



The collective power of chromatography

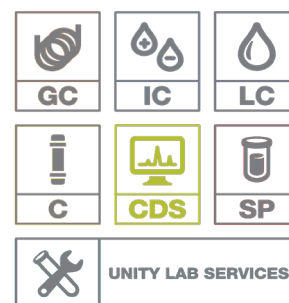
One CDS to do it all

Using versioning to understand the history of data

Thermo Scientific Chromeleon 7 Chromatography Data System

Versioning of data objects such as Processing Methods, Sequences and Report Templates allows a lab to view the history of the data generated in order to see what changes were made during its lifecycle, and what impact, if any, those changes had on results. This ability is a critical component of data integrity in regulated labs.

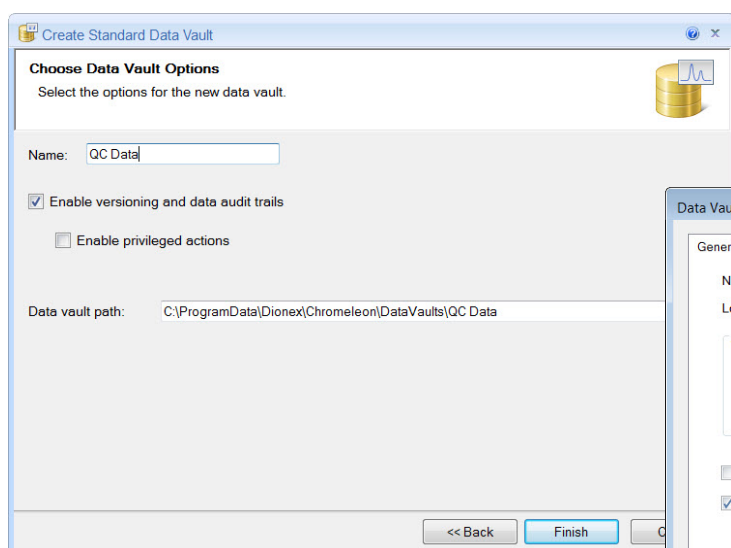
Thermo Scientific™ Chromeleon™ version 7, Chromatography Data System (CDS) contains extensive audit trails that record all the details used to generate a result, and with its powerful versioning system, these details can easily be viewed for the entire history of the data.



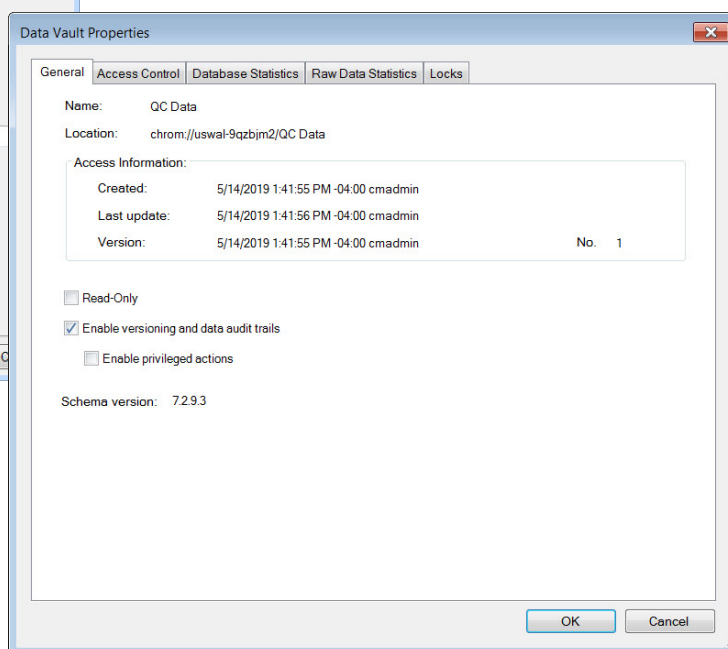


Enable version control

Versioning, along with Data Audit Trails, is controlled at the Data Vault level. This level of control makes it possible to have Data Vaults with versioning enabled when it is needed (for example, QC data), and Data Vaults with versioning disabled when it is not required (for example, development work.) Versioning can be enabled during the initial creation of the Data Vault, or afterwards if it's determined later to be required. The ability to enable or disable versioning is controlled through a privilege, which helps to ensure only qualified users can make changes.



Enabling versioning and data audit trails during Data Vault creation through a simple check box



Enabling and disabling versioning through the Data Vault Properties box. The ability to enable and disable versioning is controlled through privileges.



Version numbering

Whenever a data item (Processing Method, Instrument Method, Report Template, etc.) is saved, a new record of it is created. The record is stored along with an audit trail entry that captures information related to the creation (time, date, user, etc.). Chromeleon CDS then maintains the relationship between the records by automatically assigning an incremental number that cannot be amended in any way, and we refer to these as versions.

#	FID1B	Name	Type	Level	Position	Volume [µL]
1		Blank 1	Blank		1	1.0000
2		0.25, 0.5, 0.5	Calibration Standard	1	2	1.0000
3		0.25, 0.5, 0.5	Calibration Standard	1	2	1.0000
4		0.25, 0.5, 0.5	Calibration Standard	1	2	1.0000
5		2.5, 5, 5	Calibration Standard	2	3	1.0000
6		2.5, 5, 5	Calibration Standard	2	3	1.0000
7		2.5, 5, 5	Calibration Standard	2	3	1.0000
8		5, 10, 10	Calibration Standard	3	4	1.0000
9		5, 10, 10	Calibration Standard	3	4	1.0000
10		5, 10, 10	Calibration Standard	3	4	1.0000
11		12.5, 25, 25	Calibration Standard	4	5	1.0000
12		12.5, 25, 25	Calibration Standard	4	5	1.0000
13		12.5, 25, 25	Calibration Standard	4	5	1.0000
14		25, 50, 50	Calibration Standard	5	6	1.0000
15		25, 50, 50	Calibration Standard	5	6	1.0000
16		25, 50, 50	Calibration Standard	5	6	1.0000
17		50, 100, 100	Calibration Standard	6	7	1.0000

Name	Type	Date Modified	Version	Comment
Default	Report Template	2/5/2019 2:38:12 PM -05:00	4	
Default	View Settings	3/28/2019 2:47:05 PM -04:00	5	
ETO Quant PM	Processing Method	5/14/2019 11:06:42 AM -04:00	14	
Modify Test	View Settings	3/28/2019 3:23:05 PM -04:00	1	

The version number of each data item is displayed in the Sequence along with the date. The entire version history of the item can be displayed by showing the Data Audit Trail. In addition to the version number, the Data Audit Trail displays the Date/Time the version was created, Operator, Operation and any Comments added by the Operator when it was created.

The version number of each data object is displayed in the Sequence.

#	Name	Type	Version	Date / Time	Operator	Operation	Comment
14	ETO Quant	Processing Method	14	5/14/2019 11:06:42 AM -04:00	cmadmin	Changed	
13	ETO Quant	Processing Method	13	4/2/2019 10:02:42 AM -04:00	pkenny	Changed	
12	ETO Quant	Processing Method	12	2/27/2019 7:12:13 PM -05:00	cmadmin	Changed	
11	ETO Quant	Processing Method	11	2/27/2019 6:04:03 PM -05:00	cmadmin	Changed	
10	ETO Quant	Processing Method	10	1/29/2019 1:50:41 PM -05:00	cmadmin	Changed	
9	ETO Quant	Processing Method	9	1/24/2019 3:15:25 PM -05:00	cmadmin	Changed	
8	ETO Quant	Processing Method	8	11/21/2018 11:38:07 AM -05:00	cmadmin	Changed	
7	ETO Quant	Processing Method	7	10/23/2018 3:51:57 PM -04:00	cmadmin	Changed	
6	ETO Quant	Processing Method	6	6/1/2018 3:49:38 PM -04:00	Red	Changed	corrected channel for calibration
5	ETO Quant	Processing Method	5	6/1/2018 3:49:02 PM -04:00	Red	Changed	added calibration type
4	ETO Quant	Processing Method	4	6/1/2018 2:59:03 PM -04:00	Red	Changed	added level concentrations to component table
3	ETO Quant	Processing Method	3	6/1/2018 2:57:04 PM -04:00	Red	Changed	added blanks, standards and standard levels
2	ETO Quant	Processing Method	2	6/1/2018 2:54:40 PM -04:00	Red	Changed	optimized integration and added components
1	ETO Quant	Processing Method	1	5/23/2018 11:32:26 AM -04:00	Red	Created	adding for training

The entire version history of the data object displayed in the Data Audit Trail.



Data audit trail window

The Data Audit Trail window contains some very powerful functions that allow you to get a complete history of the data. The **Show Changes** feature displays the changes that occurred between the currently selected version and the version immediately prior to that, or, if two versions are selected, will show the changes between the two selected versions. The display can easily be switched between showing only the changes in the records and showing all the properties, even those that have not changed. In either display, easily identifiable icons quickly show what properties have changed, have been added or have been deleted.

Changes of Processing Method 'ETO Quant PM' version 5 vs. version 14

Version	Date/Time	Operator	Operation	Comment
5	6/1/2018 3:49:02 PM -04:00	Red	Changed	added calibration type
14	5/14/2019 11:06:42 AM -04:00	cmadmin	Changed	

Property Value version 5 Value version 14

- Channel All Channels FID1B
- Cal.Type Lin Lin, WithOffset

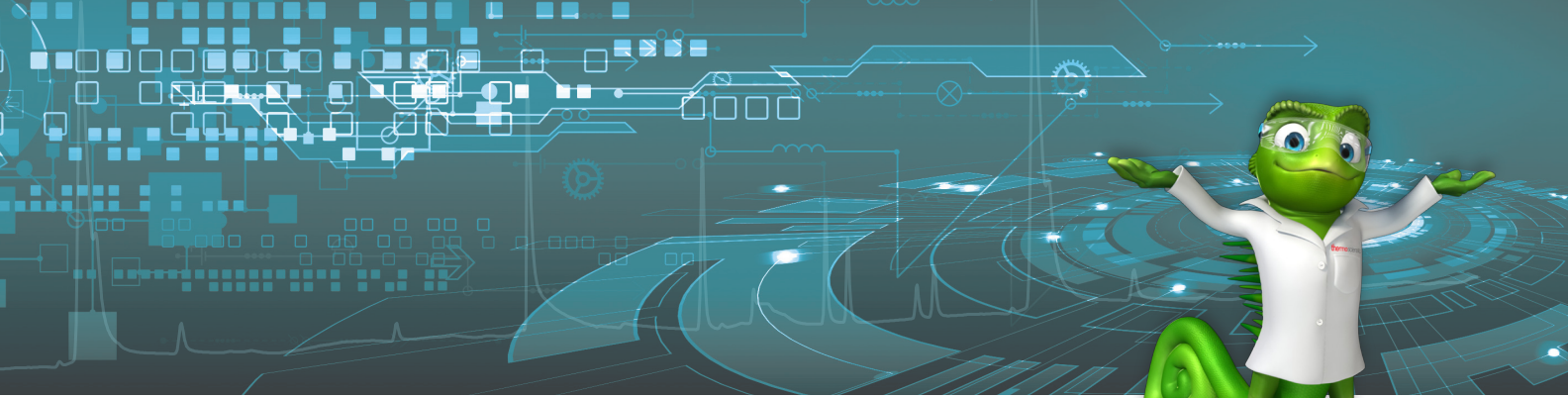
Changes of Processing Method 'ETO Quant PM' version 5 vs. version 14

Version	Date/Time	Operator	Operation	Comment
5	6/1/2018 3:49:02 PM -04:00	Red	Changed	added calibration type
14	5/14/2019 11:06:42 AM -04:00	cmadmin	Changed	

Property Value version 5 Value version 14

- Name ETO ETO
- Channel All Channels FID1B
- Comment auto generated auto generated
- Factor 1.000000 1.000000
- Eval.Type Area Area
- Cal.Type Lin Lin, WithOffset
- Stand.Meth. External External
- Level 1 0.250000 0.250000
- Level 5 25.000000 25.000000
- Level 6 50.000000 50.000000
- Level 3 5.000000 5.000000
- Level 4 12.500000 12.500000
- Level 2 2.500000 2.500000
- Level Tolerance 1

Viewing changes between version 5 and version 14. Easily identifiable icons show when a property has been changed, added or deleted. The display can be changed to show only the properties that have been changed (top figure) or all properties (bottom figure.)



Restoring versions

At any point, a current version may be restored to a previous version with ease. When the restore action is executed, it is treated as an additional new record and is fully tracked as such in the audit trail, including the assignment of a new version number. A message is also added to the Data Audit Trail showing that it was restored and what version it was restored from. All versions (current and previous) are saved and are accessible as part of the audit trail.

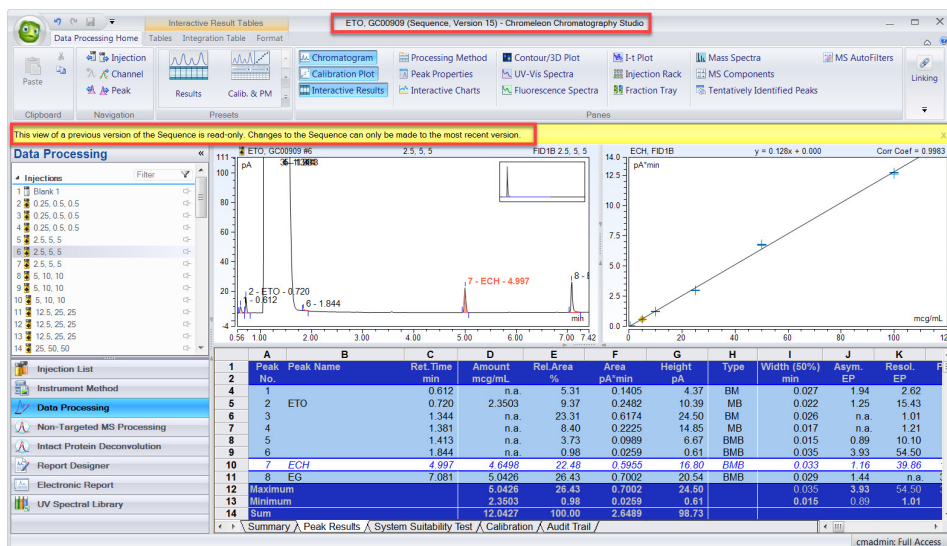
Previous versions may be restored and are given a new version number. In the figure above, version 15 (the current version) was created by restoring from version 13.

#	Name	Type	Version	Date / Time	Operator	Operation	Comment	Additional Information
15	ETO Quant	Processing Method	15	5/15/2019 2:09:17 PM -04:00	cmadmin	Changed		Restored to version 13.
14	ETO Quant	Processing Method	14	5/14/2019 11:06:42 AM -04:00	cmadmin	Changed		
13	ETO Quant	Processing Method	13	4/2/2019 10:02:42 AM -04:00	pkenny	Changed		
12	ETO Quant	Processing Method	12	2/27/2019 7:12:13 PM -05:00	cmadmin	Changed		Restored to version 10.
11	ETO Quant	Processing Method	11	2/27/2019 6:04:03 PM -05:00	cmadmin	Changed		
10	ETO Quant	Processing Method	10	1/29/2019 1:50:41 PM -05:00	cmadmin	Changed		
9	ETO Quant	Processing Method	9	1/24/2019 3:15:25 PM -05:00	cmadmin	Changed		
8	ETO Quant	Processing Method	8	11/21/2018 11:38:07 AM -05:00	cmadmin	Changed		
7	ETO Quant	Processing Method	7	10/23/2018 3:51:57 PM -04:00	cmadmin	Changed		
6	ETO Quant	Processing Method	6	6/1/2018 3:49:38 PM -04:00	Red	Changed	corrected channel for calibration	
5	ETO Quant	Processing Method	5	6/1/2018 3:49:02 PM -04:00	Red	Changed	added calibration type	
4	ETO Quant	Processing Method	4	6/1/2018 2:59:03 PM -04:00	Red	Changed	added level concentrations to component table	
3	ETO Quant	Processing Method	3	6/1/2018 2:57:04 PM -04:00	Red	Changed	added blanks, standards and standard levels	
2	ETO Quant	Processing Method	2	6/1/2018 2:54:40 PM -04:00	Red	Changed	optimized integration and added components	
1	ETO Quant	Processing Method	1	5/23/2018 11:32:26 AM -04:00	Red	Created	adding for training	

Read-only sequence viewer

Changes to some data objects, such as integration parameters in a Processing Method, or dilution factors in a Sequence, may impact sample results. Even after a new version of an object has been created, for example after a change in the Processing Method, Chromeleon CDS is able to show the results of the Sequence, including all sample results, and a visual warning is displayed to indicate this is not the current version. Multiple read-only Studio versions of the Sequence can be opened simultaneously, allowing side-by-side comparison of results. While viewing the read-only Studio versions of the data, no changes to the Processing Method, printing of the Sequence, or saving of the Sequence is allowed, however temporarily changing views, panes and zooming is possible.

Read-only Studio Sequence of a previous version. The title bar displays the version number of the Sequence and a warning message indicates this is not the most recent version.





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