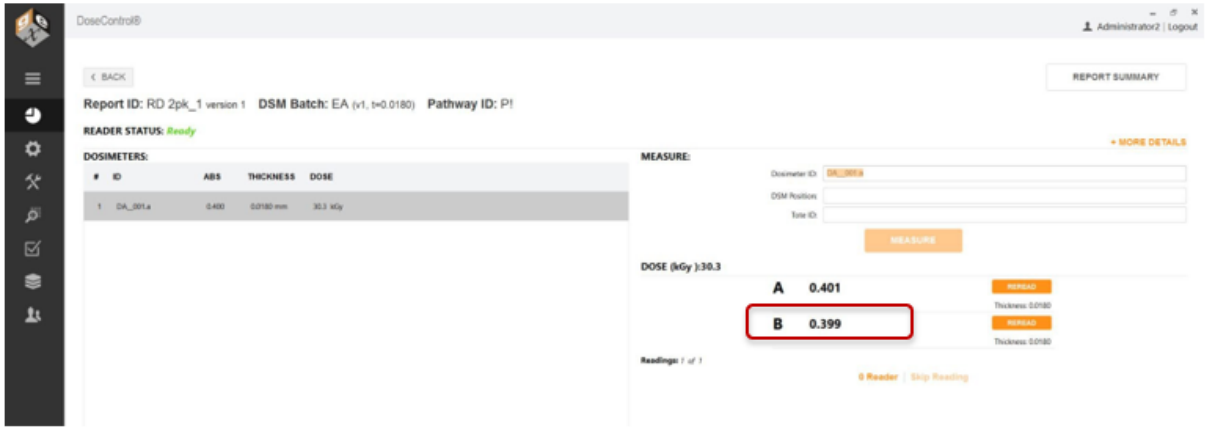
READINGS

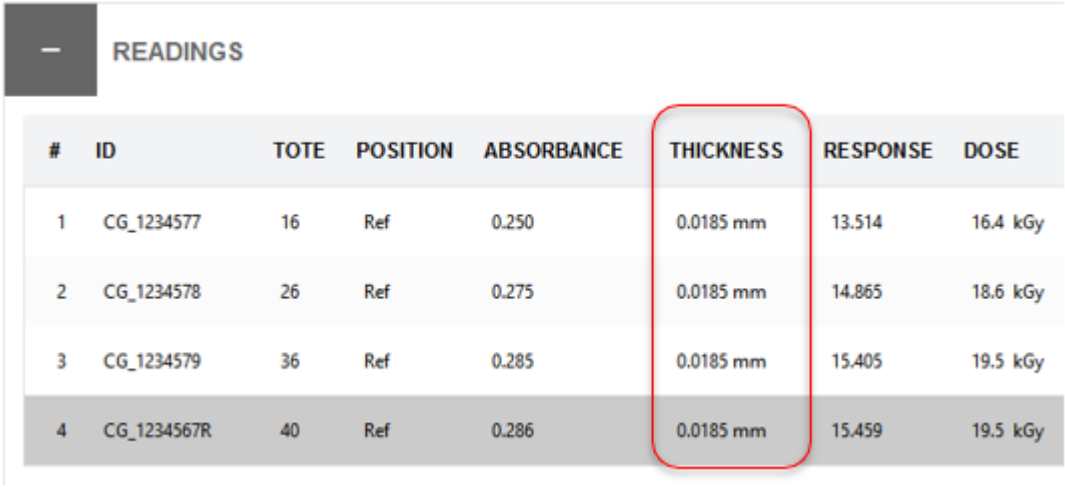
#	ID	TOTE	POSITION	ABSORBANCE	THICKNESS	RESPONSE	DOSE
1	CG_1234577	16	Ref	0.250	0.0185 mm	13.514	16.4 kGy
2	CG_1234578	26	Ref	0.275	0.0185 mm	14.865	18.6 kGy
3	CG_1234579	36	Ref	0.285	0.0185 mm	15.405	19.5 kGy
4	CG_1234567R	40	Ref	0.286	0.0185 mm	15.459	19.5 kGy

Column Name	Data Type	Notes
Ao	float	Original Absorbance (background absorbance) value of the dosimeter. The Ao is the “Initial Average Absorbance” value as configured in the Calibration used to determine dose for that dosimeter. May be NULL if not configured in the calibration. 

Column Name	Data Type	Notes
AiA	float	Absorbance values for dosimeter replicate A from the measure screen for that dosimeter ID. If the Calibration used is configured with a 1, 2, 3 or 4 for “Absorbance Count”, the AiA value is the dosimeter absorbance measurement (the A measurement – the first and only dosimeter absorbance measurement).  *Example report with AiA highlighted (1 dosimeter replicate)*

Column Name	Data Type	Notes
		 *Example report with AiA highlighted (2 dosimeter replicates)*

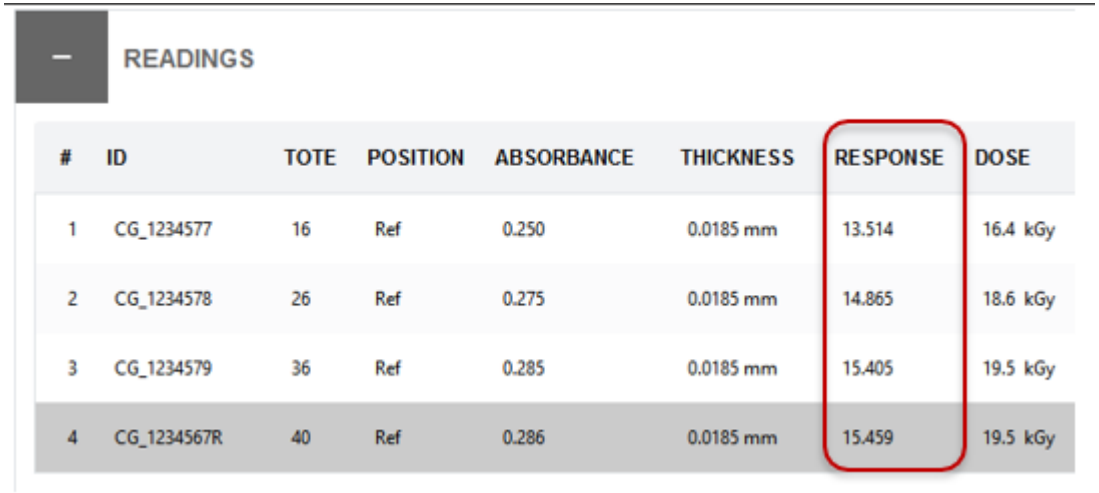
Column Name	Data Type	Notes
AiB	float	Absorbance values for dosimeter replicate B from the measure screen for that dosimeter ID, if any. If the Calibration used is configured with a value of 2, 3 or 4 for “Absorbance Count”, the AiB value is the B dosimeter absorbance measurement (the B measurement – the second absorbance measurement in a series). 
AiC	float	Absorbance values for dosimeter replicate C from the measure screen for that dosimeter ID, if any. If the Calibration used is configured with a value of 3 or 4 for “Absorbance Count”, the AiC value is the C dosimeter absorbance measurement (the C measurement – the third absorbance measurement in a series).
AiD	float	Absorbance values for dosimeter replicate D from the measure screen for that dosimeter ID, if any. If the Calibration used is configured with a value of 4 for “Absorbance Count”, the AiD value is the D dosimeter absorbance measurement (the D measurement – the fourth absorbance measurement in a series).

Column Name	Data Type	Notes
Tvalue	float	Dosimeter thickness from the dosimeter batch that is used to determine dose for that dosimeter. Dosimeter batch thickness is configured in Batches in the application. 

READINGS

#	ID	TOTE	POSITION	ABSORBANCE	THICKNESS	RESPONSE	DOSE
1	CG_1234577	16	Ref	0.250	0.0185 mm	13.514	16.4 kGy
2	CG_1234578	26	Ref	0.275	0.0185 mm	14.865	18.6 kGy
3	CG_1234579	36	Ref	0.285	0.0185 mm	15.405	19.5 kGy
4	CG_1234567R	40	Ref	0.286	0.0185 mm	15.459	19.5 kGy

Column Name	Data Type	Notes
Resp	float	The calculated Response value for the dosimeter (Ai – Ao / T) where Ai is the average absorbance of dosimeter replicates A through D. (The Response is used to calculate MDose, (i.e., Dose)
C_F	float	Correction Factor. Correction Factor may be part of the Calibration configuration and is used to make a linear correction of the dose. See Definitions
MDose	float	MDose is “Dose”. Dose calculated from the Average Dosimeter Response. MDose is not visible on the screen.
Inst_SN	nvarchar(max)	The serial number of instrument (spectrophotometer or reader) used to acquire the absorbance readings for the dosimeter.
Inst_WL	int	The wavelength of measurement used to acquire the absorbance readings for the dosimeter.



Column Name	Data Type	Notes
Path	nvarchar(max)	The Pathway ID from application that the dosimeters were irradiated in. The pathway ID is configured in Pathways.
DSMbatch	nvarchar(max)	The dosimeter batch ID from the calibration configuration in the application.
DSMCal	nvarchar(max)	Calibration ID. The unique name of the Calibration stored in DoseControl used to calculate the doses for the specific dosimeter ID.
CreatedDate	Datetimeoffset(7)	Date and time of measurement event (measure, reread). UTC formatted timestamp.
IsStatisticalReread	Bit, null	Boolean value. True = the Absorbance value (AiA, AiB AiC or AiD) is a valid statistical reread absorbance value. False = the Absorbance value (AiA, AiB AiC or AiD) is the absorbance value for dosimeter replicate from the measure screen for that dosimeter ID. See “AiA, AiB AiC or AiD” above.
IsDoseUnderRange	Bit, not null	Boolean value. True = reading is under the range of the calibration specified in the Calibration configuration. Otherwise, false.
IsDoseOverRange	Bit, not null	Boolean value. True = reading is over the range of the calibration specified in the Calibration configuration. Otherwise, false.

4.3 Export Process

When reading from the export tables for integration purposes make sure that the SELECT queries specify the names of the columns instead of using the 'star' (SELECT *) shorthand. This will prevent breaking changes to your integration scripts in the event GEX adds new columns to the export tables in future versions of DoseControl software.

4.3.1 Managing the Export Table Data

The records in the Export tables are not managed in any way by DoseControl. DoseControl will push data to the export tables, and you must maintain the export tables and delete old data.

4.3.2 Export process for ExportReports, ExportDosimeters, ExportHeaderValues, ExportComments

The export process is triggered when the user clicks the **'Process Report'** button on the Report Summary screen. Report processing is confirmed by the user by clicking the "OK" button on the info message. (See *Figures 16 and 17* below.)

A report can be processed anytime and may include missing (NULL) dosimeter readings. However, a report with no dosimeter readings cannot be processed. If the export fails, then the report processing will not complete. In the event of an export failure, contact GEX for assistance.

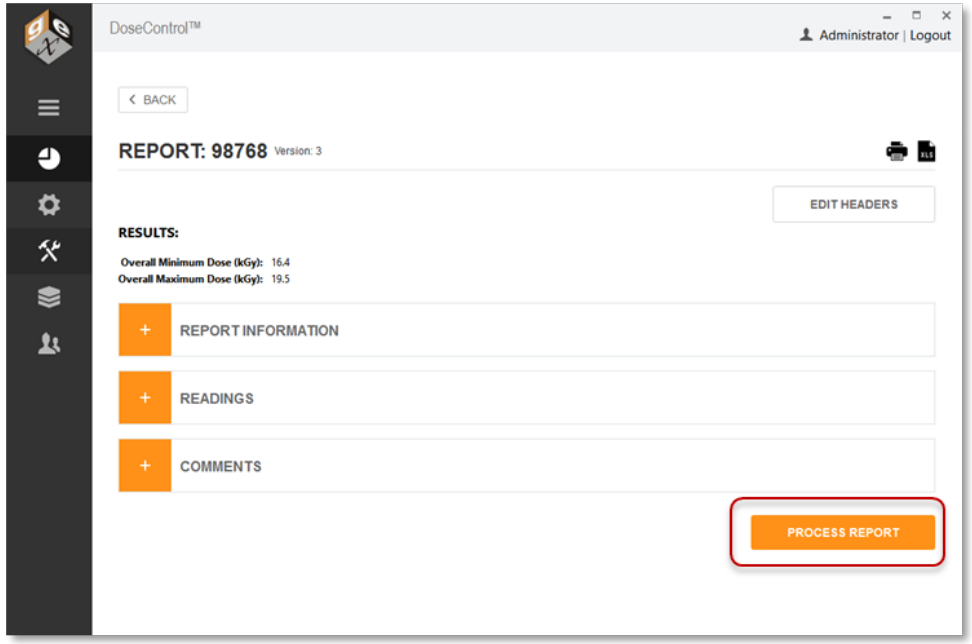


Figure 16

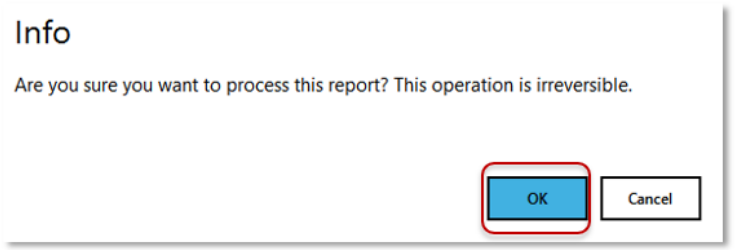


Figure 17

4.3.3 Export process for ExportMReadings

Each time the **'Measure'** button is pressed on the Measure screen, the data for that dosimeter is exported to the dbo.ExportMReadings table. See *Figure 18*.

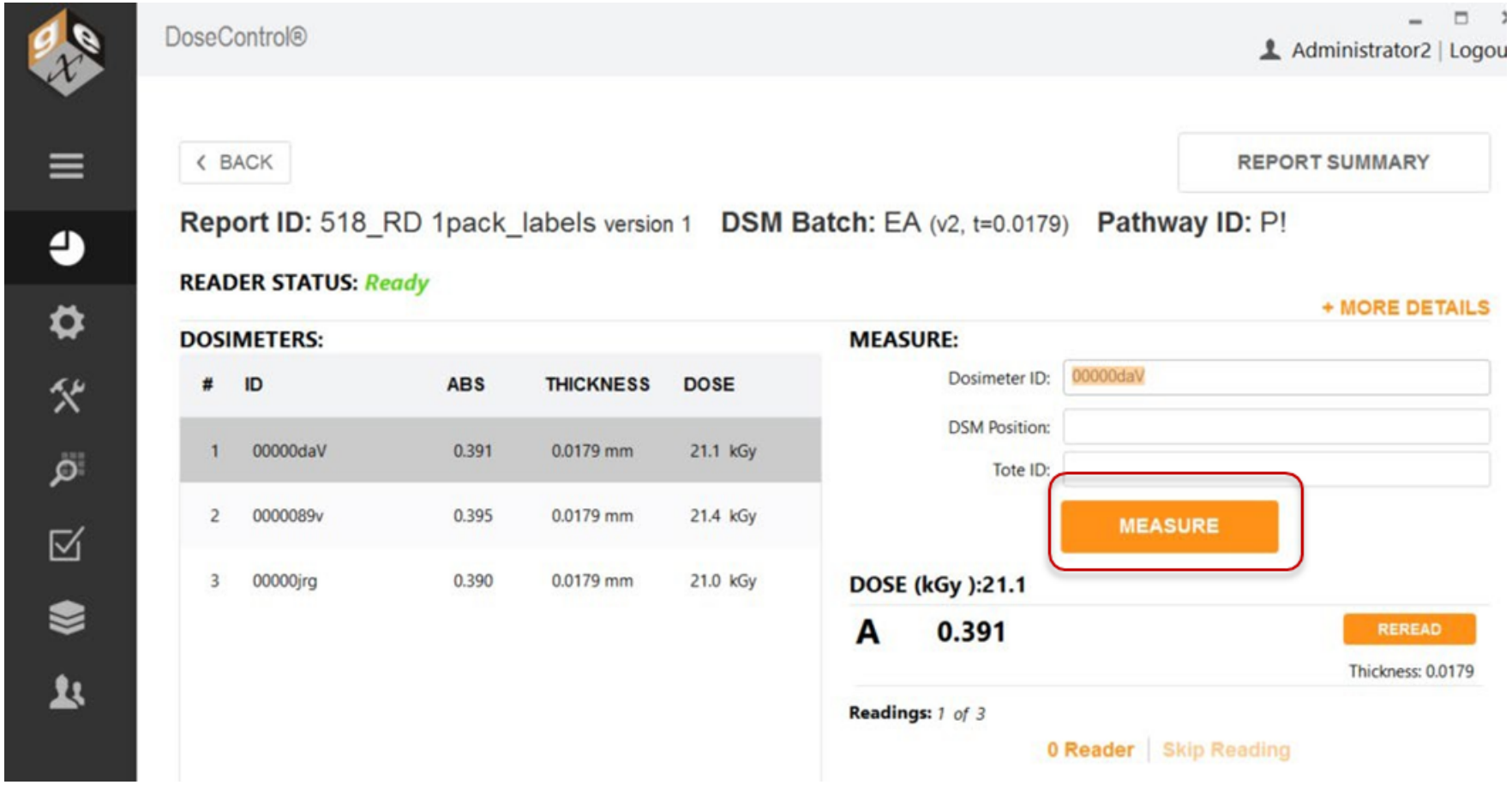


Figure 18

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