



**BTSOFT**

YOUR LAB. YOUR DATA. PERFECTLY MANAGED

NEMC 2025 Laboratory Informatics Sessions

Improving Non-Routine Test Data Management  
in Environmental Labs

August 5, 2025



# **BTSOFT**

YOUR LAB. YOUR DATA. PERFECTLY MANAGED

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# Introduction

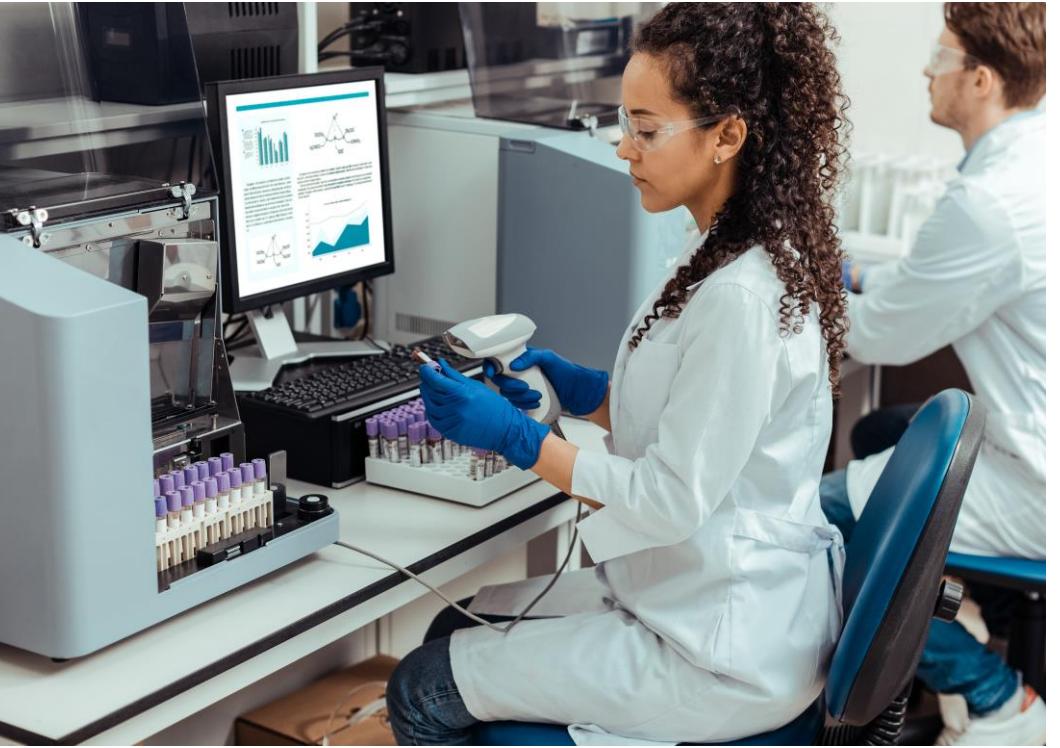
Environmental laboratories are equipped to perform a wide range of standardized analyses across various matrices. While routine tests are well-supported by existing Laboratory Information Management Systems (LIMS), specialized analyses—such as flashpoint, corrosivity, chlorophyll, and marine organism testing—often lack the same level of workflow integration.

This presentation explores the data management challenges associated with non-routine testing and introduces solutions that enhance traceability, efficiency, and regulatory compliance.



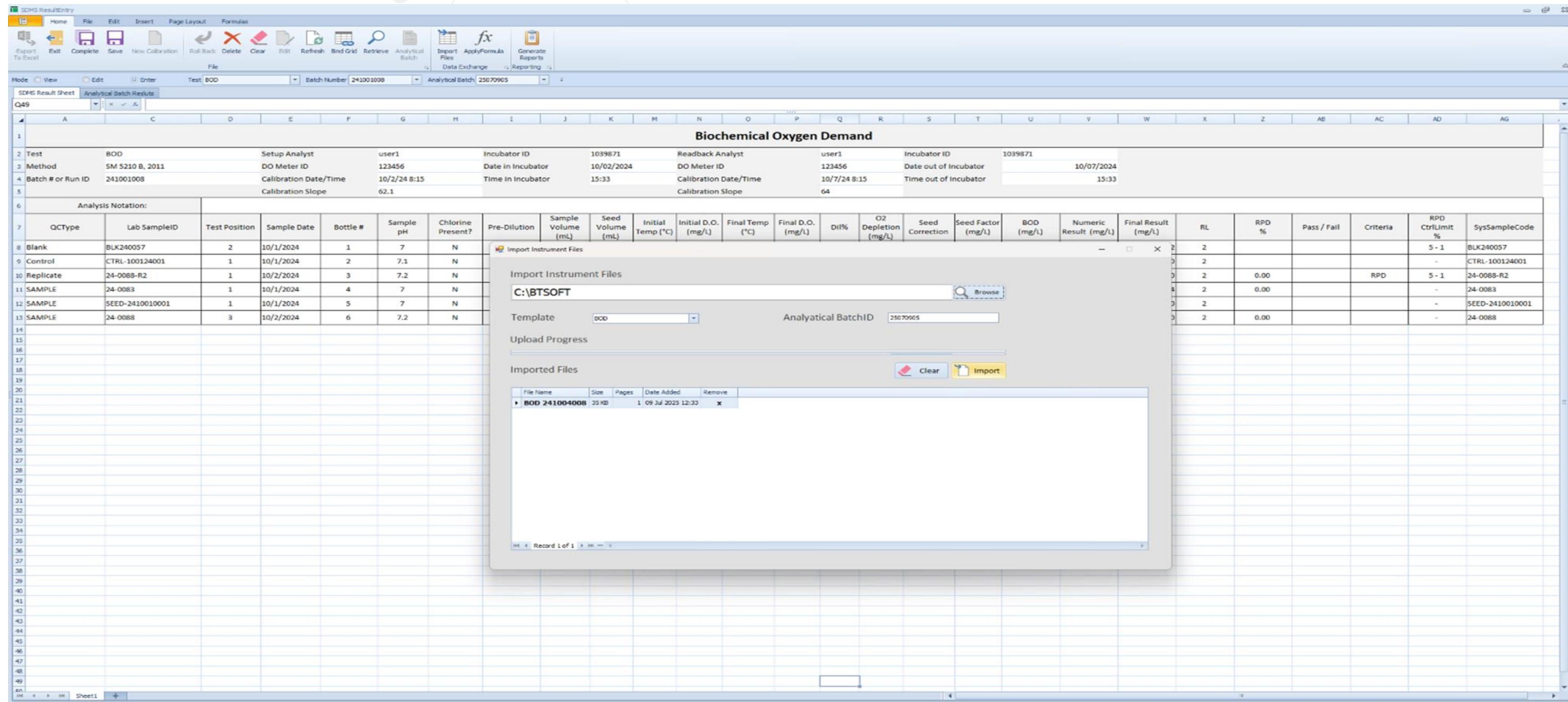
# Common Laboratory Testing

- Environmental laboratories frequently perform standard tests across various matrices:
  - - Wet chemistry for inorganic substances
  - - Metals content analysis
  - - Volatile and semi-volatile organic analysis
- However, challenges can arise with non-routine test data collection and storage.



# Common Laboratory Testing (BOD5)

- While SDMS addresses non-routine testing gaps, it is equally effective in supporting routine, high-volume analyses—offering efficiency and consistency across all workflows.



SDMS ResultEntry

File Edit Insert Page Layout Formulas

Export To Excel Complete Save New Calibration Roll Back Delete Clear Refresh Bind Grid Retrieve Analytical Batch Import Files ApplyFormula Data Exchange Generate Reports

Mode View Edit Enter Test: BOD Batch Number: 241001008 Analytical Batch: 25070905

SDMS Result Sheet Analytical Batch Results

Q49

A C D E F G H I J K M N O P Q R S T U V W X Z AB AC AD AG

1

2 Test BOD Setup Analyst: user1 Incubator ID: 1039871 Readback Analyst: user1 Incubator ID: 1039871

3 Method SM 5210 B, 2011 DO Meter ID: 123456 Date in Incubator: 10/02/2024 DO Meter ID: 123456 Date out of Incubator: 10/07/2024

4 Batch # or Run ID 241001008 Calibration Date/Time: 10/2/24 8:15 Time in Incubator: 15:33 Calibration Date/Time: 10/7/24 8:15 Time out of Incubator: 15:33

5 Calibration Slope: 62.1 Calibration Slope: 64

6 Analysis Notation:

QCType	Lab SampleID	Test Position	Sample Date	Bottle #	Sample pH	Chlorine Present?	Pre-Dilution	Sample Volume (mL)	Seed Volume (mL)	Initial Temp (°C)	Initial D.O. (mg/L)	Final Temp (°C)	Final D.O. (mg/L)	Dil%	Depletion (mg/L)	Seed Correction	Seed Factor (mg/L)	BOD (mg/L)	Numeric Result (mg/L)	Final Result (mg/L)	RL	RPD %	Pass / Fail	Criteria	RPD CtrlLimit %	SysSampleCode
Blank	BLK240057	2	10/1/2024	1	7	N														2	2			5 - 1	BLK240057	
Control	CTRL-100124001	1	10/1/2024	2	7.1	N														2	2			-	CTRL-100124001	
Replicate	24-0068-R2	1	10/2/2024	3	7.2	N														2	0.00			RPD	5 - 1	24-0068-R2
SAMPLE	24-0083	1	10/1/2024	4	7	N														2	0.00			-	24-0083	
SAMPLE	SEED-2410010001	1	10/1/2024	5	7	N														2				-	SEED-2410010001	
SAMPLE	24-0088	3	10/2/2024	6	7.2	N														2	0.00			-	24-0088	

Import Instrument Files

Import Instrument Files

C:\BTSOFT

Template: BOD Analytical BatchID: 25070905

Upload Progress

Imported Files

File Name Size Pages Date Added Remove

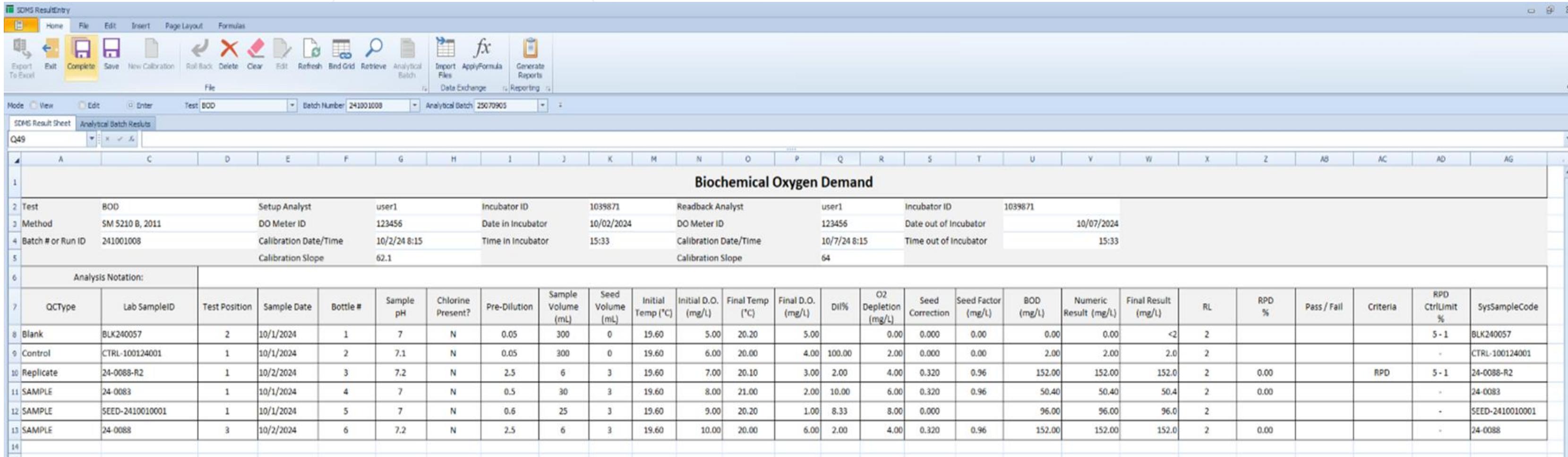
BOD 241004008 35 KB 1 09 Jul 2025 12:33 X

Clear Import

Record 1 of 1

# Common Laboratory Testing (BOD5)

- SDMS does not have to replace existing systems but complements any LIMS by extending its capability to manage flexible, template-driven, and traceable data entry.

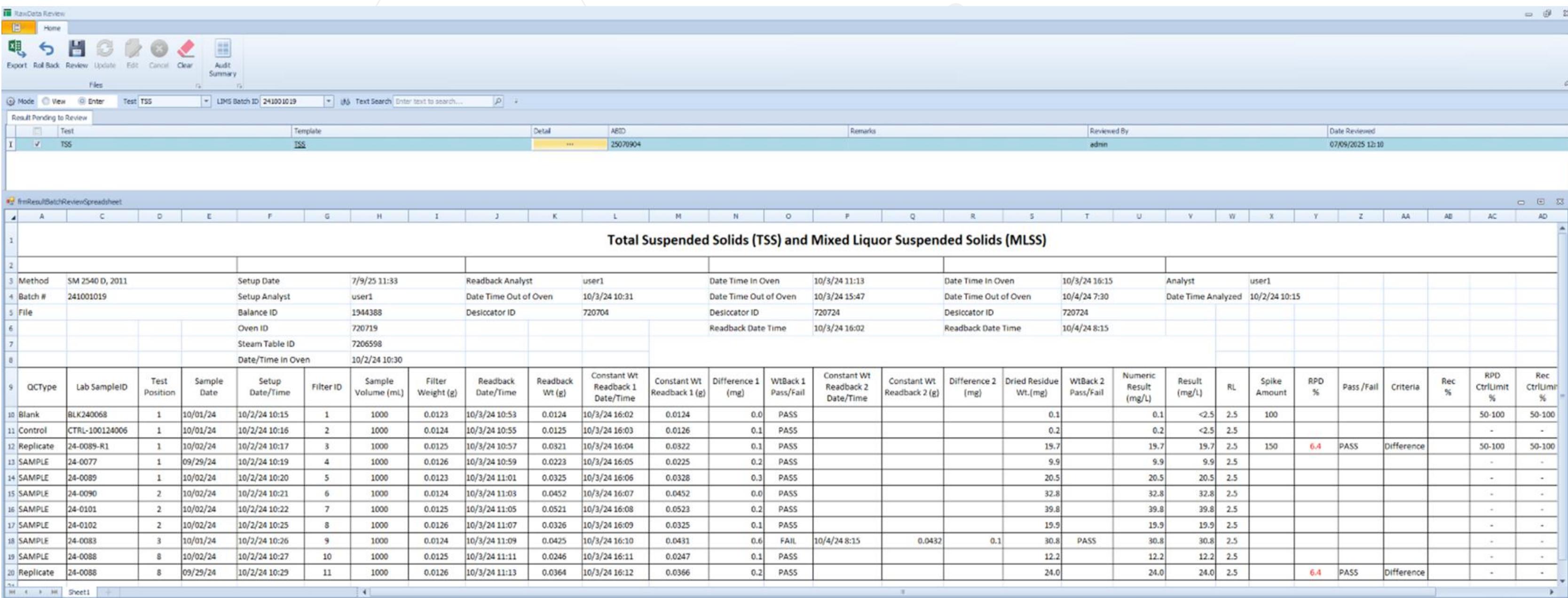


The screenshot shows the SDMS ResultEntry software interface. The title bar reads "SDMS ResultEntry". The menu bar includes "File", "Edit", "Insert", "Page Layout", and "Formulas". The ribbon bar has tabs for "Complete", "Save", "New Calibration", "Delete", "Clear", "Refresh", "Bind Grid", "Retrieve", "Analytical Batch", "Import File", "Apply Formula", "Generate Reports", "Data Exchange", and "Reporting". The main window shows a "SDMS Result Sheet" with the title "Analytical Batch Results". The sheet is titled "Biochemical Oxygen Demand". It contains data for a BOD test, including setup analyst (user1), incubator ID (1039871), readback analyst (user1), incubator ID (1039871), method (SM 5210 B, 2011), DO meter ID (123456), date in incubator (10/02/2024), DO meter ID (123456), date out of incubator (10/07/2024), batch/run ID (241001008), calibration date/time (10/24 8:15), time in incubator (15:33), calibration date/time (10/7/24 8:15), time out of incubator (15:33), and calibration slope (62.1, 64). The "Analysis Notation" section contains a table with columns for QC Type, Lab Sample ID, Test Position, Sample Date, Bottle #, Sample pH, Chlorine Present?, Pre-Dilution, Sample Volume (mL), Seed Volume (mL), Initial Temp (°C), Initial D.O. (mg/L), Final Temp (°C), Final D.O. (mg/L), Dil%, O2 Depletion (mg/L), Seed Correction (mg/L), Seed Factor, BOD (mg/L), Numeric Result (mg/L), Final Result (mg/L), RL, RPD %, Pass / Fail, Criteria, RPD Ctrl Limit %, and Sys Sample Code. The table includes rows for Blank (BLK240057), Control (CTRL-100124001), Replicate (24-0088-R2), SAMPLE (24-0083), SAMPLE (SEED-2410010001), and SAMPLE (24-0088).

Analysis Notation:		QC Type	Lab Sample ID	Test Position	Sample Date	Bottle #	Sample pH	Chlorine Present?	Pre-Dilution	Sample Volume (mL)	Seed Volume (mL)	Initial Temp (°C)	Initial D.O. (mg/L)	Final Temp (°C)	Final D.O. (mg/L)	Dil%	O2 Depletion (mg/L)	Seed Correction (mg/L)	Seed Factor	BOD (mg/L)	Numeric Result (mg/L)	Final Result (mg/L)	RL	RPD %	Pass / Fail	Criteria	RPD Ctrl Limit %	Sys Sample Code
8	Blank	BLK240057		2	10/1/2024	1	7	N	0.05	300	0	19.60	5.00	20.20	5.00		0.00	0.000	0.00	0.00	0.00	<2	2			5 - 1	BLK240057	
9	Control	CTRL-100124001		1	10/1/2024	2	7.1	N	0.05	300	0	19.60	6.00	20.00	4.00	100.00	2.00	0.000	0.00	2.00	2.00	2.0	2			-	CTRL-100124001	
10	Replicate	24-0088-R2		1	10/2/2024	3	7.2	N	2.5	6	3	19.60	7.00	20.10	3.00	2.00	4.00	0.320	0.96	152.00	152.00	152.0	2	0.00		RPD	5 - 1	24-0088-R2
11	SAMPLE	24-0083		1	10/1/2024	4	7	N	0.5	30	3	19.60	8.00	21.00	2.00	10.00	6.00	0.320	0.96	50.40	50.40	50.4	2	0.00		-	24-0083	
12	SAMPLE	SEED-2410010001		1	10/1/2024	5	7	N	0.6	25	3	19.60	9.00	20.20	1.00	8.33	8.00	0.000		96.00	96.00	96.0	2			-	SEED-2410010001	
13	SAMPLE	24-0088		3	10/2/2024	6	7.2	N	2.5	6	3	19.60	10.00	20.00	6.00	2.00	4.00	0.320	0.96	152.00	152.00	152.0	2	0.00		-	24-0088	

# Common Laboratory Testing (TSS/MLSS)

- SDMS directly contributes to laboratory digitalization by eliminating paper-based processes, enhancing data integrity, and simplifying audits.



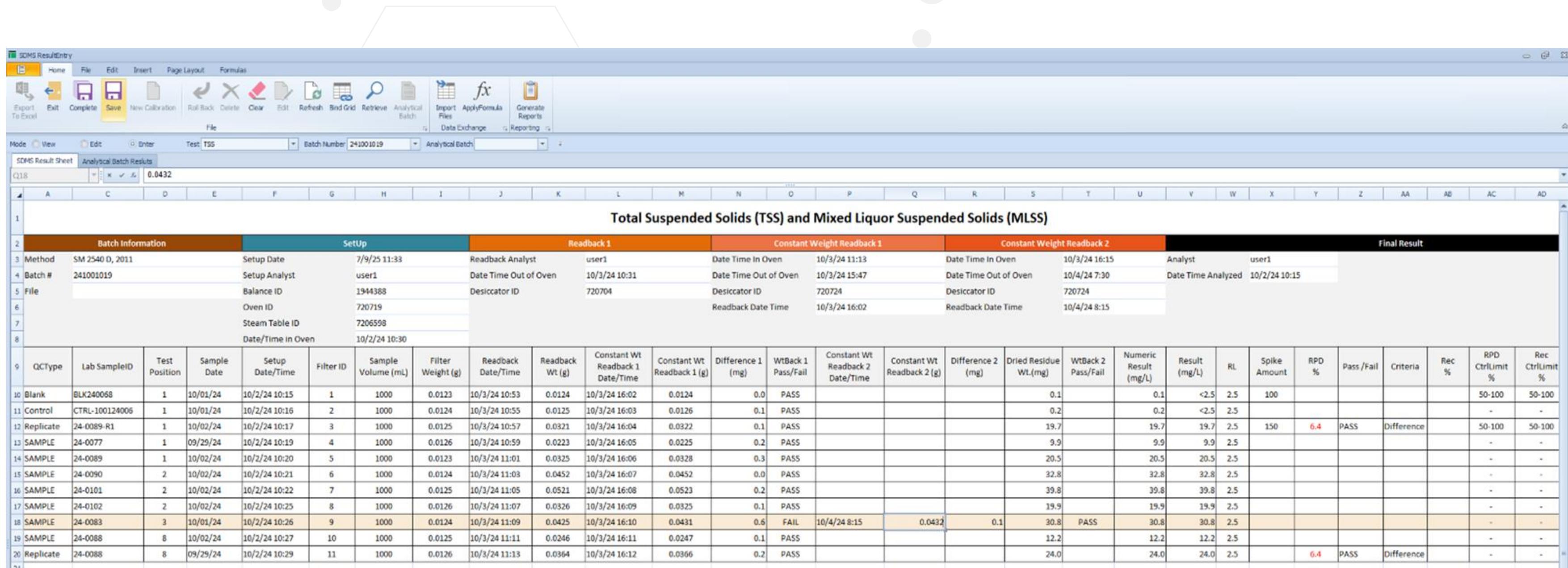
The screenshot displays the SDMS Raw Data Review software interface. At the top, a toolbar with various icons (Export, Roll Back, Review, Update, Edit, Cancel, Clear, Audit Summary) is visible. Below the toolbar, a navigation bar shows 'Mode: Test' and 'Test: TSS'. The 'LIMS Batch ID' is listed as '241001019'. A search bar 'Text Search: Enter text to search...' is present. The main area is divided into two sections: 'Result Pending to Review' and 'frmResultBatchReviewSpreadsheet'.

**Result Pending to Review:** A table with columns: Test (TSS), Template (TSS), Detail (ABD), Remarks, Reviewed By (admin), and Date Reviewed (07/09/2025 12:10).

**frmResultBatchReviewSpreadsheet:** A detailed spreadsheet titled 'Total Suspended Solids (TSS) and Mixed Liquor Suspended Solids (MLSS)'. The table includes columns for Method (SM 2540 D, 2011), Batch # (241001019), File (1944388), and various dates/times. The data section starts with rows 9 through 20, detailing test results for samples like BLK240068, CTRL-100124006, and various replicates and samples. The columns include QCType, Lab SampleID, Test Position, Sample Date, Setup Date/Time, Filter ID, Sample Volume (ml), Filter Weight (g), Readback Date/Time, Readback Wt (g), Constant Wt Readback 1 Date/Time, Constant Wt Readback 1 (g), Difference 1 (mg), WtBack 1 Pass/Fail, Constant Wt Readback 2 Date/Time, Constant Wt Readback 2 (g), Difference 2 (mg), Dried Residue Wt.(mg), WtBack 2 Pass/Fail, Numeric Result (mg/L), Result (mg/L), RL, Spike Amount, RPD %, Pass/Fail, Criteria, Rec %, RPD CtrlLimit %, and Rec CtrlLimit %.

# Common Laboratory Testing (TSS/MLSS)

- Workflows such as DF selection, duplicate tracking, and review steps can be configured per template—no code required.

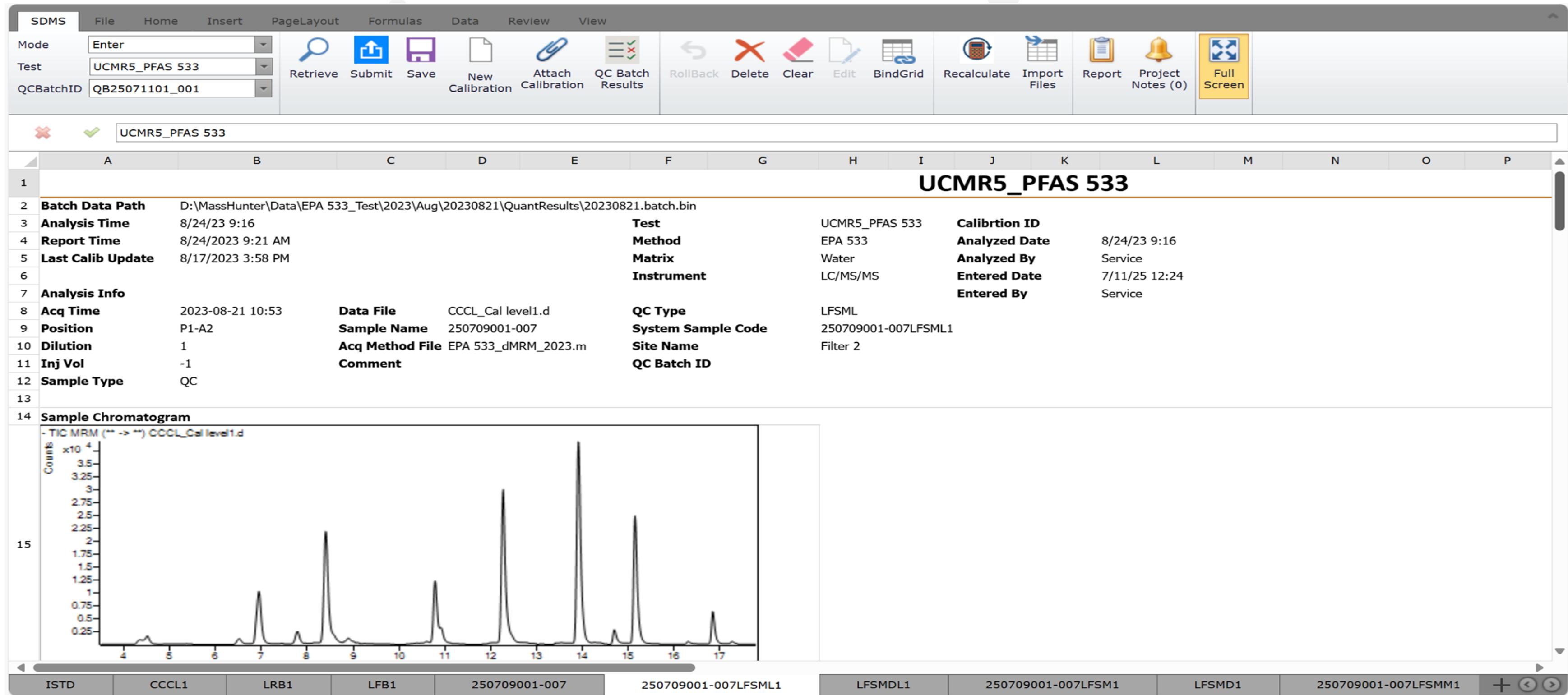


The screenshot shows a Microsoft Excel-like interface for laboratory data entry. The title bar reads "SDMS ResultEntry". The ribbon menu includes "File", "Edit", "Insert", "Page Layout", "Formulas", "Home", "Save", "New Calibration", "Roll Back", "Delete", "Clear", "Refresh", "Bind Grid", "Retrieve", "Analytical Batch", "Import Files", "ApplyFormula", "Generate Reports", "Data Exchange", and "Reporting". The "Mode" dropdown is set to "Edit" and "Test" is set to "TSS". The "Batch Number" is "241001019". The "Analytical Batch" dropdown is empty. The "SDMS Result Sheet" tab is selected. The main table is titled "Total Suspended Solids (TSS) and Mixed Liquor Suspended Solids (MLSS)". It has several sections: "Batch Information", "Setup", "Readback 1", "Constant Weight Readback 1", "Constant Weight Readback 2", and "Final Result". The "Batch Information" section contains rows for Method (SM 2540 D, 2011), Batch # (241001019), File, Balance ID (1944388), Oven ID (720719), Steam Table ID (7206598), and Date/Time in Oven (10/24 10:30). The "Setup" section has rows for Setup Date (7/9/25 11:33), Setup Analyst (user1), Date Time Out of Oven (10/3/24 10:31), and Date Time In Oven (10/3/24 11:13). The "Readback 1" section has rows for Readback Analyst (user1), Date Time Out of Oven (10/3/24 15:47), Date Time In Oven (10/3/24 16:15), and Analyst (user1). The "Constant Weight Readback 1" section has rows for Desiccator ID (720724), Desiccator ID (720724), Readback Date Time (10/3/24 16:02), and Readback Date Time (10/4/24 8:15). The "Constant Weight Readback 2" section has rows for Desiccator ID (720724), Desiccator ID (720724), Readback Date Time (10/3/24 16:02), and Readback Date Time (10/4/24 8:15). The "Final Result" section has rows for QC Type, Lab Sample ID, Test Position, Sample Date, Setup Date/Time, Filter ID, Sample Volume (mL), Filter, Readback Date/Time, Readback Wt (g), Constant Wt Readback 1 Date/Time, Constant Wt Readback 1 (g), Difference 1 (mg), WtBack 1 Pass/Fail, Constant Wt Readback 2 Date/Time, Constant Wt Readback 2 (g), Difference 2 (mg), Dried Residue Wt (mg), WtBack 2 Pass/Fail, Numeric Result (mg/L), Result (mg/L), RL, Spike Amount, RPD %, Pass/Fail, Criteria, Rec %, RPD CtrlLimit %, and Rec CtrlLimit %. The data table contains 20 rows of test results, with the 18th row highlighted in orange.

Total Suspended Solids (TSS) and Mixed Liquor Suspended Solids (MLSS)																														
Batch Information			Setup			Readback 1			Constant Weight Readback 1			Constant Weight Readback 2			Final Result															
3	Method	SM 2540 D, 2011	Setup Date	7/9/25 11:33	Readback Analyst	user1	Date Time In Oven	10/3/24 11:13	Date Time In Oven	10/3/24 16:15	Analyst	user1																		
4	Batch #	241001019	Setup Analyst	user1	Date Time Out of Oven	10/3/24 10:31	Date Time Out of Oven	10/3/24 15:47	Date Time Out of Oven	10/4/24 7:30	Date Time Analyzed	10/2/24 10:15																		
5	File		Balance ID	1944388	Desiccator ID	720704	Desiccator ID	720724	Desiccator ID	720724																				
6			Oven ID	720719			Readback Date Time	10/3/24 16:02	Readback Date Time	10/4/24 8:15																				
7			Steam Table ID	7206598																										
8			Date/Time in Oven	10/24 10:30																										
9	QCType	Lab SampleID	Test Position	Sample Date	Setup Date/Time	Filter ID	Sample Volume (mL)	Filter	Readback Date/Time	Readback Wt (g)	Constant Wt Readback 1 Date/Time	Constant Wt Readback 1 (g)	Difference 1 (mg)	WtBack 1 Pass/Fail	Constant Wt Readback 2 Date/Time	Constant Wt Readback 2 (g)	Difference 2 (mg)	Dried Residue Wt (mg)	WtBack 2 Pass/Fail	Numeric Result (mg/L)	Result (mg/L)	RL	Spike Amount	RPD %	Pass/Fail	Criteria	Rec %	RPD CtrlLimit %	Rec CtrlLimit %	
10	Blank	BLK240058	1	10/01/24	10/2/24 10:15	1	1000	0.0123	10/3/24 10:53	0.0124	10/3/24 16:02	0.0124	0.0	PASS				0.1		0.1	<2.5	2.5	100				50-100	50-100		
11	Control	CTRL-100124006	1	10/01/24	10/2/24 10:16	2	1000	0.0124	10/3/24 10:55	0.0125	10/3/24 16:03	0.0126	0.1	PASS				0.2		0.2	<2.5	2.5				-	-			
12	Replicate	24-0089-R1	1	10/02/24	10/2/24 10:17	3	1000	0.0125	10/3/24 10:57	0.0321	10/3/24 16:04	0.0322	0.1	PASS				19.7		19.7	19.7	2.5	150	6.4	PASS	Difference	50-100	50-100		
13	SAMPLE	24-0077	1	09/29/24	10/2/24 10:19	4	1000	0.0126	10/3/24 10:59	0.0223	10/3/24 16:05	0.0225	0.2	PASS				9.9		9.9	9.9	2.5				-	-			
14	SAMPLE	24-0089	1	10/02/24	10/2/24 10:20	5	1000	0.0123	10/3/24 11:01	0.0325	10/3/24 16:06	0.0328	0.3	PASS				20.5		20.5	20.5	2.5				-	-			
15	SAMPLE	24-0090	2	10/02/24	10/2/24 10:21	6	1000	0.0124	10/3/24 11:03	0.0452	10/3/24 16:07	0.0452	0.0	PASS				32.8		32.8	32.8	2.5				-	-			
16	SAMPLE	24-0101	2	10/02/24	10/2/24 10:22	7	1000	0.0125	10/3/24 11:05	0.0521	10/3/24 16:08	0.0523	0.2	PASS				39.8		39.8	39.8	2.5				-	-			
17	SAMPLE	24-0102	2	10/02/24	10/2/24 10:25	8	1000	0.0126	10/3/24 11:07	0.0326	10/3/24 16:09	0.0325	0.1	PASS				19.9		19.9	19.9	2.5				-	-			
18	SAMPLE	24-0083	3	10/01/24	10/2/24 10:26	9	1000	0.0124	10/3/24 11:09	0.0425	10/3/24 16:10	0.0431	0.6	FAIL	10/4/24 8:15	0.0432	0.1	30.8	PASS	30.8	30.8	2.5				-	-			
19	SAMPLE	24-0088	6	10/02/24	10/2/24 10:27	10	1000	0.0125	10/3/24 11:11	0.0246	10/3/24 16:11	0.0247	0.1	PASS				12.2		12.2	12.2	2.5				-	-			
20	Replicate	24-0088	8	09/29/24	10/2/24 10:29	11	1000	0.0126	10/3/24 11:13	0.0364	10/3/24 16:12	0.0366	0.2	PASS				24.0		24.0	24.0	2.5		6.4	PASS	Difference	-	-		

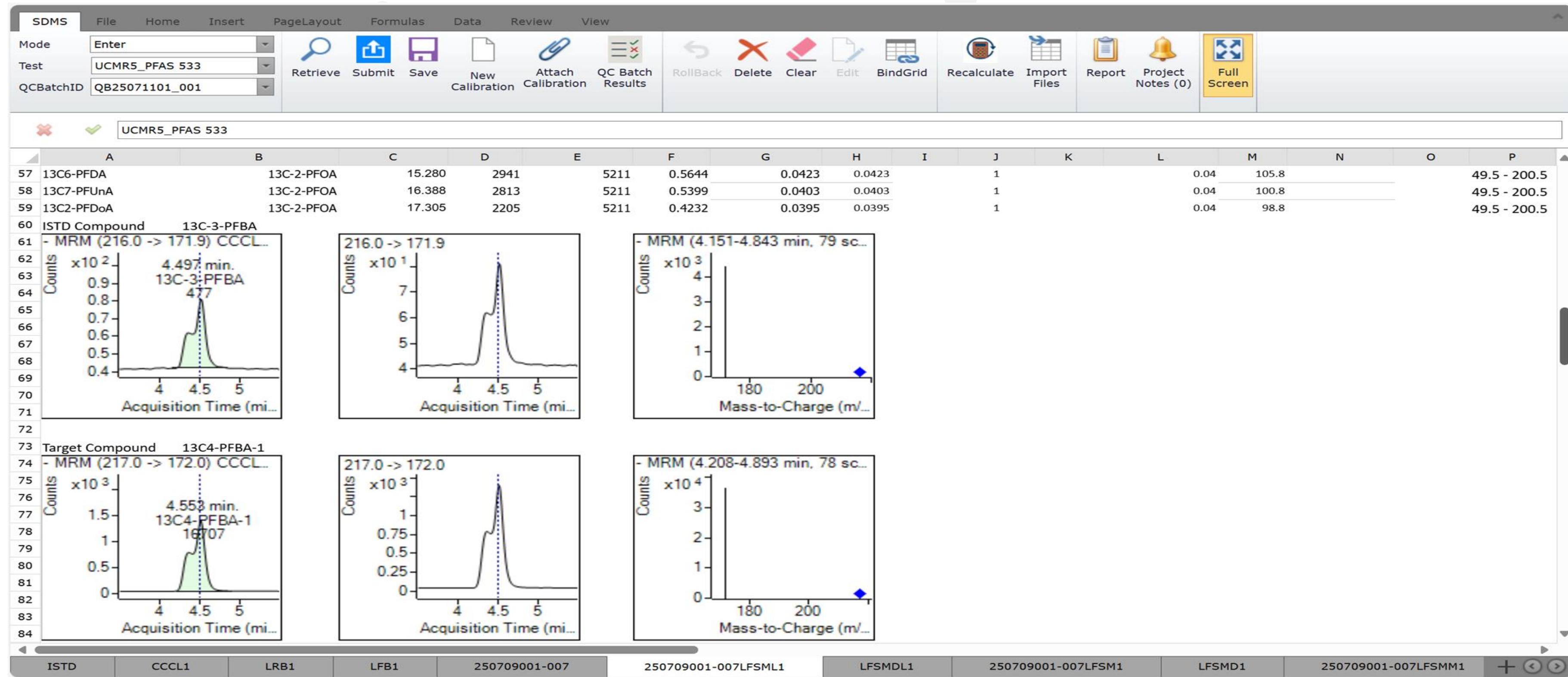
# Common Laboratory Testing (UCMR5 PFAS 533)

- Users can create and deploy customized result entry templates tailored to their workflows and regulations—without any programming effort.



# Common Laboratory Testing (UCMR5 PFAS 533)

- Automatic flagging, built-in formulas, and configurable validation rules make SDMS a quality-centric system suitable for regulated environments.



# Challenges with Non-Routine Tests

Examples of non-routine tests:

- - Phytoplankton
- - Particle Size Distribution
- - Chlorophyll
- - Ocean Currents

Issues:

- - Lack of specific workflows in LIMS
- - Inefficient and non-traceable data methods
- - Use of customized spreadsheets leads to errors and non-compliance

# Solution – Sample Data Management System (SDMS)

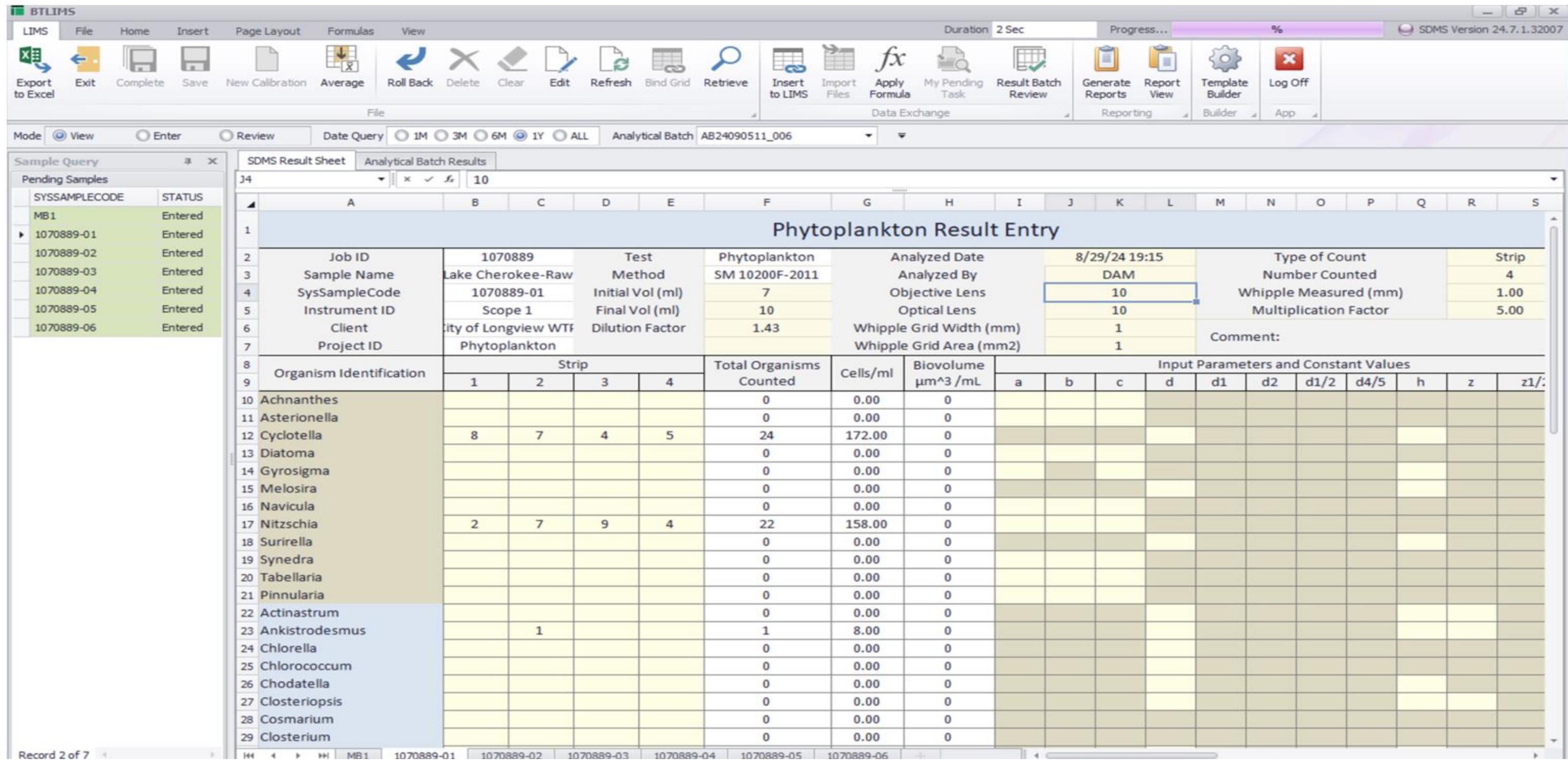
Key benefits of SDMS:

- - LIMS-agnostic system for managing all lab testing data
- - Automates electronic data capture
- - Replaces spreadsheets with reliable processes
- - Supports informatics-style solutions for non-routine analyses



# Challenges with Non-Routine Tests (Ex: Marine Organisms)

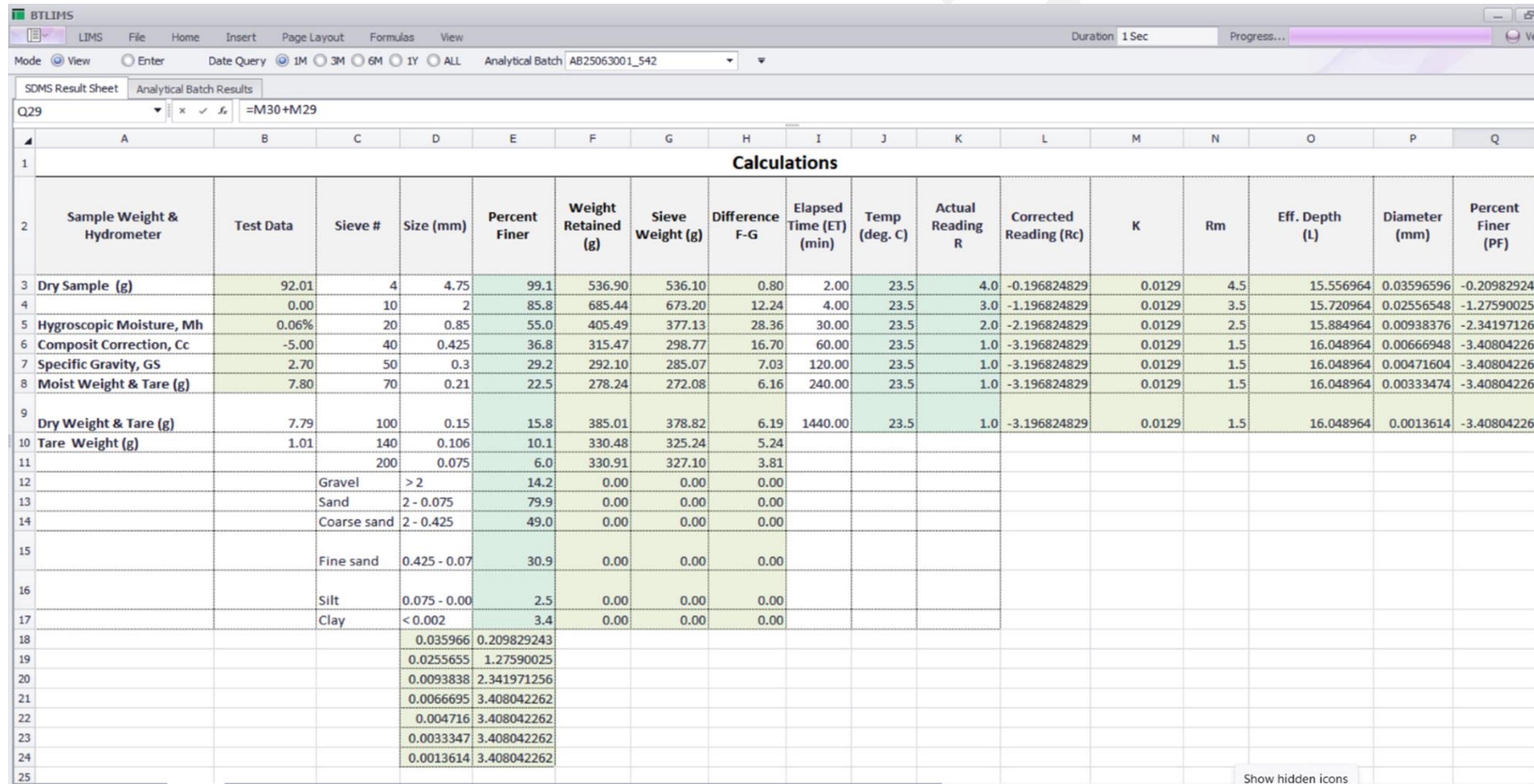
- Every action—entry, edit, approval—is logged and traceable, ensuring data accountability and regulatory readiness.



The screenshot shows the BTLIMS software interface for laboratory management. The main window is titled "Phytoplankton Result Entry". The interface includes a ribbon bar with tabs for LIMS, File, Home, Insert, Page Layout, Formulas, View, Data Exchange, Reporting, and App. The "Data Exchange" tab is selected. The "Reporting" tab is open, showing a "Phytoplankton Result Entry" form. The form contains fields for Job ID (1070889), Test Method (SM 10200F-2011), Analyzed Date (8/29/24 19:15), and various parameters like Initial Vol (ml), Final Vol (ml), and Dilution Factor. The "Organism Identification" section lists 29 different phytoplankton species, each with a "Strip" column (1, 2, 3, 4) and a "Total Organisms Counted" column. The "Input Parameters and Constant Values" section contains numerous numerical and text fields for calculations. The status bar at the bottom shows the record number (Record 2 of 7) and the analytical batch (AB24090511\_006).

# Challenges with Non-Routine Tests (Ex: Particle Size Distribution)

- SDMS connects instruments, exports to LIMS, and supports EDD/reporting with minimal integration effort.

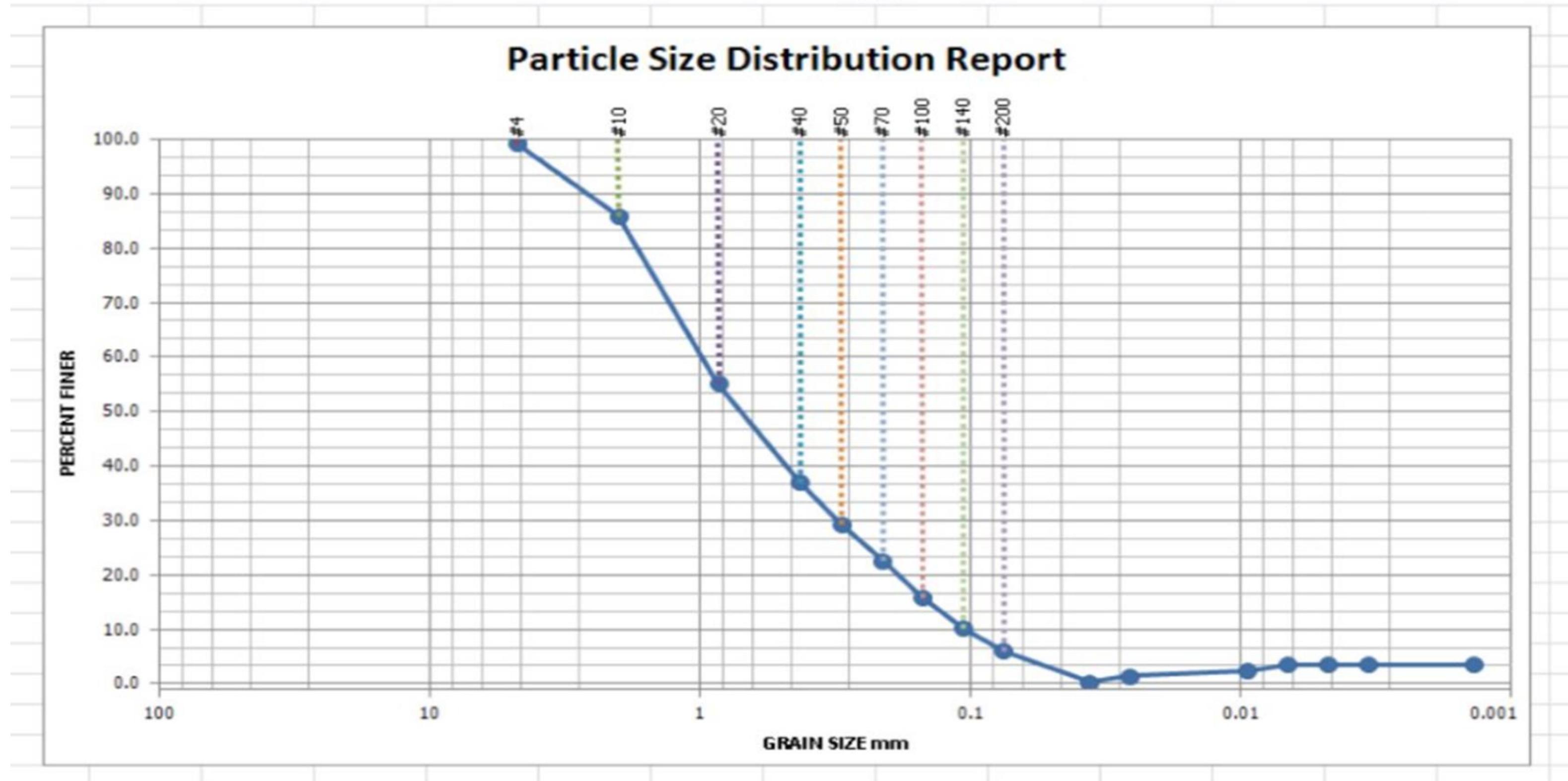


The screenshot shows a Microsoft Excel-like spreadsheet within the BTLIMS software. The title bar indicates 'BTLIMS' and the file is titled 'SDMS Result Sheet' under 'Analytical Batch AB25063001\_542'. The spreadsheet has a header row labeled 'Calculations' and contains data for a particle size distribution test. The columns include: Sample Weight & Hydrometer, Test Data, Sieve #, Size (mm), Percent Finer, Weight Retained (g), Sieve Weight (g), Difference F-G, Elapsed Time (ET) (min), Temp (deg. C), Actual Reading R, Corrected Reading (Rc), K, Rm, Eff. Depth (L), Diameter (mm), and Percent Finer (PF). The data rows include: Dry Sample (g), Hygroscopic Moisture, Mh, Composit Correction, Cc, Specific Gravity, GS, Moist Weight & Tare (g), Dry Weight & Tare (g), Tare Weight (g), Gravel, Sand, Coarse sand, Fine sand, Silt, Clay, and various numerical values for each parameter. The bottom of the sheet shows a summary row with values 0.035966, 0.209829243, 0.02556555, 1.27590025, 0.00938388, 2.341971256, 0.0066695, 3.408042262, 0.004716, 3.408042262, 0.0033347, 3.408042262, 0.0013614, and 3.408042262.

Calculations																
Sample Weight & Hydrometer	Test Data	Sieve #	Size (mm)	Percent Finer	Weight Retained (g)	Sieve Weight (g)	Difference F-G	Elapsed Time (ET) (min)	Temp (deg. C)	Actual Reading R	Corrected Reading (Rc)	K	Rm	Eff. Depth (L)	Diameter (mm)	Percent Finer (PF)
Dry Sample (g)	92.01	4	4.75	99.1	536.90	536.10	0.80	2.00	23.5	4.0	-0.196824829	0.0129	4.5	15.556964	0.03596596	-0.20982924
0.00	0.00	10	2	85.8	685.44	673.20	12.24	4.00	23.5	3.0	-1.196824829	0.0129	3.5	15.720964	0.02556548	-1.27590025
Hygroscopic Moisture, Mh	0.06%	20	0.85	55.0	405.49	377.13	28.36	30.00	23.5	2.0	-2.196824829	0.0129	2.5	15.884964	0.00938376	-2.34197126
Composit Correction, Cc	-5.00	40	0.425	36.8	315.47	298.77	16.70	60.00	23.5	1.0	-3.196824829	0.0129	1.5	16.048964	0.00666948	-3.40804226
Specific Gravity, GS	2.70	50	0.3	29.2	292.10	285.07	7.03	120.00	23.5	1.0	-3.196824829	0.0129	1.5	16.048964	0.00471604	-3.40804226
Moist Weight & Tare (g)	7.80	70	0.21	22.5	278.24	272.08	6.16	240.00	23.5	1.0	-3.196824829	0.0129	1.5	16.048964	0.00333474	-3.40804226
Dry Weight & Tare (g)	7.79	100	0.15	15.8	385.01	378.82	6.19	1440.00	23.5	1.0	-3.196824829	0.0129	1.5	16.048964	0.0013614	-3.40804226
Tare Weight (g)	1.01	140	0.106	10.1	330.48	325.24	5.24									
		200	0.075	6.0	330.91	327.10	3.81									
	Gravel	>2		14.2	0.00	0.00	0.00									
	Sand	2 - 0.075		79.9	0.00	0.00	0.00									
	Coarse sand	2 - 0.425		49.0	0.00	0.00	0.00									
		Fine sand	0.425 - 0.07	30.9	0.00	0.00	0.00									
		Silt	0.075 - 0.00	2.5	0.00	0.00	0.00									
		Clay	<0.002	3.4	0.00	0.00	0.00									
				0.035966	0.209829243											
				0.02556555	1.27590025											
				0.00938388	2.341971256											
				0.0066695	3.408042262											
				0.004716	3.408042262											
				0.0033347	3.408042262											
				0.0013614	3.408042262											

# Challenges with Non-Routine Tests (Ex: Particle Size Distribution)

- Though designed for environmental labs, SDMS applies to many laboratory sectors, including Consumer Products, Food, Agriculture, and Industrial testing.



## Conclusion and Potential Next Steps

### Summary:

- Non-routine and specialized testing are critical yet often overlooked aspects of laboratory data management.
- Traditional methods like spreadsheets create inefficiencies, risk errors, and hinder compliance.
- Implementing an SDMS provides a scalable, reliable, and LIMS-independent solution for managing all test data.

### Next Steps:

1. Assess your lab's current data collection processes.
2. Identify gaps in non-routine test data workflows.
3. Explore SDMS solutions that integrate with your existing systems to improve compliance and traceability.