

Pharma & Biotech

Practical Applications of Data Integrity and Audit Trail Review

Demystifying the Audit Trail

Robert Lutskus | Lonza Informatics | 25 June 2019



Agenda

■ Regulatory requirements

- ALCOA +
- Current Guidance
- What does it look like on paper
- Is this new?

■ Today's Expectations

- Regulatory Requirements

■ Types of Audit Trails

- Types of audit trails (Data and System)
- Understand what is in the application audit trail
- Examples of Good, Bad and Ugly Audit Trails
- System Selection considerations

■ How to Review

- Critical Audit Trail Data
- Risk Assessment
- Periodic Review
- Documentation



Regulatory Requirements

ALCOA + Refresher

■ **Attributable**

- Data must be recorded so that it can be linked to the unique individual who produced it. Every piece of data entered into the record must be capable of being traced back to the time it was taken and to the individual who entered it.

■ **Legible**

- Data must be traceable, permanent, readable, and understandable by anyone reviewing the record. This is expanded to include any metadata pertaining to the record.

■ **Contemporaneous**

- Data are data that are summarily entered into the record at the time they are generated.

■ **Original**

- Data, or the source data, is the record medium in which the data was first recorded. An original data record should include the first data entered and all successive data entries required to fully detail the scope of the project.

■ **Accurate**

- Data are correct, truthful, complete, valid, and reliable. Controls put in place to assure the accuracy of data should be implemented on a risk-based structure.

■ **Complete**

- Data including any repeat or reanalysis performed on the sample.

■ **Consistent**

- All elements of the analysis such as the sequence of events follow on and are date or time stamped in the expected sequence.

■ **Enduring**

- Not recorded on the back of envelopes, cigarette packets, sticky notes, or the sleeves of a coat but in notebooks or electronic media in the data systems of instruments.

■ **Available**

- Data can be accessed for review and audit or inspection over the lifetime of the record.

■ Core purpose for the audit trail?



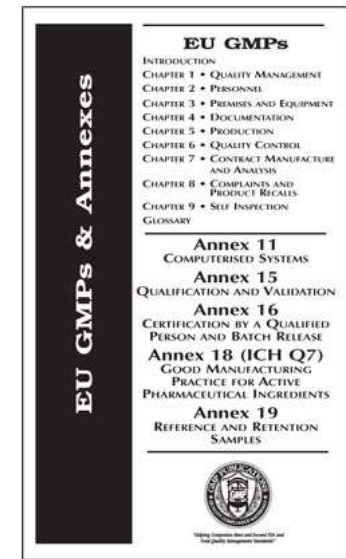
Regulatory Requirements

- 21 CFR Part 11 Subpart B Sec 11.10 Controls for Closed Systems
- Use of *secure, computer-generated, time-stamped audit trails* to independently record the date and time of operator entries and actions that create, modify, or delete electronic records. Record changes shall not obscure previously recorded information. Such audit trail documentation shall be retained for a period at least as long as that required for the subject electronic records and shall be available for agency review and copying



Regulatory Requirements

- EudraLex Volume 4 Annex 11: Computerised Systems
- *“Consideration should be given, based on a risk assessment, to building into the system the **creation of a record of all GMP-relevant changes and deletions** (a system generated “audit trail”). For change or deletion of GMP-relevant data the reason should be documented. Audit trails need to be **available and convertible to a generally intelligible form** and regularly reviewed.”*



Regulatory Requirements

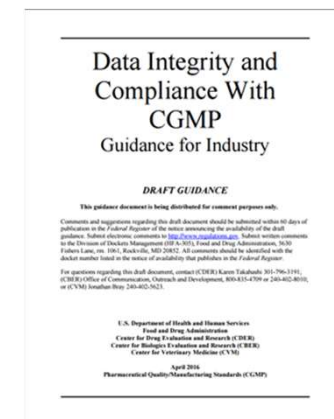
- PIC/S Good Practices for Data Management and Integrity in Regulated GMP/GDP Environments
- *“Where available, audit trail functionalities for electronic-based systems should be configured properly to capture general system events as well as any **activities relating to the acquisition, deletion, overwriting of and changes to data** for audit purposes.”*
- *“Audit trails should be verified during validation of the system.”*
- *“Companies should implement procedures that outline their policy and processes for the **review of audit trails in accordance with risk management principles**”*



Regulatory Requirements

System Audit Trail

- FDA Data Integrity and Compliance with CGMP
- “Regarding audits, FDA recommends that audit trails that capture changes to **critical data be reviewed with each record** and before final approval of the record. Audit trails subject to regular review should include, but are not limited to, the following: the change history of finished product test results, changes to sample run sequences, changes to sample identification, and changes to critical process parameters. FDA recommends **routine scheduled audit trail review** based on the complexity of the system and its intended use.”



Regulatory Requirements

System Audit Trail

- MHRA
- “An *audit trail provides for secure recording of life-cycle details* such as creation, additions, deletions or alterations of information in a record, either paper or electronic, without obscuring or overwriting the original record. An audit trail facilitates the reconstruction of the history of such events relating to the record regardless of its medium, including the “who, what, when and why” of the action.”
- “Routine data review should include a documented *audit trail review* where this is determined by a *risk assessment*.”



Regulatory Requirements

Paper Audit Trail

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Step	Test description	Actual Result	Tester Sign / Date
1.	Record Equipment number and Temperature	Equipment Number ^② 1A1E ^④ 1A201 1N602 Temperature ^① 95 ^③ 35.01 35	RL 26Feb2019

- ① Wrong Measurement 26Feb2019 RL
- ② Incorrect Rounding 26 Feb 2019 RL
- ③ Write Over 26 Feb 2019 RL
- ④ Incorrect Equipment ID 26Feb 2019 RL

- 21 CFR Part 11 – 1997 (2003)
- Annex 11 – 2011

- PIC/S - 2016
- FDA- 2018
- MHRA – 2018



Regulatory Requirements

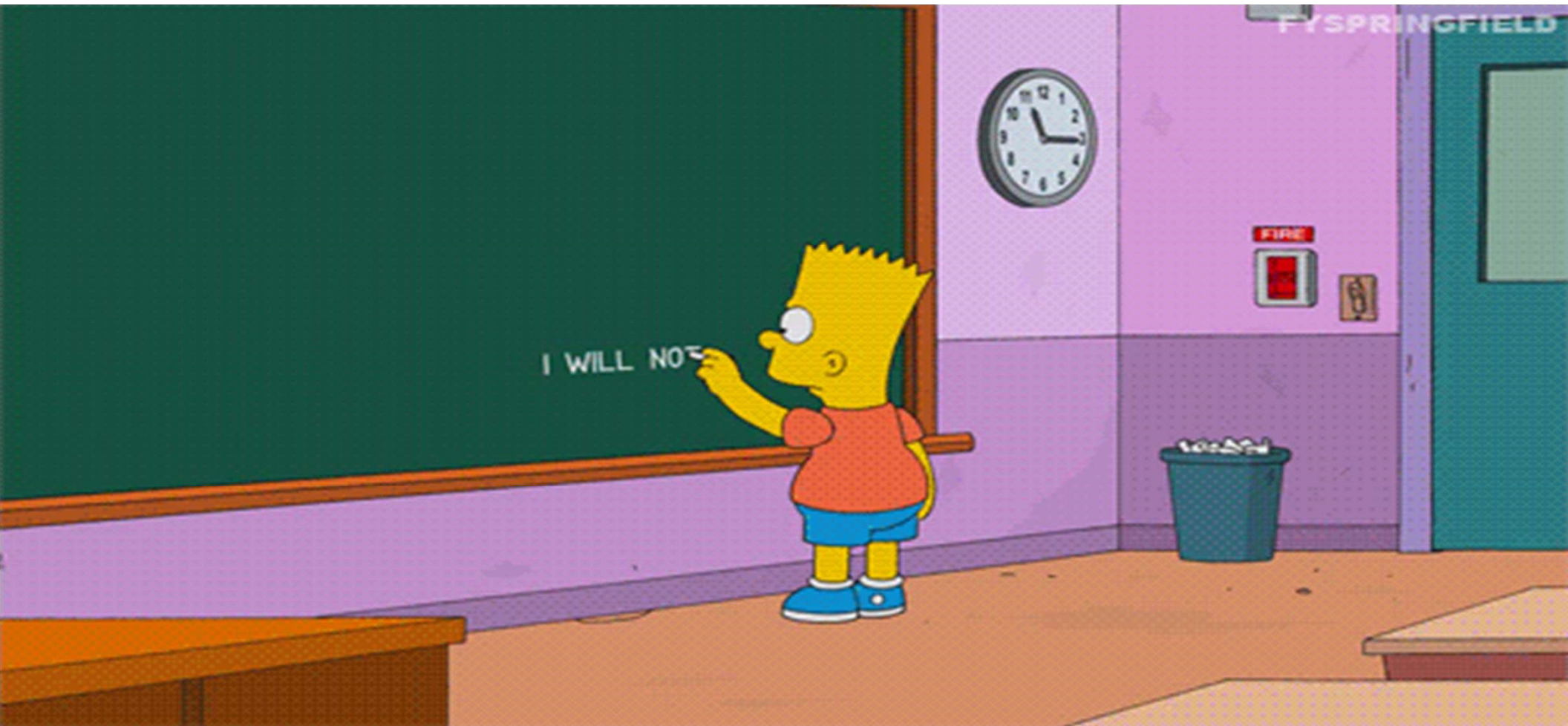
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- Systems User Requirements Specification
- Previous Audit Focus



Today's Expectations

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Regulatory Requirements

Expectations today for the Audit Trail – GAMP 5 Guidance

■ Automated

- The audit trail entries must be automatically captured by the computer system whenever an electronic record is created, modified or deleted.

■ Secure

- Audit trail data must be stored in a secure manner and must not be editable by any user.

■ Contemporaneous

- Each audit trail entry must be time stamped according to a controlled clock which cannot be altered. The time should either be based on central server time or a local time, so long as it is clear in which time zone the entry was performed.

■ Traceable

- Each audit trail entry must be attributable to the individual responsible for the direct data input. Updates made to data records must not obscure previous values and where required by regulation the reason for changing the data must also be recorded.

■ Archived

- The audit trail must be retained as long as the electronic record is required to be stored.

■ Available

- The audit trail must be available for agency review and copying

Regulatory Requirements

Expectations today for Audit Trail Entries - GAMP 5 Guidance

■ Identification of the User making the entry

- This is needed to ensure traceability. This could be a user's unique ID, however there should be a way of correlating this ID to the person.

■ Date and Time Stamp

- This is a critical element in documenting a sequence of events and vital to establishing an electronic record's trustworthiness and reliability. It can also be effective deterrent to records falsification.

■ Link to Record

- This is needed to ensure traceability. This could be the record's unique ID.

■ Original Value - New Value

- This is needed in order to be able to have a complete history and to be able reconstruct the sequence of events

■ Reason for Change

- This is only required if stipulated by the regulations pertaining to the audit trailed record.

Types of Audit Trails

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Types of Audit Trails

■ System Audit Trail

- Applied to system settings or actions
- Reviewed periodically based on risk



■ Data Audit Trail

- Applied to data i.e. electronic records/results
- Reviewed as part of regular review

Types of Audit Trails

Data Audit Trail

Step	Test description	Actual Result	Tester Sign / Date
1.	Record Equipment number and Temperature	Equipment Number ^② 1A1E ^④ 1A1E01 1NCO2 Temperature ^① 95 ^③ 35.01 35	RL 26Feb2019

① Wrong Measurement 26Feb2019 RL

② Incorrect Rounding 26 Feb 2019 RL

③ Write Over 26 Feb 2019 RL

④ Incorrect Equipment ID 26 Feb 2019 RL

Data Audit Trail

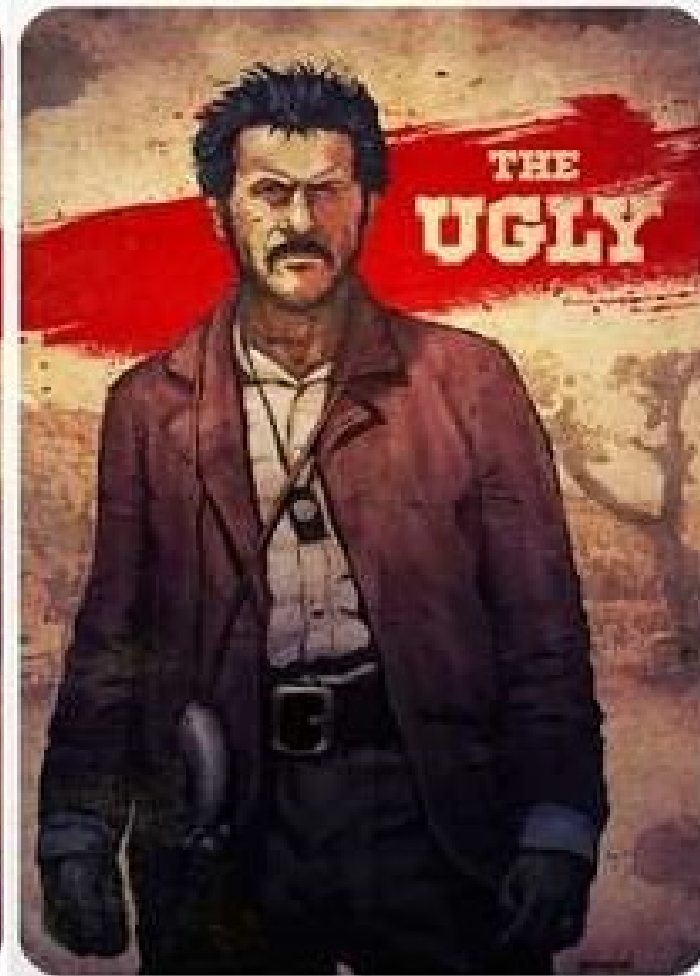
System Audit Trail

(*) P = production; C = Clearing; CH = changeover; RE = repair; MA = maintenance; CA = calibration; Q = qualification; V = validation

```
4/3/2019 9:47:15 AM [Info] RecordAuditTrailEntry
4/3/2019 9:47:16 AM [Info] GetUserPrincipal(): expiration is: 57 days 5 hours 14 minutes 9 seconds
4/3/2019 3:48:29 PM [Info] RecordAuditTrailEntry
4/3/2019 3:48:30 PM [Info] GetUserPrincipal(): expiration is: 56 days 23 hours 12 minutes 55 seconds
4/3/2019 3:50:58 PM [Info] RecordAuditTrailEntry
4/3/2019 3:50:58 PM [Info] GetUserPrincipal(): expiration is: 56 days 23 hours 10 minutes 27 seconds
4/3/2019 3:51:02 PM [Info] GetLookupData() called with user: MODADMIN and startDateRange: 1/1/0001 12:00:00 AM
4/3/2019 3:51:02 PM [Warn] ReferenceDataService: startDateRange was NULL.
4/3/2019 3:51:02 PM [Warn] ReferenceDataService: startDateRange was NULL.
4/3/2019 3:51:02 PM [Debug] LookupData: GetObjectData() called.
4/3/2019 3:51:02 PM [Debug] ReferenceDataService.GetLookupData: Elapsed time to get data: 0 min 0 sec
4/3/2019 3:51:03 PM [Info] RecordAuditTrailEntry
4/3/2019 3:51:03 PM [Info] GetUserPrincipal(): expiration is: 56 days 23 hours 10 minutes 21 seconds
4/3/2019 3:51:04 PM [Info] GetTestData() called with user: MODADMIN and startDateRange: 1/1/0001 12:00:00 AM
4/3/2019 3:51:04 PM [Info] GetSampleData() called with user: MODADMIN and startDateRange: 1/1/0001 12:00:00 AM
4/3/2019 3:51:04 PM [Info] GetLocationsData() called with user: MODADMIN and startDateRange: 1/1/0001 12:00:00 AM
4/3/2019 3:51:04 PM [Info] GetResultsData() called with user: MODADMIN and startDateRange: 1/1/0001 12:00:00 AM
4/3/2019 3:51:04 PM [Info] GetOrganismData() called with user: MODADMIN and startDateRange: 1/1/0001 12:00:00 AM
4/3/2019 3:51:04 PM [Warn] ReferenceDataService: startDateRange was NULL.
4/3/2019 3:51:04 PM [Warn] ReferenceDataService: startDateRange was NULL.
4/3/2019 3:51:04 PM [Info] GetUserData() called with user: MODADMIN and startDateRange: 1/1/0001 12:00:00 AM
4/3/2019 3:51:04 PM [Warn] ReferenceDataService: startDateRange was NULL.
4/3/2019 3:51:04 PM [Warn] ReferenceDataService: startDateRange was NULL.
4/3/2019 3:51:04 PM [Warn] ReferenceDataService: startDateRange was NULL.
4/3/2019 3:51:04 PM [Warn] ReferenceDataService: startDateRange was NULL.
4/3/2019 3:51:04 PM [Warn] ReferenceDataService: startDateRange was NULL.
4/3/2019 3:51:04 PM [Debug] LimitSql.SelectActive: Elapsed time to get data: 0 min 0 sec
4/3/2019 3:51:04 PM [Debug] ResultsData: GetObjectData() called.
4/3/2019 3:51:04 PM [Debug] LimitRuleGroupSql.SelectActive: Elapsed time to get data: 0 min 0 sec
4/3/2019 3:51:04 PM [Debug] ReferenceDataService.GetResultsData: Elapsed time to get data: 0 min 0 sec
4/3/2019 3:51:04 PM [Debug] LimitRuleSql.SelectActive: Elapsed time to get data: 0 min 0 sec
```

Audit Trail Examples

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Audit Trail Examples

Bad

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Command Usage Log			
Operator	Operator Name	Date / Time	Command
admin	admin	25-10-2018 00:01:17	Auto Archive Log to C:\Temp\Log files auto archive\AutoArchiv [redacted].pdf
admin	admin	25-10-2018 09:41:15	The user 'admin' logged in to [redacted] after a login timeout.
admin	I admin	25-10-2018 09:43:51	Lab name option changed from nothing to QCA
admin	admin	25-10-2018 09:43:51	AutoName option changed from True to False
admin	admin	25-10-2018 09:43:51	AutoStop option changed from True to False
admin	admin	25-10-2018 09:43:51	AutoPrint option changed from True to False
admin	admin	25-10-2018 10:07:15	[redacted] timed out due to inactivity.
admin	admin	25-10-2018 11:02:08	The user 'admin' login attempt was successful.
admin	admin	25-10-2018 11:02:08	[redacted] application started
admin	admin	25-10-2018 11:02:08	LogoutTime : 15
admin	admin	25-10-2018 11:02:08	UseZero : True
admin	admin	25-10-2018 11:02:08	Reader Type : [redacted]
admin	admin	25-10-2018 11:02:09	The reader is not responding. [redacted]
admin	admin	25-10-2018 11:04:46	Changed User Specific from False to True
admin	admin	25-10-2018 11:32:57	Password History Timeout option changed from 0 to 540

Name	Date modified	Type
 AutoArchive [redacted].pdf	2018 15:33	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 00:01	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 00:01	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 00:01	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 00:01	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 00:01	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 00:01	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 00:01	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 00:01	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 00:01	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 10:01	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 00:00	Adobe Acrobat D..
 AutoArchive [redacted].pdf	2018 00:01	Adobe Acrobat D..

Audit Trail Examples

Ugly

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My login

Role

Muscan administrator

User

MS_Admin

Log out

My details

Users

Laboratories

Audit trails

Logs

Application variables

Sample types

MuScan machines

Active Devices

Audit trails

Search options

Event date

Search

Clear

User

Event

Batch id

Run id

Results 1-100 of 2050

On Sat 18 Aug 2018 12:08:37 MS_Admin has logged in

On Fri 17 Aug 2018 17:08:44 MS_Operator has logged in

On Fri 17 Aug 2018 17:08:37 MS_Admin has logged out

On Fri 17 Aug 2018 17:08:42 MS_Admin has logged in

On Fri 17 Aug 2018 17:08:10 MS_Admin has logged out

On Fri 17 Aug 2018 23:08:40 MS_Admin created T_AUTH_USER(). USERNAME: 'Tester'

On Fri 17 Aug 2018 23:08:40 MS_Admin created CREDENTIAL(). USERNAME: 'Tester' CREDENTIAL: '74d9f9224baa50908bd154b73f123eab'

On Fri 17 Aug 2018 23:08:41 MS_Admin created GRANTED_ROLE(). USERNAME, USERGROUP, APP_NAME, START_DATE, USERNAME: 'Tester' USERGROUP: 'MSC_OPERATOR' APP_NAME: 'MUSCAN' START_DATE: '2018/08/17 12:51' END_DATE: '2018/08/18 17:25:27'

On Fri 17 Aug 2018 23:08:10 MS_Admin created CREDENTIAL(). USERNAME: 'Tester1' CREDENTIAL: '74d9f9224baa50908bd154b73f123eab'

On Fri 17 Aug 2018 23:08:10 MS_Admin disabled T_AUTH_USER(). USERNAME: 'Tester1' null

On Fri 17 Aug 2018 23:08:10 MS_Admin disabled GRANTED_ROLE(). USERNAME, USERGROUP, APP_NAME, START_DATE, USERNAME: 'Tester1' null USERGROUP: 'MSC_RD_ENGINEER' null APP_NAME: 'MUSCAN' null START_DATE: '2018/08/09 08:50:32' null END_DATE: '2018/08/09 08:50:42' null

On Fri 17 Aug 2018 23:08:10 MS_Admin created CREDENTIAL(). USERNAME: 'Michele Test' CREDENTIAL: '74d9f9224baa50908bd154b73f123eab'

On Fri 17 Aug 2018 17:08:10 MS_Admin has logged in

On Fri 17 Aug 2018 12:08:18 MS_Operator has logged out

On Fri 17 Aug 2018 09:08:21 MS_Admin has logged out

On Fri 17 Aug 2018 09:08:07 MS_Admin has logged in

On Fri 17 Aug 2018 15:54:59 login failed for MS_Admin

On Fri 17 Aug 2018 09:08:49 MS_Operator has logged out

On Fri 17 Aug 2018 09:08:05 MS_Operator has logged in

On Fri 17 Aug 2018 15:08:56 MS_Operator updated ASSAY_BATCH(). BATCH_ID, LAB_NAME, BATCH_ID: '914' LAB_NAME: 'TESTLAB007' OPERATOR_SIGNATURE: '4008f6e91bc36a2b6952f358cf904'

On Fri 17 Aug 2018 15:08:56 MS_Operator updated ASSAY_BATCH(). BATCH_ID, LAB_NAME, BATCH_ID: '914' LAB_NAME: 'TESTLAB007' ASSESS1: 'A'

On Fri 17 Aug 2018 15:08:28 MS_Operator updated ANALYSIS_RUN(). BATCH_ID, RUN_ID, BATCH_ID: '914' RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' ASSESS1: 'A'

On Fri 17 Aug 2018 15:08:19 MS_Operator updated ASSAY_RUN_IMAGE(). RUN_ID, batch_id, RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' batch_id: '914' CELLS_CONFIRMED_OPERATOR: 'V' changed to: '24' ASSESS1: 'A'

On Fri 17 Aug 2018 15:08:19 MS_Operator updated ANALYSIS_RUN(). BATCH_ID, RUN_ID, BATCH_ID: '914' RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' RUN_SPOTS_OPERATOR: 'V' changed to: '24'

On Fri 17 Aug 2018 15:08:48 MS_Operator updated ANALYSIS_RUN(). BATCH_ID, RUN_ID, BATCH_ID: '914' RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' ASSESS1: 'A'

On Fri 17 Aug 2018 15:08:36 MS_Operator updated ASSAY_RUN_IMAGE(). RUN_ID, batch_id, RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' batch_id: '914' CELLS_CONFIRMED_OPERATOR: 'V' changed to: '20' ASSESS1: 'A' CELLS_DETECTED_OPERATOR: 'V' changed to: '1' CELLS_DISAPPROVED_OPERATOR: 'V' changed to: '1'

On Fri 17 Aug 2018 15:08:36 MS_Operator updated ANALYSIS_RUN(). BATCH_ID, RUN_ID, BATCH_ID: '914' RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' RUN_SPOTS_OPERATOR: 'V' changed to: '10'

On Fri 17 Aug 2018 15:08:18 MS_Operator updated ASSAY_RUN_IMAGE(). RUN_ID, batch_id, RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' batch_id: '914' CELLS_CONFIRMED_OPERATOR: 'V' changed to: '22' ASSESS1: 'A'

On Fri 17 Aug 2018 15:08:18 MS_Operator updated ANALYSIS_RUN(). BATCH_ID, RUN_ID, BATCH_ID: '914' RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' RUN_SPOTS_OPERATOR: '48' changed to: '70'

On Fri 17 Aug 2018 15:08:08 MS_Operator updated ASSAY_RUN_IMAGE(). RUN_ID, batch_id, RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' batch_id: '914' CELLS_CONFIRMED_OPERATOR: 'V' changed to: '24' ASSESS1: 'A'

On Fri 17 Aug 2018 15:08:08 MS_Operator updated ANALYSIS_RUN(). BATCH_ID, RUN_ID, BATCH_ID: '914' RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' RUN_SPOTS_OPERATOR: '24' changed to: '48'

On Fri 17 Aug 2018 15:08:02 MS_Operator updated ANALYSIS_RUN(). BATCH_ID, RUN_ID, BATCH_ID: '914' RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' RUN_SPOTS_OPERATOR: 'V' changed to: '24'

On Fri 17 Aug 2018 15:08:01 MS_Operator updated ASSAY_RUN_IMAGE(). RUN_ID, batch_id, RUN_ID: 'b11db49f-0c0f-4553-866f-a94876861223' batch_id: '914' CELLS_CONFIRMED_OPERATOR: 'V' changed to: '24' ASSESS1: 'A'

On Fri 17 Aug 2018 09:08:33 MS_Operator has logged in

On Thu 16 Aug 2018 14:08:32 MS_Admin has logged in

On Thu 16 Aug 2018 14:08:41 MS_Reviewer has logged in

Powered by Innosieve Diagnostics 2018

Gui Version: 1.07

About Innosieve Diagnostics

Log Out

Robert Lutskus | Lonza Informatics | 25 June 2019

Audit Trail Examples

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Ugly

Audit					
Drag a column header here to group by that column.					
Audit ID	Table Name	Primary Id	User Name	Activity Date	Column 1
9417851	TIME_FRAME_T	419	MODADMIN	7/1/2015 2:26:51 PM	DESCRIPTION
Audit ID	9417851	Table Name	TIME_FRAME_T	Primary Id	419
Activity Date	7/1/2015 2:26:51 PM	Activity	UPDATE	User Name	MODADMIN
Column 1	DESCRIPTION	Old Value 1	Sampling	New Value 1	Sampling
Column 2	TEST_TYPE_ID	Old Value 2	590	New Value 2	590
Column 3	TEST_STAGE_ID	Old Value 3	75	New Value 3	75
Column 4	SEQUENCE	Old Value 4	1	New Value 4	1
Column 5	MIN_TIME	Old Value 5	0	New Value 5	0
Column 6	MAX_TIME	Old Value 6	0	New Value 6	0
Column 7	MIN_CYCLES	Old Value 7	0	New Value 7	0
Column 8	MAX_CYCLES	Old Value 8	0	New Value 8	0
Column 9	E_SIGN	Old Value 9	Y	New Value 9	Y
Column 10	E_SIGN_VERIFICATION	Old Value 10	N	New Value 10	N
Column 11	PRINT_LABELS	Old Value 11	Y	New Value 11	N
Column 12	USE_PREVIOUS_RESULT	Old Value 12	N	New Value 12	N
Column 13	MATCHING_RESULTS_ONLY	Old Value 13	N	New Value 13	N
Column 14	SHOW_PERSONNEL_PANEL	Old Value 14	N	New Value 14	N
Column 15	SHOW_DEVICE_CONTROL	Old Value 15	N	New Value 15	N
Column 16	SHOW_SAMPLE_MEDIA	Old Value 16	N	New Value 16	N
Column 17	SHOW_SAMPLE_TIMES	Old Value 17	N	New Value 17	N
Column 18	SHOW_INCUBATION_TIMES	Old Value 18	N	New Value 18	N
Column 19	SHOW_ADD_CYCLE	Old Value 19	N	New Value 19	N
Column 20	SHOW_ENVIRONMENT	Old Value 20	N	New Value 20	N
Column 21	SHOW_READINGS	Old Value 21	N	New Value 21	N
Column 22	SHOW_ORGID	Old Value 22	N	New Value 22	N
Column 23	REQUIRE_START_DATE	Old Value 23	N	New Value 23	N
Column 24	REQUIRE_END_DATE	Old Value 24	N	New Value 24	N
Column 25	REQUIRE_PERFORMED_USER	Old Value 25	N	New Value 25	N
Column 26	MIN_CAL_ALIGNMENT	Old Value 26	None	New Value 26	None
Column 27	MAX_CAL_ALIGNMENT	Old Value 27	None	New Value 27	None
Column 28	ACTIVE	Old Value 28	Y	New Value 28	Y
Column 29	LEGACY	Old Value 29	N	New Value 29	N
Column 30		Old Value 30		New Value 30	

Click on a row to display everything in the row below in a table.

Print Labels was changed from Yes to No.

Audit Trail Examples

Good

<u>Standards Results</u>					
Standards	Conc./Dil.	Well	Reaction Time (sec)	Average Reaction Time (sec)	Back Prediction (Linear Regression)
Blank	Blank	A 5	****	****	****
		A 6	****		
Std. 1	0.05	B 5	3236	3258	0.0318
		B 6	3280		
Std. 2	0.5	C 5	1401	1405	1.23
		C 6	1409		
# Std. 3	5	F 5	1138	1130	3.18
		H 8	1122		

Reviewed By : _____

Date/Time : _____

(!! = Masked, **** = reaction time > 3300, ???? = atypical, # = Modified, >>>> = High OD)
 (In Notes : ! = Masked Point(s), * = Point(s) Did Not React, ? = Atypical Point(s), # = Modified, > = High OD, <LS = Less than the lowest standard)

Audit Trail Examples

Good

■ Data Audit Trail

- Audit Trail review as part of sample review
- The system will automatically flag any sample that has had a value changed from an initial save/signature.
- Reviewer doesn't need to go to the historical "Audit Trail" that is difficult to find information for end users.
- System displays a history of the sample information in a user-friendly, tab based design
- Reviewer can see
 - Initial Entry
 - Who Performed the action
 - When the performed the action
 - Updated Entry
 - Who performed edit/update
 - When the performed the action/update
 - The note associated with the change

00000YHK

10/27/2017 9:30:37 AM

R1001.1

Air Viable

Global Pharmaceutical...

MODADMIN

00000YJ1

10/9/2017 1:16:11 PM

R1003.S01a

MAS Air Viable 1 Stage...

Global Pharmaceutical...

MODADMIN

Remaining minutes until samples complete: 0

Table Notes

Operation	Note	User Name	Note Date
SAMPLE	The result was changed from 300 to 100 because Rob can't count	MODADMIN	10/4/2017 10:21:26 AM
SAMPLE	Added TW Number	MODADMIN	10/11/2017 4:03:03 PM
RESULT	Submitted by Accugenix Import	MODADMIN	10/27/2017 9:30:38 AM

Sampling

Incubation

Testing

Readings

Excursions

Exceeded Limits

Media

Equipment

E-Sigs

Organism

Reviews

Table Notes

Group

Readings History

Drag a column header here to group by that column.

Measurement	Operator	Value	Uom	Reading Date	Performed User	Audit Action	Audit Date
Bacteria	=	300	cfu	10/4/2017 9:56:48 AM	MODADMIN	I	10/4/2017 10:01:14 AM
TSA Mold	=	0	cfu	10/4/2017 9:56:48 AM	MODADMIN	I	10/4/2017 10:01:14 AM
TSA Count	=	300	cfu	10/4/2017 9:56:48 AM	MODADMIN	I	10/4/2017 10:01:14 AM
TSA Probable Count	=	TNTC	cfu/m^3	10/4/2017 9:56:48 AM	MODADMIN	I	10/4/2017 10:01:14 AM
TSA Total Count	=	TNTC	cfu/m^3	10/4/2017 9:56:48 AM	MODADMIN	I	10/4/2017 10:01:14 AM
Bacteria	=	100	cfu	10/4/2017 9:56:48 AM	MODADMIN	U	10/4/2017 10:21:52 AM
TSA Mold	=	0	cfu	10/4/2017 9:56:48 AM	MODADMIN	U	10/4/2017 10:21:52 AM
TSA Count	=	100	cfu	10/4/2017 9:56:48 AM	MODADMIN	U	10/4/2017 10:21:52 AM
TSA Probable Count	=	124	cfu/m^3	10/4/2017 9:56:48 AM	MODADMIN	U	10/4/2017 10:21:52 AM
TSA Total Count	=	124	cfu/m^3	10/4/2017 9:56:48 AM	MODADMIN	U	10/4/2017 10:21:52 AM

Readings History

Dilution History

Dilution Equipment History

Incubation History

Organism Found History

Sample History

Workspace Equip

Audit Trail Examples

Lonza

Good

Dashboard

Admin

Schedule

Review/Approve

Analyze

Report Gallery

Reset Layout

Filter Panel

Details Panel

History Panel

Edit

Review

Approve

ReOpen

NoTest

Undo NoTest

Group

Post Results

Process

Print

Save Filter

Open Filter

View

Operation

Tools

Drag a column header here to group by that column.

Sampling Barcode	Sample Start Date	Sampling Site	Test Method	Sampling Locati...	Sampling Techni...	Sampling Enviro...	Sampling Plan	Approval Date	Excursion Numb...	EM Edit	FDC Edit
00000Y6XP252	8/9/2017 12:30:00 PM	R1001.5	Personnel Monitoring	Global Pharmaceutical...	Analyst07	D	Aseptic EM Routine			N	N
00000Y6S	8/9/2017 12:30:00 PM	R1001.1	Air Viable	Global Pharmaceutical...	MODADMIN	D	Aseptic EM Routine		TW1234	Y	N
00000Y7B	8/3/2017 3:00:00 AM	R1001.3	Air Viable	Global Pharmaceutical...	MODADMIN	D	Aseptic EM Routine			N	N
00000Y7C	8/3/2017 3:00:00 AM	R1001.3	Air Viable	Global Pharmaceutical...	MODADMIN	D	Aseptic EM Routine			N	N
00000Y7D	8/3/2017 3:00:00 AM	R1001.3	Air Viable	Global Pharmaceutical...	MODADMIN	D	Aseptic EM Routine			N	N
00000Y7EP151	8/3/2017 3:00:00 AM	R1001.5	Personnel Monitoring	Global Pharmaceutical...	Analyst04	D	Aseptic EM Routine			N	N
00000Y7F	8/3/2017 3:00:00 AM	R1001.W52	Surface Bioburden	Global Pharmaceutical...	MODADMIN	D	Aseptic EM Routine			N	N
00000Y7G	8/3/2017 3:00:00 AM	R1001.6	Settle Plates	Global Pharmaceutical...	MODADMIN	D	Aseptic EM Routine			Y	N
00000Y7H	8/3/2017 3:00:00 AM	R1001.W53	Surface Bioburden	Global Pharmaceutical...	MODADMIN	D	Aseptic EM Routine			N	N
00000Y7I	8/3/2017 3:00:00 AM	R1001.8	Surface Bioburden	Global Pharmaceutical...	MODADMIN	D	Aseptic EM Routine			N	N
00000Y7J	8/3/2017 3:00:00 AM	R1001.W51	Surface Bioburden	Global Pharmaceutical...	MODADMIN	D	Aseptic EM Routine			Y	N
00000Y7EP152	8/3/2017 3:00:00 AM	R1001.5	Personnel Monitoring	Global Pharmaceutical...	Analyst04	D	Aseptic EM Routine			N	N
00000Y7EP251	8/3/2017 3:00:00 AM	R1001.5	Personnel Monitoring	Global Pharmaceutical...	Analyst06	D	Aseptic EM Routine			N	N
00000Y7EP252	8/3/2017 3:00:00 AM	R1001.5	Personnel Monitoring	Global Pharmaceutical...	Analyst06	D	Aseptic EM Routine			N	N
00000Y79	8/3/2017 3:00:00 AM	R1001.1	Air Viable	Global Pharmaceutical...	MODADMIN	D	Aseptic EM Routine			Y	N
00000Y7A	8/3/2017 2:26:53 AM	R1001.2	Total Particulate	Global Pharmaceutical...	MODADMIN	D	Aseptic EM Routine			N	Y

Readings

Measurement	Operator	Value	Uom	Token	Particle Size	Result	Formula	Reading Date
TSA Bacterium	=	10	cfu	SB_Bacteria		N		8/3/2017 2:38:38 AM
TSA Mold	=	0	cfu	SB_Mold		N		8/3/2017 2:38:38 AM
TSA Total Count	=	10	cfu	SB_Result		Y	IF((SB_Bacteria+SB_Mold)+250.250,(SB_Bacteria+SB_Mold))	8/3/2017 2:38:38 AM

Sampling | Incubation | Testing | **Readings** | Excursions | Exceeded Limits | Media | Equipment | E-Sigs | Organism | Reviews | Table Notes | Group | Attribute Data | Site Trend | Attachments

Readings History

Measurement	Operator	Value	Uom	Token	Particle Size	Result	Formula	Reading Date	Performed User	Audit Action	Audit Date	Time Frame Des...
Measurement: TSA Total Count (2 items)												
TSA Total Count	=	10	cfu	SB_Result		Y	IF((SB_Bacteria+SB_M...	8/3/2017 2:38:38 AM	MODADMIN	U	8/3/2017 2:57:31 AM	Results Entry
TSA Total Count	=	0	cfu	SB_Result		Y	IF((SB_Bacteria+SB_M...	8/3/2017 2:38:38 AM	MODADMIN	I	8/3/2017 2:39:08 AM	Results Entry
Measurement: TSA Bacterium (2 items)												
TSA Bacterium	=	10	cfu	SB_Bacteria		N		8/3/2017 2:38:38 AM	MODADMIN	U	8/3/2017 2:57:31 AM	Results Entry
TSA Bacterium	=	0	cfu	SB_Bacteria		N		8/3/2017 2:38:38 AM	MODADMIN	I	8/3/2017 2:39:08 AM	Results Entry
Measurement: TSA Mold (2 items)												
TSA Mold	=	0	cfu	SB_Mold		N		8/3/2017 2:38:38 AM	MODADMIN	U	8/3/2017 2:57:31 AM	Results Entry
TSA Mold	=	0	cfu	SB_Mold		N		8/3/2017 2:38:38 AM	MODADMIN	I	8/3/2017 2:39:08 AM	Results Entry

Readings History | Dilution History | Dilution Equipment History | Dilution Media History | Incubation History | Organism Found History | Sample History | Sample Product History | Workspace Equipment History | Workspace Media History

Ready

94 records were returned

94 records were returned.

Audit Trail Examples

Good

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Audit										
EQUIPMENT_TYPE_AUDIT										
EQUIPMENT_TYPE_AUDIT_ID	EQUIPMENT_TYPE_ID	DESCRIPTION	CREATED_USERNAME	CREATED_DATE	UPDATED_USERNAME	UPDATED_DATE	ACTIVE	LEGACY	AUDIT_ACTION	AUDIT_DATE
EQUIPMENT_TYPE_ID: 1 (1 item)										
1	1	No equipment type	MODADMIN	7/31/2018 10:54 AM	MODADMIN	7/31/2018 10:54 AM	Y	N	I	7/31/2018 10:54 AM
EQUIPMENT_TYPE_ID: 7 (2 items)										
2	7	Incubator	MODADMIN	7/31/2018 10:54 AM	MODADMIN	7/31/2018 10:54 AM	Y	N	I	7/31/2018 10:54 AM
8	7	Sample Reconciliation	MODADMIN	7/31/2018 10:54 AM	MODADMIN	2/5/2019 10:46 PM	Y	N	U	2/5/2019 10:46 PM
EQUIPMENT_TYPE_ID: 8 (1 item)										
3	8	Active Air Sampler	MODADMIN	7/31/2018 10:54 AM	MODADMIN	7/31/2018 10:54 AM	Y	N	I	7/31/2018 10:54 AM
EQUIPMENT_TYPE_ID: 9 (1 item)										
4	9	Particulate Counter	MODADMIN	7/31/2018 10:54 AM	MODADMIN	7/31/2018 10:54 AM	Y	N	I	7/31/2018 10:54 AM
EQUIPMENT_TYPE_ID: 10 (1 item)										
5	10	Incubator 20-25	MODADMIN	7/31/2018 3:33 PM	MODADMIN	7/31/2018 3:33 PM	Y	N	I	7/31/2018 3:33 PM
EQUIPMENT_TYPE_ID: 11 (1 item)										
6	11	Hoods	MODADMIN	7/31/2018 3:33 PM	MODADMIN	7/31/2018 3:33 PM	Y	N	I	7/31/2018 3:33 PM
EQUIPMENT_TYPE_ID: 12 (1 item)										
7	12	Incubator 30-35	MODADMIN	7/31/2018 3:33 PM	MODADMIN	7/31/2018 3:33 PM	Y	N	I	7/31/2018 3:33 PM
EQUIPMENT_TYPE_ID: 13 (1 item)										
9	13	Incubator 20-25°C	MODADMIN	3/11/2019 1:28 PM	MODADMIN	3/11/2019 1:28 PM	Y	N	I	3/11/2019 1:28 PM
EQUIPMENT_TYPE_ID: 14 (1 item)										
10	14	HPLC	MODADMIN	3/20/2019 2:18 PM	MODADMIN	3/20/2019 2:18 PM	Y	N	I	3/20/2019 2:18 PM
EQUIPMENT_TYPE_ID: 15 (1 item)										
11	15	Mass Spec	MODADMIN	3/20/2019 2:31 PM	MODADMIN	3/20/2019 2:31 PM	Y	N	I	3/20/2019 2:31 PM
EQUIPMENT_TYPE_ID: 16 (1 item)										
12	16	HIAC	MODADMIN	3/20/2019 2:32 PM	MODADMIN	3/20/2019 2:32 PM	Y	N	I	3/20/2019 2:32 PM
EQUIPMENT_TYPE_ID: 17 (1 item)										
13	17	20 to 25 Deg C Incubator	MODADMIN	3/20/2019 2:42 PM	MODADMIN	3/20/2019 2:42 PM	Y	N	I	3/20/2019 2:42 PM

Date Range

From:

To:

Range:

Audit Action

Insert (I)
Update (U)
Delete (D)

Table List

ENVIRONMENT_DEF_AUDIT_T
EQUIPMENT_AUDIT_T
EQUIPMENT_HISTORY_AUDIT_T
EQUIPMENT_TYPE_AUDIT_T

Audit Search List

User Role Audit
Sample Product Audit
Batch Audit
Plan Audit

Review and Auto Approval

Concentrate on the most important samples

■ Review and Approve by Exception

- Allows reviewer to concentrate on samples with issues instead of the 95-98% that followed the defined, validated process
- System only approvers samples that meet criteria
 - No edits to information
 - No out of specification results
 - No notes from users
 - And many more...

■ System Checks

- Controls sample workflow
- Enforces incubation/hold times
- Ensures scheduled samples are taken
- Ensures media is within expiration and passed qualifying testing
- Ensures equipment is within calibration
- Ensures all fields are filled out
- Ability to have secondary electronic verifier signatures
- Flags any sample with a change, note or out of specification limit
 - Displays audit trail if any changes occurred

Needs Review by Qualified Reviewer

Sampling Barcode	Sample Start Date	Sampling Site	Test Method	Most Severe Excursion	Approval Date
MG452397	7/14/2009 10:51:12 AM	R1003.S01a	Air Viable	Action	
000006T7	7/9/2009 6:41:38 AM	R1001.8	Surface Bioburden	Action	
0000097Q	6/24/2009 5:35:05 PM	WFI-D1	TOC Analysis	Alert	
000009H5	6/24/2009 5:35:05 PM	WFI-D1	LAL/Endotoxin Analysis	Action	
000006SF	6/11/2009 7:56:13 AM	R1001.8	Surface Bioburden	Action	
00000523P1S2	6/10/2009 5:13:24 PM	R1001.5	Personnel Monitoring	Action	
000006GO	6/10/2009 5:13:24 PM	R1001.WS1	Surface Bioburden	Action	
000008FO	6/10/2009 5:13:24 PM	R1003.S01a	Air Viable	Alert	
MG452149	5/1/2009 10:36:28 PM	R1003.D01	Surface Bioburden	Action	

Reviewed by System

Sampling Barcode	Sample Start Date	Sampling Site	Test Method	Most Severe Excursion	Approval Date
P-10027379452	5/5/2017 10:43:44 PM	R1001.WS2	Surface Bioburden		7/11/2018 11:54:42 AM
00000Y5R	7/26/2017 11:00:00 PM	R1001.WS1	Surface Bioburden		7/11/2018 11:54:42 AM
00000Y5P	7/26/2017 11:00:00 PM	R1001.WS3	Surface Bioburden		7/11/2018 11:54:42 AM
00000Y5Q	7/26/2017 11:00:00 PM	R1001.8	Surface Bioburden		7/11/2018 11:54:42 AM
00000Y5N	7/26/2017 11:00:00 PM	R1001.WS2	Surface Bioburden		7/11/2018 11:54:42 AM
00000YAF	8/15/2017 11:00:00 PM	R1001.WS2	Surface Bioburden		7/11/2018 11:54:42 AM
00000YAH	8/15/2017 11:00:00 PM	R1001.WS3	Surface Bioburden		7/11/2018 11:54:42 AM
00000YAJ	8/15/2017 11:00:00 PM	R1001.WS1	Surface Bioburden		7/11/2018 11:54:42 AM
00000YBO	9/6/2017 12:00:00 PM	R1001.WS1	Surface Bioburden		7/11/2018 11:54:42 AM
00000YBN	9/6/2017 12:00:00 PM	R1001.8	Surface Bioburden		7/11/2018 11:54:42 AM
00000YBM	9/6/2017 12:00:00 PM	R1001.WS3	Surface Bioburden		7/11/2018 11:54:42 AM
00000YBK	9/6/2017 12:00:00 PM	R1001.WS2	Surface Bioburden		7/11/2018 11:54:42 AM

System Selection

Current state vs Future State

- Understand how your current system is capturing data.
 - Remediate?
 - Replace?
-
- When selecting new systems:
 - RFP/URS Considerations
 - System Implementation
-
- Show and Prove!



How to Review

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Audit Trail Review

General

- The system must be validated first
- Define which data is critical to patient safety and regulatory compliance
- Analyze the path of data in the system and the business process, specifically looking at the defined data
- Identify areas of high risk to patient safety and compliance
- Develop risk-based approach based on criticality of data

Audit Trail Review

The type of review shall be based on the type of audit trail...

■ Data Audit Trail

- Reviewed as part of regular review
- Must be reviewed before e.g. a batch is dispositioned.
- Review needs to be done as an integrated part during approval process clearly outlined in a procedure
- MODA enables an easy review within the approval screen as shown before... No additional reports, windows and pain

■ System Audit Trail

- Applied to system settings or actions
- Reviewed periodically based on risk = focus on anything with direct impact to product or release via FMEA
- Can be very specific for a company because it ensures changes of master data, configuration, interfaced devices/systems, infrastructure or settings.
- Change management is where the pain comes in.
 - If the system lacks certain controls, making changes require significantly more verification steps to ensure the change was made appropriately.

Audit Trail Review

Risk Assessment

- The goal is to create a risk assessment that is:
 - Quantifiable
 - Objective
 - Actionable
- Take into account the possible measures that can be implemented to reduce the risk to data integrity
- FMEA is commonly used as a risk assessment for data integrity
- Standard way of assessing all QC systems
- This provides a framework to consistently assess the risk to data integrity and perform standardized reassessments as the systems and processes change and evolve.



Audit Trail Review

Risk Assessment

- Define data integrity failure modes for the different stages



- Where can manual steps compromise the integrity of the data?

- Define accepted level and not acceptable level

- Calculate score

- Define actions for score above acceptable level

- Recalculate score taking into account actions

- Repeat until score below acceptable level or risk accepted

Audit Trail Review

What to look at for all types of Audit Trails

- Periodic Review – Scheduled Review of System Audit Trail
 - Deletions
 - Modifications of GxP critical data items
 - Undocumented configuration changes
 - Corrupt entries
 - Anomalies in date and time stamps
 - Changes inconsistent with adjacent data
 - Generic account access recordings (outside of system-required accounts, such as accounts required to run background jobs).
 - Addition of critical authorizations
 - Sequence of samples

- Frequency of Periodic Review
 - Based on GAMP category
 - Criticality of Data

Audit Trail Review

Documentation

- System Tools vs External Tools
- If possible, evidence of audit trail review is made in the computerized system software itself, rather than using a (hybrid) paper record.
- Allows for clearer link between the audit trail and the review.
- Tools to efficiently identify the required Critical Audit Trail Entries should be developed and validated. These can include: validated Excel spreadsheets, validated access data bases (Scripts), customized reports or other validated software (using a validated interface)



Summary

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Summary

■ Good Audit Trails:

- Captures the information required by regulations
- Separate data audit trails from system audit trails
- Saves the audit trails compliantly within the system
- Allow you to easily review the relevant audit entries

■ “Ugly” Audit Trails:

- Captures the information required by regulations
- Mix data audit trails with system audit trails
- Require you to have a process for searching the audit trail during review

■ Bad Audit Trails:

- Mix data audit trails with system audit trails
- Saves the audit trails as files outside of the application/database, or
- Does not fully capture the information required by regulations

Summary

- Define a process to evaluate existing systems for audit trail review
- Define a process to review existing system audit trails
- Review relevant data audit trail when approving the data
- Review relevant system audit trail periodically
- Implement the search criteria in your procedures to make the review process easier
- Evaluate the quality of the audit trail when implementing new systems



Q&A Session

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Any questions?



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Thank you

