

Chemical Analysis Report

CEN-DIST-2021-12-08-03

Florida Department of Environmental Protection
Central Laboratory
2600 Blair Stone Road
Tallahassee, FL 32399-2400
DOH Accreditation E31780

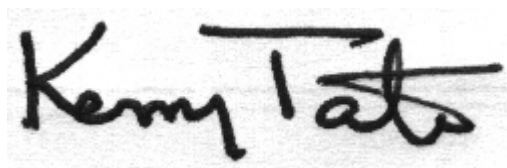
Event Description: **Upper Cypress SCI and Johns Lake Outlet**
Request ID: **RQ-2021-11-01-21**
Customer: **CEN-DIST**
Project ID: **SMP**

Send Reports to:
FL Dept. of Environmental Protection
FL Dept. of Environmental Protection
3319 Maguire Blvd., Suite 232
Orlando, FL 32803-3767
Attn: Matthew Bearden

For additional information please contact
Colin Wright, Ph.D.
Liang-Tsair Lin, Ph.D.
Kerry Tate, Ph.D.
Dr. rer. nat. Bettina Steinbock
Thekkekalathil Chandrasekhar, Ph.D, QA Officer
Phone (850) 245-8085

Certified by: Kerry Tate, Ph.D., Environmental Administrator

Date Certified: 04-JAN-2022 10:39

A handwritten signature in black ink that reads "Kerry Tate". The signature is written in a cursive, flowing style with a horizontal line above the first name.

Case Narrative

Unless otherwise noted, all samples included in this report were received in accordance with protocols referenced in Chapter 62-160, Florida Administrative Code (F.A.C.). Results published in this report pertain only to the samples as submitted to, and received by the laboratory. All times in this report are adjusted to the applicable Eastern Time Zone (EST or EDT).

Results for the following analytical group are included in this report: Nutrients.

Scientific notation may be used in reporting very large or small values. Values reported using scientific notation will take the form of the following example: 1.3E+03, which is equivalent to 1.3×10^3 or 1300.

Unless otherwise noted, analytical values for soil and sediment samples are reported on a dry weight basis, and analytical values for waste and tissue samples are reported on a wet weight basis.

Results for TNI accredited tests met requirements established by The NELAC Institute. A double asterisk (**) is used to indicate an analyte/matrix/method for which the laboratory is not TNI accredited by the Florida Department of Health Environmental Laboratory Certification Program or where accreditation for that field of testing is not applicable.

Any significant anomalies or deviations from established protocols are documented in Non-Conformance Reports, which, where appropriate, are included within this analytical report. Additional comments related to specific analytical tests may be included as remarks following the analytical results for each sample. Such comments and remarks are for informational purposes only and are not intended to convey judgement about the usability of the reported data.

A quality control report on the performance of the test method for the submitted samples is included. Uncertainty associated with the analytical results contained in this report can be estimated from the reported quality assurance results and from published quality control acceptance limits for each analytical test. Matrix quality control results (matrix spike recoveries and matrix sample precision) pertain only to the matrix sample tested and do not necessarily reflect test method performance for other samples.

Typical matrix quality control (QC) measurements may include matrix spike recovery, matrix spike duplicate recovery, matrix spike precision and matrix sample precision. Not all matrix QC results may be available or reportable; where they are not an explanation is provided. Typical reasons for unavailable QC results include, but are not limited to, a) insufficient matrix sample to perform some or all QC measurements; b) analyte concentration in the sample replicated was too low for a meaningful measurement of precision and c) analyte concentration in the matrix sample spiked was too high (relative to the amount of analyte spiked) for a meaningful measurement of recovery. Where matrix QC results are unavailable, other method performance metrics (e.g., LCS recovery, LCS precision, surrogate recovery) may be used to assess performance of the method. Comments explaining any missing QC measurements are not intended to convey any adverse conclusions about the quality of the reported data.

Precision is reported as relative percent difference unless otherwise noted.

Quality Control codes as defined below may be used in this report to indicate results that are associated with one or more quality control elements which did not fall within established test method criteria. Such results may be qualified as estimates using a J qualifier as required by 62-160 F.A.C. Explanations are included in the report for any results that were reported as estimates for other reasons.

QC Codes used in this report may include:

- LCS – Recovery for the batch Laboratory Control Sample (LCS) was outside existing control limits;
- MS – Recovery for the batch matrix spike (MS) was outside existing control limits;
- CCV – Recovery for a continuing calibration verification (CCV) standard was outside existing control limits;
- SUR – Recovery of a surrogate (SUR) for associated analytes was outside existing control limits;
- RPD – The precision, measured as relative percent difference (RPD), of batch replicate measurements was outside existing control limits;
- RSD – The precision, measured as relative standard deviation (RSD), of batch replicate measurements was outside existing control limits;
- SMP – Sample - used precision derived from replicate analyses of a sample;

The following data qualifiers are used, where applicable, in this report as specified in 62-160 F.A.C.

- A - Value reported is the mean of two or more determinations.
- B - Results based on colony counts outside the acceptable range.
- I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
- J - Estimated value and/or the analysis did not meet established quality control criteria.
- K - Actual value is known to be less than value given.
- L - Actual value is known to be greater than value given.
- N - Presumptive evidence of presence of material.
- O - Sampled, but analysis lost or not performed.
- Q - Sample held beyond normal holding time.
- T - Value reported is less than the criterion of detection.
- U - Material was analyzed for but not detected. The reported value is the method detection limit for the sample analyzed.
- V - Analyte was detected in both sample and method blank.
- X - Too few individuals to calculate SCI value.
- Y - The laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate.
- Z - Colonies were too numerous to count (TNTC).

Quality control information from overflow laboratories may not be included in this report. Please refer to the associated report from the overflow laboratory for additional information.

Sample Location: Johns Lake @ conservation area dock

Collection Date/Time: 12/07/2021 10:53

Field ID: G1CE0111

Matrix: W-SURF-FRH

Sample ID	Ref. Method	Component	Result	Code	Units	Batch ID	QC Codes
2294097	EPA 180.1 Rev. 2.0	Turbidity	2.3		NTU	P407226	
	EPA 300.0 Rev. 2.1	Chloride	40		mg Cl/L	P407363	
		Sulfate	13		mg SO4/L	P407366	
		Color (true)	150		PCU	P407230	
	SM 2320 B-2011	Total Alkalinity	48		mg CaCO3/L	P407289	
	SM 2540 C-2011	TDS	177		mg/L	P407672	
	SM 2540 D-2011	TSS	2	I	mg/L	P407694	
	SM 4500 F-C-2011	Fluoride	0.12		mg F/L	P407294	
2294098	EPA 350.1 Rev. 2.0	Ammonia-N	0.042		mg N/L	P407715	
	EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	0.98		mg N/L	P407875	
	EPA 353.2 Rev. 2.0	NO2NO3-N	0.018		mg N/L	P407298	
	EPA 365.1 Rev. 2.0	Total-P	0.089		mg P/L	P407340	
	SM 5310 B-2011	Organic Carbon	20		mg C/L	P407795	
2294099	EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	0.055		mg P/L	P407218	

Ref. Method and Comment:

SM 2540 D-2011: Batch relative percent difference is unavailable because of low analyte concentration in the QC sample.

Quality Assurance Report

Method Blank Results

Reference Method: EPA 180.1 Rev. 2.0
Batch ID: P407226

Component	Result	Code	Units
Turbidity	0.10	U	NTU

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P407363

Component	Result	Code	Units
Chloride	0.20	U	mg Cl/L

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P407366

Component	Result	Code	Units
Sulfate	0.20	U	mg SO4/L

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P407715

Component	Result	Code	Units
Ammonia-N	0.002	U	mg N/L

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P407875

Component	Result	Code	Units
Kjeldahl Nitrogen	0.080	U	mg N/L

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P407298

Component	Result	Code	Units
NO2NO3-N	0.004	U	mg N/L

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P407340

Component	Result	Code	Units
Total-P	0.002	U	mg P/L

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P407218

Component	Result	Code	Units
O-Phosphate-P	0.004	U	mg P/L

Reference Method: SM 2120 B-2011
Batch ID: P407230

Component	Result	Code	Units
Color (true)	2.5	U	PCU

Quality Assurance Report

Method Blank Results

Reference Method: SM 2320 B-2011
Batch ID: P407289

Component	Result	Code	Units
Total Alkalinity	0.65	U	mg CaCO ₃ /L

Reference Method: SM 2540 C-2011
Batch ID: P407672

Component	Result	Code	Units
TDS	15	U	mg/L

Reference Method: SM 2540 D-2011
Batch ID: P407694

Component	Result	Code	Units
TSS	2	U	mg/L

Reference Method: SM 4500 F-C-2011
Batch ID: P407294

Component	Result	Code	Units
Fluoride	0.035	U	mg F/L

Reference Method: SM 5310 B-2011
Batch ID: P407795

Component	Result	Code	Units
Organic Carbon	0.50	U	mg C/L

Quality Assurance Report

Laboratory Control Sample Accuracy

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P407363

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Chloride	104		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P407366

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Sulfate	98.4		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P407715

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Ammonia-N	99.0		P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P407875

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Kjeldahl Nitrogen	98.0		P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P407298

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
NO2NO3-N	102		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P407340

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total-P	106		P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P407218

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
O-Phosphate-P	100		P	90 - 110

Reference Method: SM 2120 B-2011
Batch ID: P407230

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Color (true)	101		P	85 - 115

Reference Method: SM 2320 B-2011
Batch ID: P407289

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Total Alkalinity	101		P	94 - 106

Quality Assurance Report Laboratory Control Sample Accuracy

Reference Method: SM 4500 F-C-2011
Batch ID: P407294

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Fluoride	102		P	93 - 104

Reference Method: SM 5310 B-2011
Batch ID: P407795

Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
Organic Carbon	96.8		P	85 - 115

Quality Assurance Report Matrix Spike Accuracy

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P407363

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2293857	Chloride	102		P	90 - 110
2294046	Chloride	105		P	90 - 110

Reference Method: EPA 300.0 Rev. 2.1
Batch ID: P407366

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2293857	Sulfate	97.3		P	90 - 110
2294046	Sulfate	99.0		P	90 - 110

Reference Method: EPA 350.1 Rev. 2.0
Batch ID: P407715

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2294064	Ammonia-N	99.8	99.4	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0
Batch ID: P407875

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2294502	Kjeldahl Nitrogen	97.4	101	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0
Batch ID: P407298

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2294063	NO2NO3-N	102	102	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0
Batch ID: P407340

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2294098	Total-P	108	109	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved
Batch ID: P407218

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2294065	O-Phosphate-P	100	98.7	P/P	90 - 110

Reference Method: SM 4500 F-C-2011
Batch ID: P407294

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2293934	Fluoride	100	99.9	P/P	92 - 107

Reference Method: SM 5310 B-2011
Batch ID: P407795

Spiked Sample	Component	% Rec.1	% Rec.2	Pass/Fail	Control Limits
2294509	Organic Carbon	101		P	85 - 115

Quality Assurance Report Precision

Reference Method: EPA 180.1 Rev. 2.0

Batch ID: P407226

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2294046	Turbidity	6.67	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1

Batch ID: P407363

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2293857	Chloride	0.221	Sample	P	0 - 20

Reference Method: EPA 300.0 Rev. 2.1

Batch ID: P407366

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2293857	Sulfate	0.678	Sample	P	0 - 20

Reference Method: EPA 350.1 Rev. 2.0

Batch ID: P407715

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2294064	Ammonia-N	0.316	Spike	P	0 - 20

Reference Method: EPA 351.2 Rev. 2.0

Batch ID: P407875

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2294502	Kjeldahl Nitrogen	3.03	Spike	P	0 - 20

Reference Method: EPA 353.2 Rev. 2.0

Batch ID: P407298

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2294063	NO2NO3-N	0.491	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0

Batch ID: P407340

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2294098	Total-P	0.783	Spike	P	0 - 20

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Batch ID: P407218

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2294065	O-Phosphate-P	1.41	Spike	P	0 - 20

Quality Assurance Report Precision

Reference Method: SM 2120 B-2011
Batch ID: P407230

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2294055	Color (true)	0.232	Sample	P	0 - 20

Reference Method: SM 2320 B-2011
Batch ID: P407289

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2293934	Total Alkalinity	1.10	Sample	P	0 - 5.2

Reference Method: SM 2540 C-2011
Batch ID: P407672

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2294076	TDS	1.45	Sample	P	0 - 10

Reference Method: SM 4500 F-C-2011
Batch ID: P407294

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2293934	Fluoride	0.487	Spike	P	0 - 2.1

Reference Method: SM 5310 B-2011
Batch ID: P407795

Replicated Lab Sample	Component	% RSD/RPD	Sample/Spike/LCS*	Pass/Fail	Control Limits
2294509	Organic Carbon	0.178	Spike	P	0 - 20

* Sample, spike and/or laboratory control sample precision (LCS) is reported.

Quality Assurance Report Calibration Verification

Reference Method: EPA 300.0 Rev. 2.1

Run ID: A109256

Included Lab Sample IDs: 2294097

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Chloride	105	105	P/P	90 - 110
Sulfate	102	102	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0 dissolved

Run ID: A109275

Included Lab Sample IDs: 2294099

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
O-Phosphate-P	102	101	P/P	90 - 110

Reference Method: EPA 180.1 Rev. 2.0

Run ID: A109277

Included Lab Sample IDs: 2294097

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Turbidity	100	100	P/P	95 - 105

Reference Method: SM 2120 B-2011

Run ID: A109278

Included Lab Sample IDs: 2294097

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Color (true)	102	104	P/P	85 - 115

Reference Method: SM 2320 B-2011

Run ID: A109312

Included Lab Sample IDs: 2294097

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total Alkalinity	98.4	100	P/P	90 - 110

Reference Method: SM 4500 F-C-2011

Run ID: A109312

Included Lab Sample IDs: 2294097

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Fluoride	102	102	P/P	90 - 110

Reference Method: EPA 353.2 Rev. 2.0

Run ID: A109315

Included Lab Sample IDs: 2294098

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
NO ₂ NO ₃ -N	101	101	P/P	90 - 110

Reference Method: EPA 365.1 Rev. 2.0

Run ID: A109471

Included Lab Sample IDs: 2294098

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Total-P	104	106	P/P	90 - 110

Quality Assurance Report Calibration Verification

Reference Method: EPA 350.1 Rev. 2.0

Run ID: A109493

Included Lab Sample IDs: 2294098

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Ammonia-N	99.0	98.8	P/P	90 - 110

Reference Method: SM 5310 B-2011

Run ID: A109530

Included Lab Sample IDs: 2294098

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Organic Carbon	97.0	96.0	P/P	90 - 110

Reference Method: EPA 351.2 Rev. 2.0

Run ID: A109613

Included Lab Sample IDs: 2294098

Component	% Rec.1	% Rec.2	Pass/Fail*	Control Limits
Kjeldahl Nitrogen	95.0	92.0	P/P	90 - 110

* Pass/Fail determinations are made for each bracketing calibration verification check.

Control limits for initial calibration checks may be different from those for continuing checks, depending on method requirements.

Where they are different, both control limits are provided.

Quality Assurance Report Summary

Ref. Method	Analyte	LCS % Recovery	MS % Recovery		LCS	Precision	MS
						SMP	
EPA 180.1 Rev. 2.0	Turbidity					6.67	
EPA 300.0 Rev. 2.1	Chloride	104	102	105		0.221	
	Sulfate	98.4	97.3	99.0		0.678	
EPA 350.1 Rev. 2.0	Ammonia-N	99.0	99.8	99.4			0.316
EPA 351.2 Rev. 2.0	Kjeldahl Nitrogen	98.0	97.4	101			3.03
EPA 353.2 Rev. 2.0	NO ₂ NO ₃ -N	102	102	102			0.491
EPA 365.1 Rev. 2.0	Total-P	106	108	109			0.783
EPA 365.1 Rev. 2.0 dissolved	O-Phosphate-P	100	100	98.7			1.41
SM 2120 B-2011	Color (true)	101				0.232	
SM 2320 B-2011	Total Alkalinity	101				1.10	
SM 2540 C-2011	TDS					1.45	
SM 4500 F-C-2011	Fluoride	102	100	99.9			0.487
SM 5310 B-2011	Organic Carbon	96.8	101				0.178

Reference Method Descriptions

Method	Description	Associated Samples
EPA 180.1 Rev. 2.0	Turbidity in aqueous matrices	2294097
EPA 300.0 Rev. 2.1	Chloride in aqueous matrices	2294097
EPA 300.0 Rev. 2.1	Sulfate in aqueous matrices	2294097
EPA 350.1 Rev. 2.0	Ammonia in aqueous matrices as mg N/L	2294098
EPA 351.2 Rev. 2.0	Total Kjeldahl Nitrogen in aqueous matrices	2294098
EPA 353.2 Rev. 2.0	Nitrite/Nitrate in aqueous matrices as mg N/L	2294098
EPA 365.1 Rev. 2.0	Total Phosphorus in aqueous matrices as mg P/L	2294098
EPA 365.1 Rev. 2.0 dissolved	Ortho-phosphate, dissolved, in filtered, aqueous matrices as mg P/L	2294099
SM 2120 B-2011	True Color measured at 450 nm (not valid for NPDES monitoring)	2294097
SM 2320 B-2011	Alkalinity in aqueous matrices as mg CaCO ₃ /L	2294097
SM 2540 C-2011	Total Dissolved Solids in aqueous matrices	2294097
SM 2540 D-2011	Total Suspended Solids in aqueous matrices using a maximum of 250 mL of sample	2294097
SM 4500 F-C-2011	Fluoride in aqueous matrices, without distillation (not valid for NPDES monitoring)	2294097
SM 5310 B-2011	Nonpurgeable Organic Carbon in aqueous matrices	2294098

Preparation and Analysis Log

Ref. Method	Received Date	Prep Date/Time	Prepared By	Analysis Date/Time	Analyzed By	Associated Samples
EPA 180.1 Rev. 2.0	12/08/2021			12/08/2021 16:09	Khloe J Berg	2294097
EPA 300.0 Rev. 2.1	12/08/2021			12/10/2021 22:44	Roberta Tatti	2294097
EPA 350.1 Rev. 2.0	12/08/2021			12/20/2021 13:16	Ping Hua	2294098
EPA 351.2 Rev. 2.0	12/08/2021	12/28/2021 02:23	Samantha L Bates	12/29/2021 16:04	Alexandra J Mattheus	2294098
EPA 353.2 Rev. 2.0	12/08/2021			12/10/2021 10:18	Beverly Y. Sanders	2294098
EPA 365.1 Rev. 2.0	12/08/2021	12/14/2021 10:43	Simonne.V. Calhoun	12/17/2021 15:54	Shengyu Ding	2294098
EPA 365.1 Rev. 2.0 dissolved	12/08/2021			12/08/2021 15:11	James L Waggerby	2294099
SM 2120 B-2011	12/08/2021			12/08/2021 16:37	Samantha L Bates	2294097
SM 2320 B-2011	12/08/2021			12/10/2021 01:17	Dale L. Simmons	2294097
SM 2540 C-2011	12/08/2021			12/10/2021 15:28	Yijie Li	2294097
SM 2540 D-2011	12/08/2021			12/10/2021 15:28	Yijie Li	2294097
SM 4500 F-C-2011	12/08/2021			12/10/2021 01:17	Dale L. Simmons	2294097
SM 5310 B-2011	12/08/2021			12/21/2021 01:09	Khloe J Berg	2294098