

STANDARD OPERATING PROCEDURE
For
SM 4500-NO₃ F / SM 4500-NH₃ G / SM 4500-Cl⁻ E (SM 23rd Edition)

Determination of Nitrate/Nitrite by Automated Cadmium Reduction Method
Determination of Ammonia by Automated Phenate Method
Determination of Chloride by Automated Ferricyanide Method

**SOP #: SM 4500-Cl-NOx-
NH₃**

REVISION #: 0

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Page 1 of 15

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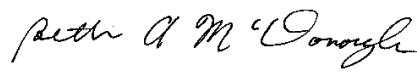
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TABLE OF CONTENTS

	Page
LIST OF REVISIONS	3
LIST OF TABLES	4
1.0 SCOPE AND APPLICATION	5
2.0 SUMMARY OF METHOD	5
3.0 DEFINITIONS.....	5
4.0 INTERFERENCES	7
5.0 SAFETY	8
6.0 EQUIPMENT AND SUPPLIES	8
7.0 REAGENTS AND STANDARDS.....	8
8.0 SAMPLE COLLECTION, PRESERVATION, AND STORAGE	9
9.0 QUALITY CONTROL.....	9
10.0 CALIBRATION AND STANDARDIZATION	9
11.0 PROCEDURE	9
12.0 DATA ANALYSIS AND CALCULATIONS.....	11
14.0 METHOD PERFORMANCE	12
15.0 POLLUTION PREVENTION	12
16.0 WASTE MANAGEMENT	13
17.0 REFERENCES.....	13
18.0 TABLES	14



LIST OF REVISIONS

Rev. #	Date	Description of Revision	Section #
0	April 2022	None	



LIST OF TABLES

	Page
TABLE 1. QUALITY CONTROL TESTS AND ACCEPTANCE LIMITS	14
TABLE 2. EXAMPLE ANALYSIS TABLE.....	15



METHODS: SM (23rd Edition) 4500-NO₃ F, 4500-NH₃ G & 4500-CL⁻ E

TITLES: Automated Cadmium Reduction Method; Automated Phenate Method; and Automated Ferricyanide Method

ANALYTES: Nitrate/Nitrite, Ammonia, and Chloride

INSTRUMENTATION: Skalar Segmented Flow Analyzer

1.0 SCOPE AND APPLICATION

- 1.1 This method is applicable to acid-preserved surface waters, ground waters, and drinking water. The laboratory's analytical range for nitrate/nitrite and ammonia is from 0.040 to 1.0 mg N/L and for chloride is from 4.0 to 150 mg/L. The range may be extended with sample dilution.
- 1.2 The instrument is not configured appropriately for wastewaters. Wastewaters may contaminate the instrument, making it difficult to maintain low reporting limits.
- 1.3 The methods may be run in combination or individually.

2.0 SUMMARY OF METHOD

- 2.1 For total nitrate/nitrite, the sample is buffered at pH 8.2 and is passed through a column containing granulated copper-cadmium to reduce the nitrate to nitrite. The nitrite is determined by diazotizing with sulfanilamide and coupling with N-(1-naphthyl)-ethylenediamine dihydrochloride to form a highly colored azo dye which is measured at 540 nm.
- 2.2 For ammonia, a modified Berthelot reaction is used. The sample is buffered, dialyzed, and chlorinated to monochloramine which reacts with salicylate to form 5-aminosalicylate. After oxidation and oxidative coupling, a green-colored complex is formed and measured at 660 nm.
- 2.3 For chloride, thiocyanate ion (SCN⁻) is liberated from mercuric thiocyanate. In the presence of iron ion, the liberated SCN⁻ forms highly colored ferric thiocyanate and is measured at 480 nm.

3.0 DEFINITIONS

- 3.1 Calibration Blank - A volume of reagent water fortified with the same matrix as the calibration standards but without the analyte. The calibration blank is a zero standard and is used to calibrate the flow analyzer.
- 3.2 Calibration Standard (CAL) - A solution prepared from the dilution of stock standard solutions. The CAL solutions are used to calibrate the instrument response with respect to analyte concentration.
- 3.3 Continuing Calibration Verification (CCV) or Instrument Performance Check (IPC) Solution - A solution of method analyte(s) used to evaluate the performance of the instrument system with respect to a defined set of method criteria after calibration. Consists of calibration point(s) (typically midrange) periodically reanalyzed within the test cycle to verify that the initial calibration



is applicable throughout the sample run. A CCV is required after every tenth sample and at the end of the analytical run.

- 3.4 Drift Standard - A standard run periodically to adjust for baseline and response shift; it is followed by a Wash.
- 3.5 Initial Calibration Blank (ICB) - A volume of reagent water fortified with the same matrix as the calibration standards but without the analyte. An ICB is analyzed after calibration.
- 3.6 Initial Calibration Verification (ICV) - A solution of method analyte(s) used to evaluate the performance of the instrument system with respect to a defined set of method criteria immediately after calibration. Consists of a concentration at or near the midpoint of the calibration curve. An ICV is required after calibration.
- 3.7 Instrument Detection Limit (IDL) - The concentration equivalent to the analyte signal which is equal to three times the standard deviation of a series of ten replicate measurements of the calibration blank signal at the same wavelength.
- 3.8 Laboratory Duplicate (Sample Duplicate) - Two aliquots of the same sample taken in the laboratory and analyzed separately with identical procedures. Analysis of the sample and the sample duplicate indicate precision associated with laboratory procedures, but not with sample collection, preservation, or storage procedures.
- 3.9 Laboratory Fortified Blank (LFB) - An aliquot of LRB to which known quantities of the method analyte(s) are added in the laboratory. The LFB is analyzed exactly like a sample, and its purpose is to determine whether the methodology is in control, and whether the laboratory is capable of making accurate and precise measurements.
- 3.10 Laboratory Fortified Sample Matrix (LFM) - An aliquot of an environmental sample to which known quantities of the method analyte(s) are added in the laboratory. The LFM is analyzed exactly like a sample, and its purpose is to determine whether the sample matrix contributes bias to the analytical results. The background concentration of the analyte(s) in the sample matrix must be determined in a separate aliquot and the measured values in the LFM corrected for background concentrations for the purpose of determining LFM recoveries.
- 3.11 Laboratory Reagent Blank (LRB) - An aliquot of reagent water or other blank matrices that are treated exactly as a sample including exposure to all glassware, equipment, solvents, reagents, and internal standards that are used with field samples. The LRB is used to determine if method analytes or other interferences are present in the laboratory environment, reagents, or apparatus that are used in processing field samples through the method.
- 3.12 Linear Calibration Range (LCR) - The concentration range over which the instrument response to an analyte is linear.
- 3.13 Quadratic Calibration Range (QCR) - For chloride, the concentration range over which the instrument response fits a quadratic curve. Unlike linear curves, values above the highest calibration standard are not reliable.
- 3.14 Method Detection Limit (MDL) - The minimum concentration of an analyte that can be identified, measured, and reported with 99% confidence that the analyte concentration is greater than zero.
- 3.15 Minimum Reporting Limit (MRL) - The lowest amount of an analyte in a sample that can be quantitatively determined with acceptable precision and accuracy under stated analytical



conditions. This defined concentration can be no lower than the concentration of the MRL check standard for that analyte and can only be used if acceptable quality control criteria for the analyte at this concentration are met.

- 3.16 MRL Check Standard - Low-level standard with concentration generally 3 to 5 times the MDL value. The standard is analyzed at the beginning of each analytical run before the samples are run.

- 3.17 Nitrite Check Standard - An unfiltered sodium nitrite standard at the high end of the calibration curve. The standard is analyzed at the beginning of each analytical run before the samples are run. The standard is used to determine reduction efficiency as follows:

$$\text{Efficiency (\%)} = \frac{\text{Instrument Nitrate Concentration (1.0 mg/L)}}{\text{Instrument Nitrite Concentration (1.0 mg/L)}} \times 100$$

- 3.18 Quality Control Sample (QCS) - A solution of method analyte(s) of known concentration(s), which is used to fortify an aliquot of LRB or sample matrix. The QCS is obtained from a source external to the laboratory and different from the source of calibration standards. It is used to check laboratory and instrument performance with externally prepared test materials.

- 3.19 Safety Data Sheet (SDS) - Written information provided by vendors concerning a chemical's toxicity, health hazards, physical properties, fire, and reactivity data including storage, spill, and handling precautions.

- 3.20 Stock Standard Solution (SSS) - A concentrated solution containing one or more method analytes, prepared in the laboratory using assayed reference materials or purchased from a reputable commercial source.

- 3.21 Tracer - An aliquot of the highest calibration standard used by the software to establish analyte elution time.

- 3.22 Wash - An aliquot of acid blank that follows a Drift standard; used to adjust for baseline and response shift.

- 3.23 Wash Ignore - An aliquot of acid blank used after samples that may have a high concentration of analytes and/or contaminants.

- 3.24 UCL – Upper Control Limit = Mean concentration (X) + 3 standard deviation (SD)

$$\text{UWL – Upper Warning Limit} = X + 2 \text{ SD}$$

$$\text{LCL – Lower Control Limit} = X - 3 \text{ SD}$$

$$\text{LWL – Lower Warning Limit} = X - 2 \text{ SD}$$

4.0 INTERFERENCES

- 4.1 Sample turbidity may interfere with spectrophotometry; samples are filtered with a > 0.45-µm filter to remove turbidity without affecting analyte concentration.



5.0 SAFETY

- 5.1 Protective clothing, gloves and glasses must be worn when working with sulfuric acid and other toxic and/or corrosive chemicals. Refer to Safety Data Sheets (SDS) for toxicity and hazard levels.
- 5.2 It is the responsibility of the user of this method to comply with relevant disposal and waste regulations.

6.0 EQUIPMENT AND SUPPLIES

- 6.1 Skalar San+ automated segmented flow analyzer, controller, and autosampler.
- 6.2 Skalar FlowAccess software, Version 3.3.4 (Windows 10).
- 6.3 Autosampler tubes: Greiner Bio-One Polystyrene 12 mL, 16-mm x 100-mm.
- 6.4 Peristaltic pump tubing - assorted (See instrument manual).
- 6.5 Volumetric glassware and/or calibrated pipettors.
- 6.6 Personal Protective Equipment (PPE): Lab coats, vinyl gloves, safety glasses, etc. Nitrile gloves are not to be used as they may contribute nitrate contamination when in contact with acids.
- 6.7 Polished ASTM Type I reagent water with low ionic and total organic carbon content.
- 6.8 Tubing and air-stone to helium-spargre reagent water.
- 6.9 Calibrated temperature infrared (IR) thermometer for ensuring standards and samples are at room temperature.
- 6.10 Sample filter cartridges (e.g., Evergreen Labware Products 208-3355-030).
- 6.11 Glass vacuum filtration assembly with 0.45- μ m filters.
- 6.12 ZapCap-CR nylon 0.45- μ m filter (#10443423).

7.0 REAGENTS AND STANDARDS

- 7.1 Refer to the reagent and standard preparation sheets for this method. Larger or smaller quantities may be prepared to accommodate different numbers of samples so long as the molar ratios of the components are maintained.
- 7.2 Hypochlorite Cleaning Solution: Dilute 160 mL of 12.5% sodium hypochlorite solution to 2 L with reagent water. This solution is used for nitrate/nitrite and ammonia.
- 7.3 Weekly Chloride Cleaning Solution (1-M HCl): Dilute 50 mL of concentrated hydrochloric acid to 500 mL with reagent water.
- 7.4 Monthly Chloride Cleaning Solution: Dissolve 20 g of oxalic acid in 500 mL of reagent water.



- 7.5 Glassware cleaning solution (for precleaned tubes): Mix 650 mL of trace metal-grade, concentrated hydrochloric acid and 12.383 L of reagent water.

8.0 SAMPLE COLLECTION, PRESERVATION, AND STORAGE

- 8.1 Sample collection techniques appropriate to the sample type must be practiced.
- 8.2 Samples must be preserved to pH < 2 with 9.4-N sulfuric acid.
- 8.3 Samples must be refrigerated at $4 \pm 2^{\circ}\text{C}$.
- 8.4 Preserved/refrigerated samples must be analyzed within 28 days of collection, unless prior arrangement has been made with sample owner or samples are delivered to WES frozen.

9.0 QUALITY CONTROL

- 9.1 An LRB and an LFB are analyzed with every batch of up to 20 field samples. The LRB must be below 50% of the minimum reporting limits. The LFB recoveries must be within 10% of the true value.
- 9.2 Duplicates and LFBs are analyzed at a frequency of 10%. Recoveries should be within 20% of the true value.
- 9.3 An unfiltered QCS is analyzed with every batch. QCS recoveries must be within 10% of the true value.

10.0 CALIBRATION AND STANDARDIZATION

- 10.1 The instrument is calibrated on each day of use with at least three calibration standards for linear curves and at least 5 calibration standards for quadratic curves plus a calibration blank and uses the analysis procedure below.
- 10.2 The calibration curves for ammonia and nitrite/nitrate are linear and must have correlation coefficients ($r \geq 0.995$). The calibration curve for chloride is quadratic and must have an r^2 value ≥ 0.990 . Curves are not forced through the origin.
- 10.3 Back-calculated values of calibration standards must be within 10% of the true values, except for calibration standards at or below the minimum reporting limit. Standards at the MRL must be within $\pm 50\%$ or must meet the data users' criteria.

11.0 PROCEDURE

- 11.1 Remove standards, reagents, and samples from refrigerators and allow them to equilibrate to room temperature; a warm water bath and IR thermometer can be used to accelerate the process for the standards and reagents.
- 11.2 If necessary, empty the hazardous waste container into the inorganic drum in the WES Hazardous Waste Room. Empty acidified water waste into a laboratory sink, which drains to the building's pH neutralizing tank.
- 11.3 Manually switch the outflow from the autosampler to the chloride/nitrate/ammonia splitter. Insert the ammonia flow cell and the 660-nm filter. Move the air tubes slightly to avoid pinching by the



bars. Clamp down the platens on the autosampler and both pump units and turn them on; set the flow to high on the pump units for at least ten minutes to flush them. Make sure reagent water reservoirs are full.

- 11.4 Rinse the reagent water carboy at least three times with polished reagent water and fill; sparge with helium for ten minutes.
- 11.5 Partially fill the autosampler rinse and acid blank flasks with sparged water and acidify with 9.4-N sulfuric acid. Bring the flasks up to volume. Partially fill the quality control flasks (chloride and ammonia/nitrate MRL standards, LFM, and QCS) with acid blank. Partly fill the nitrite check standard with reagent water; do not acidify.
- 11.6 De-gas the two ammonia buffers and the mercury (II) thiocyanate reagent by filtering with the 0.45- μ m vacuum filtration equipment. De-gas the iron (III) ammonium sulfate by filtering with a ZapCap filter.
- 11.7 Start the flow for the autosampler acid blank then turn off the autosampler and turn it back on again to rinse the syringe with acid blank. Start the flow for the reagents, then turn on the ammonia heater (40°C). Place the waste tubes into the hazardous waste container.
- 11.8 Turn on the Skalar control unit and allow it to initialize. Turn on the computer and start the Skalar FlowAccess software. Log in and select the "Filtered" system. Run the baselines for the three analytes.
- 11.9 Turn on flow to the nitrate/nitrite cadmium column and let it flush on high flow for at least one minute. Check for stable baselines.
- 11.10 Insert pre-cleaned tubes for the drift and carryover standards and place the uncovered beaker of auto-diluter stock into position; make sure the volume of the standard in the beaker is approximately 150 mL. Tubes are cleaned by filling with glassware cleaner, followed by at least three rinses with reagent water. The tubes are stored upside-down to dry.
- 11.11 Create the table for the run, using an existing table as a template. A Tracer starts the table, followed by a Drift and Wash. Next are the calibration standards, followed by a Wash-Ignore, a Drift and a Wash. Initial quality control samples follow. Every ten samples are followed by a Wash-Ignore, Drift, a Wash, Continuing Calibration Verification Standard, and Continuing Calibration Blank. Print the table as a reference for filling the sample racks.
- 11.12 Turn off baseline acquisition and start autosampler preparation of the drift and carryover standards: click Control, then click on the autosampler image, then Pre-dilution Utility. The drift concentration should be 80% of the highest concentration in the calibration curve.
- 11.13 Once the drift and carryover standards are prepared, turn the pump units on high, then turn the baselines on. Small carryover peaks from the standard preparation should appear in approximately 3 minutes for chloride, 5 minutes for nitrate/nitrite, and 6 minutes for ammonia on high flow; meanwhile, complete preparation of the quality control standards in the flasks.
- 11.14 Set the flows to normal.
- 11.15 Place the calibration standard tubes into position and start analysis. Turn on the auto-shutdown feature, if needed.



- 11.16 Rinse the pre-dilution blank tubes with acid blank and fill one tube with acid blank; place the full tube in autosampler position A1 and the empty tube in position A2.
- 11.17 Rinse each remaining sample tube with the filtered sample as assigned in Step 11.11, discard, then fill with filtered sample, and place into position in the autosampler rack.
- 11.18 During analysis, replenish the reagent water reservoirs.
- 11.19 Monitor the run for out-of-range samples. Dilutions of 2x (5 mL to 10 mL) and 5x (2 mL to 10 mL) may be prepared in pre-cleaned tubes with acid blank and acid-washed Class A glass pipets or calibrated pipettors. Higher dilution factors can be made with acid-washed volumetric flasks. Every ten samples are bracketed with continuing quality control, as mentioned above.
- 11.20 When the run is completed, turn off the flow to the nitrate/nitrite cadmium column. Turn off the ammonia heater. Dip each reagent line into a 500-mL beaker of reagent water and place into the reagent water reservoir.
- 11.21 Move the autosampler lines to the reagent water reservoir. Turn the autosampler off and on again to flush the syringe with reagent water.
- 11.22 After approximately 15 minutes of rinsing with reagent water, move the waste lines to the acidified water container. Set the flows to normal and rinse for at least 15 minutes more.
- 11.23 Turn off the computer, controller, autosampler, and pump units (in no particular order). Lift the platens on the autosampler and pump units.

12.0 DATA ANALYSIS AND CALCULATIONS

- 12.1 The Skalar FlowAccess software performs peak identification and calculations, using peak heights and the calibration curves.
- 12.2 Unused calibrators may be deselected for each analyte; unused calibrators are noted on the charting and result tables. Examples when calibrators may be deselected include: software requires calibration information for both analytes when standards for one analyte are below the MRL, results indicate a problem with one standard, etc.
- 12.3 Peak heights may be adjusted manually; chromatograms showing unadjusted and marked adjusted heights are printed. Examples of peak height adjustment include: software not choosing the top of the peak within the time window, obvious interference at the point where the software marked the peak, etc.
- 12.4 Chloride charting must be manually reviewed for peak heights greater than those of the highest calibrators, as the software may incorrectly solve the quadratic equation for these peaks.
- 12.5 Calibration curves, charting, and result tables are printed and included in the run folders, along with reagent and standard preparation sheets.

13.0 MAINTENANCE

- 13.1 Peristaltic pump tubing should be replaced monthly, or less often with reduced usage.
- 13.2 Platens on the pump units and autosampler must not be clamped down when not in use.



- 13.3 If the instrument is expected to go unused for more than several days, release the platens after use and wait at least 15 minutes for depressurization. Lift the pump bars and remove the air tubing from underneath them. Return the pump bars to the down position. This keeps the air tubing from being pinched and allows the pump bar springs to be in a more relaxed position.
- 13.4 The instrument's plastic tubing is replaced at least annually as part of a service contract with the manufacturer. More frequent tubing replacement may be needed if highly contaminated samples, such as wastewaters, are analyzed.
- 13.5 General cleaning procedure (weekly or when contamination is suspected):
- 13.5.1 Place the nitrate/nitrite and ammonia sets of reagent tubes in flasks with hypochlorite cleaning solution; place the three active autosampler tubes in another flask of hypochlorite cleaning solution.
- 13.5.2 Rinse the system for 45 minutes or longer if heavy contamination is suspected.
- 13.5.3 Rinse the sets of tubes by dipping them in 500-mL beakers of reagent water and place them into their respective reservoirs of reagent water.
- 13.5.4 Rinse the system with reagent water for at least 30 minutes.
- 13.5.5 After 15 minutes of rinsing, place the chloride reagent tubes in the weekly chloride cleaning solution and run for 15 minutes.
- 13.5.6 Rinse the chloride reagent tubes by dipping them in a 500-mL beaker of reagent water and place them into their reservoir of reagent water.
- 13.5.7 Rinse the system with reagent water for at least 30 minutes.
- 13.6 Monthly chloride cleaning procedure:
- 13.6.1 Place the chloride reagent tubes in the monthly chloride cleaning solution and run for 30 minutes.
- 13.6.2 Rinse the chloride reagent tubes by dipping them in a 500-mL beaker of reagent water and place them into their reservoir of reagent water.
- 13.6.3 Rinse the system with reagent water for at least 15 minutes.

14.0 METHOD PERFORMANCE

- 14.1 For method performance, see the Initial Demonstration of Capability (IDC) data for accuracy and precision, along with data from the yearly Method Detection Limit (MDL) study. All data are stored electronically in the WES SharePoint indefinitely and in hard copy for a period of up to 10 years. Precision and accuracy quality control charts are generated automatically by the LIMS and reviewed monthly.

15.0 POLLUTION PREVENTION

- 15.1 The quantity of chemicals purchased should be based on expected usage during its shelf life.



15.2 Actual reagent preparation volumes should reflect anticipated usage during its shelf life.

16.0 WASTE MANAGEMENT

16.1 WES laboratory waste management practices comply with all applicable federal, state, and local rules and regulations.

17.0 REFERENCES

- 17.1 American Public Health Association (APHA). 2017. *Standard Methods for the Examination of Water and Wastewater*, 23rd Edition. APHA, American Water Works Association, and Water Environment Federation, Washington, D.C.
- 17.2 Ammonia (Skalar Method). Catnr. 156-350.1w/rX(+valve). Issue 092815/MH/99300143. Skalar Analytical B.V. Breda, The Netherlands.
- 17.3 Chloride (Skalar Method). Catnr. 239-325.1(+P8). Issue 092315/MH/99300143. Skalar Analytical B.V. Breda, The Netherlands.
- 17.4 Nitrate + Nitrite (Skalar Method). Catnr. 461-031(+P8). Issue 092115/MH/99300143. Skalar Analytical B.V. Breda, The Netherlands.
- 17.5 Segmented Flow Analyzer: SA3000/5000 Chemistry Unit User Manual. 2013. Publication No: 0101063D.US Skalar Analytical B.V. Breda, The Netherlands.
- 17.6 FlowAccess V3 User Manual. 2013. Publication No: 0101092I.US. Skalar Analytical B.V. Breda, The Netherlands.



18.0 TABLES

TABLE 1. Quality Control Tests and Acceptance Limits

Accuracy			Precision		
QC Test	Acceptance Limits (% Recovery)	Frequency	QC Test	Acceptance Limits (RPD ^a)	Frequency
Laboratory Fortified Blank (LFB)	90 - 110	With every batch of ≤ 20 samples	Laboratory Duplicates	≤ 20	10%
Laboratory Fortified Matrix (LFM)	80 - 120	10%			
Quality Control Standard (QCS)	90 - 110	With every batch of ≤ 20 samples			
Laboratory Reagent Blank (LRB)	> - ½ MRL and < ½ MRL	With every batch of ≤ 20 sample			
Initial Calibration Blank (ICB)	> - ½ MRL and < ½ MRL	After calibration			
Initial Calibration Verification (ICV)	90 - 110	After calibration			
Continuing Calibration Blank (CCB)	> - ½ MRL and < ½ MRL	After every 10 samples and at the end of the analytical run			
Continuing Calibration Verification (CCV)	90 - 110	After every 10 samples and at the end of the analytical run			
Method Reporting Limit (MRL) Standards	50 - 150	With every batch			
Nitrite Check Standard	90 - 110	With every batch			

^a RPD = relative percent difference between duplicates.



TABLE 2. EXAMPLE ANALYSIS TABLE

Position	Type	Identity	Comments	Weight	Ext. Dilution Factor	Pre-dil Factor
Pre-dil Position						
ST8	T	Tracer	1.0000 1.0000	1		
WT	W	Wash	1.0000 1.0000	1		
B1	D	Drift	1.0000 1.0000	1		
WT	W	Wash	1.0000 1.0000	1		
ST25	S1	Blank Standard	1.0000 1.0000		1	
ST1	S2	0.010/2.0/0.010 Standard	1.0000 1.0000		1	
ST2	S3	0.020/4.0/0.020 Standard	1.0000 1.0000		1	
ST3	S4	0.040/8.0/0.040 Standard	1.0000 1.0000		1	
ST4	S5	0.10/20./0.10 Standard	1.0000 1.0000		1	
ST5	S6	0.25/50./0.25 Standard	1.0000 1.0000		1	
ST6	S7	0.50/100/0.50 Standard	1.0000 1.0000		1	
ST7	S8	0.75/150/0.75 Standard	1.0000 1.0000		1	
ST8	S9	1.0/200/1.9 Standard	1.0000 1.0000	1		
WT	WI	WashIgnore	1.0000 1.0000	1		
B2	D	Drift	1.0000 1.0000	1		
WT	W	Wash	1.0000 1.0000	1		
A1	U	Pre-dilution Blank	1.0000 1.0000		20	A2
B5	U	Carryover Standard	1.0000 1.0000	1		
A3	U	Carryover Blank	1.0000 1.0000		1	
A4	U	QCS 0.50/100/0.50	1.0000 1.0000	1		
A5	U	MRL CI 4.0	1.0000 1.0000	1		
A6	U	MRL NH3/NOx 0.040	1.0000 1.0000	1		
A7	U	Nitrite 1.0	1.0000 1.0000	1		
ST5	U	ICV 0.25/50./0.25	1.0000 1.0000		1	
A8	U	ICB	1.0000 1.0000	1		
A9	U	LRB	1.0000 1.0000	1		
A10	U	LFB 0.25/50./0.25	1.0000 1.0000		1	
ST5	U	CCV 0.25/50./0.25	1.0000 1.0000	1		
A11	U	CCB	1.0000 1.0000	1		
B3	D	Drift	1.0000 1.0000	1		
WT	W	Wash	1.0000 1.0000	1		
A12	U	2000792	1.0000 1.0000		1	
A13	U	2000939	1.0000 1.0000		1	
A14	U	2000940	1.0000 1.0000		1	
A15	U	2000941	1.0000 1.0000		1	
A16	U	DUP 2000792	1.0000 1.0000	1		
A17	U	LFM 2000792	1.0000 1.0420	1		
A18	U	2001227 PT 2:200mL	1.0000 100.0000		1	
A19	U	2001001	1.0000 1.0000		1	
A20	U	2001002	1.0000 1.0000		1	
A21	U	2001227 QC 2:200mL	1.0000 100.0000		1	
WT	WI	WashIgnore	1.0000 1.0000	1		
B4	D	Drift	1.0000 1.0000	1		
WT	W	Wash	1.0000 1.0000	1		
ST6	U	CCV 0.50/100/0.50	1.0000 1.0000	1		
A22	U	CCB	1.0000 1.0000	1		
A23	U	2001227 PT 2:100mL	1.0000 50.0000		1	
A24	U	2001227 PT 5:100mL	1.0000 20.0000		1	
A25	U	2001227 PT 5:50mL	1.0000 10.0000		1	
WT	WI	WashIgnore	1.0000 1.0000	1		
B5	D	Drift	1.0000 1.0000	1		
WT	W	Wash	1.0000 1.0000	1		
ST5	U	CCV 0.25/50./0.25	1.0000 1.0000	1		
A26	U	CCB	1.0000 1.0000	1		
B1	D	Drift	1.0000 1.0000	1		
WT	W	Wash	1.0000 1.0000	1		