Laboratory Procedure Manual

Analyte: **Volatile Organic Compounds (VOCs) & Trihalomethanes/MTBE**

Matrix: **Whole Blood**

Method: **Headspace Solid-Phase Microextraction with Benchtop GC MS**

As performed by:

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Important Information for Users

The Centers for Disease Control and Prevention (CDC) periodically refines these laboratory methods. It is the responsibility of the user to contact the person listed on the title page of each write-up before using the analytical method to find out whether any changes have been made and what revisions, if any, have been incorporated.

Public Release Data Set Information

This document details the Lab Protocol for testing the items listed in the following table

Data File Name	Variable Name	SAS Label
VOCWB_K	LBX2DF	Blood 2,5-Dimethylfuran (ng/mL)
	LBX4CE	Blood 1,1,1,2-Tetrachloroethane (ng/mL)
	LBXV06	Blood Hexane (ng/mL)
	LBXV07N	Blood Heptane (ng/mL)
	LBXV08N	Blood Octane (ng/mL)
	LBXV1D	Blood 1,2-Dichlorobenzene (ng/mL)
	LBXV2A	Blood 1,2-Dichloroethane (ng/mL)
	LBXV3B	Blood 1,3-Dichlorobenzene (ng/mL)
	LBXV4C	Blood Tetrachloroethene (ng/mL)
	LBXVAPN	Blood α-Pinene (ng/mL)
	LBXVBF	Blood Bromoform (ng/mL)
	LBXVBM	Blood Bromodichloromethane (ng/mL)
	LBXVBZ	Blood Benzene (ng/mL)
	LBXVBZN	Blood Benzonitrile (ng/mL)
	LBXVC6	Blood Cyclohexane (ng/mL)
	LBXVCB	Blood Chlorobenzene (ng/mL)
	LBXVCF	Blood Chloroform (ng/mL)
	LBXVCM	Blood Dibromochloromethane (ng/mL)
	LBXVCT	Blood Carbon Tetrachloride (ng/mL)
	LBXVDB	Blood 1,4-Dichlorobenzene (ng/mL)
	LBXVDE	Blood 1,2-Dibromoethane (ng/mL)
	LBXVDEE	Blood Diethyl Ether (ng/mL)
	LBXVEA	Blood Ethyl Acetate (ng/mL)
	LBXVEB	Blood Ethylbenzene (ng/mL)
	LBXVEC	Blood Chloroethane (ng/mL)
	LBXVFN	Blood Furan (ng/mL)
	LBXVIBN	Blood Isobutyronitrile (ng/mL)
	LBXVIPB	Blood Isopropylbenzene (ng/mL)
	LBXVMC	Blood Methylene Chloride (ng/mL)
	LBXVME	Blood MTBE (ng/mL)
	LBXVMCP	Blood Methylcyclopentane (ng/mL)
	LBXVMIK	Blood Methyl Isobutyl Ketone (ng/mL)
	LBXVNB	Blood Nitrobenzene (ng/mL)
	LBXVOX	Blood o-Xylene (ng/mL)
	LBXVTC	Blood Trichloroethene (ng/mL)
	LBXVTE	Blood 1,1,1-Trichloroethane (ng/mL)
	LBXVTFT	Blood ααα-Trifluorotoluene (ng/mL)
	LBXVTHF	Blood Tetrahydrofuran (ng/mL)
	LBXVTP	Blood 1,2,3-Trichloropropane (ng/mL)
	LBXVVB	Blood Vinyl Bromide (ng/mL)
	LBXVXY	Blood m-/p-Xylene (ng/mL)

1. Clinical Relevance and Summary of Test Principle

a. Clinical Relevance

Biomonitoring of volatile organic compounds (VOCs) in blood provides useful information on exposure and internal dose of environmental chemicals. To support studies exploring the relationship between exposure to these chemicals and adverse health effects, an automated analytical method was developed using capillary gas chromatography (GC) and mass spectrometry (MS) with selected-ion monitoring (SIM) detection and isotope-dilution. This method quantifies levels of individual VOCs in blood to low-parts-per-trillion range. Because non-occupationally exposed individuals have blood VOC concentrations in this range, this method is applicable for determining these quantities and investigating cases of sustained or recent low-level exposure.

b. Test Principle

Volatile organic compounds are measured in specially collected whole blood specimens by headspace solid-phase microextraction (SPME)/gas chromatography/isotope dilution mass spectrometry using a similar method as described by Blount, *et al*.[1] Analysis of the blood specimen is performed by equilibrium headspace analysis using SPME. For analysis, 3 mL of blood is transferred by a Luer Lock syringe from a blood collection tube to a headspace vial. The SPME fiber is inserted into the headspace of a hermetically sealed sample vial containing the blood specimen. The VOCs partition into the coating on the outside of the SPME fiber shaft. This fiber is then inserted into the heated GC inlet where the VOCs rapidly desorb because of the high temperature. Extracted VOCs are focused at the head of the GC column using a cryogenic trap. Analytes are separated on a capillary column designed for VOC analyses and quantified using SIM MS (unit mass resolution). Response calibration is performed using isotopically labeled standards to normalize calibration standards and sample responses. This method is applicable to the determination of a broad range of VOCs in 3-mL blood with detection limits in the low-parts-per-trillion range. Because non-occupationally exposed individuals have blood VOC concentrations in this range, this method is applicable for determining these quantities and investigating cases of exposure to VOCs.

Alteration of particular aspects of this method can result in major biases. Care is required to produce non-contaminated blanks, blood collection tubes, and quality control materials. Efforts must be taken to minimize the sources of VOC contamination. Some typical contamination sources include the use of smoke, solvents, bleach and cleaning products, dry-cleaned clothing, air fresheners, perfumes, fuel/exhaust fumes, off-gassing from paints/adhesives/plastics, and inadequate lab air handling.[2,3]

2. Safety Precautions

a. Reagent toxicity or carcinogenicity

ALL OF THE COMPOUNDS USED IN THIS METHOD ARE HAZARDOUS CHEMICALS! When working with neat (undiluted) materials or highly concentrated solutions use a high draft fume hood and lower all the sashes to recommended operating height because most of these compounds are toxic. Wear vinyl or nitrile gloves when handling hazardous chemicals to prevent absorption through the skin. Some of the compounds used in this study are known or suspected carcinogens, mutagens and/or teratogens.

When handling bulk solvent for cleaning syringes, work in an appropriate chemical fume hood, use protective eye equipment with splash protection, and wear nitrile gloves and a lab coat.

b. Radioactive hazards

None.

c. Microbiological hazards

Follow universal precautions. Because of the possibility of exposure to various microbiological hazards, appropriate measures should be taken to avoid any direct contact with the blood specimens. A Hepatitis B vaccination series is recommended for health care and laboratory workers who are exposed to human fluids and tissues.

d. Mechanical hazards

When working with headspace syringes, keep hands clear of the needles, never recap needles, and dispose of needles in a sharps container. When inserting a needle into a vacutainer, first touch the needle to the vacutainer stopper at the proper position before applying pressure needed for piercing. When breaking open QC and standard ampules, use Kevlar gloves. Dispose of ampule glass in broken glass steel autoclave pans or sharps container. In addition wear Kevlar gloves over nitrile gloves when decontaminating and cleaning glass syringes.

There are minimal instrument hazards when performing this procedure using standard safety practices. Laboratorians should read and follow the manufacturer's information regarding safe operation of equipment. Avoid direct contact with the mechanical and electronic components of the gas chromatograph or mass spectrometer unless all power to the instrument is off. Generally, mechanical and electronic maintenance and repair should only be performed by qualified technicians. The autosampler and the mass spectrometer contain a number of areas that are hot enough to cause burns. Precautions should be used when working in these areas.

e. Protective equipment

Standard safety precautions should be followed when performing this procedure, including the use of a lab coat or disposable gown, safety glasses, appropriate gloves, and biological safety and chemical fume hoods. Refer to the laboratory *Chemical Hygiene Plan* and CDC Division of Laboratory Sciences safety policies and procedures for details related to specific activities, reagents, or agents.

f. Training

Formal training in the use of the gas chromatograph and mass spectrometer is necessary. Users are required to read the operation manuals and should demonstrate safe techniques in performing the method.

g. Personal hygiene

Follow Universal Precautions. Care should be taken when handling chemicals or any biological specimen. Routine use of gloves and proper hand washing should be practiced. Refer to the laboratory Chemical Hygiene Plan and CDC Division of Laboratory Sciences safety policies and procedures for details related to specific activities, reagents, or agents.

h. Disposal of wastes

Waste materials must be disposed of in compliance with CDC laboratory, federal, state, and local regulations. Solvents and reagents should always be disposed of in an appropriate container clearly marked for waste products and temporarily stored in a chemical fume hood. Disposable plastic, glass, and paper (e.g. pipet tips, blood collection tubes, gloves, etc.) that contact blood are placed in a biohazard autoclave bag. The biohazard autoclave bags should be kept in appropriate containers until sealed and autoclaved. Wipe down all surfaces with fresh 70% ethanol solution when work is finished. Disposable needles attached to syringes to withdraw blood from blood collection tubes should be placed immediately into a sharps container after use. Sharps containers are to be autoclaved when they become full. Any plastic syringes used to aliquot blood are to be disposed of in sharps containers if needles are left attached, but may be disposed as nonsharps biohazard if needles are removed. All reusable syringes and other non-disposable glassware that contact blood are to be decontaminated with a freshly prepared bleach solution (a 10% dilution of commercial sodium hypochlorite (bleach) for at least 10 min. or equivalent) before re-use or disposal. Commercial sodium hypochlorite solutions contain significant amounts of chloroform and bromodichloromethane that can contaminate samples; routine disinfection with bleach should therefore be isolated from preparatory areas and VOC blood specimens and specimen samples.

Observe Universal Precautions. Dispose of all biological samples and diluted specimens in a biohazard autoclave bag at the end of the analysis according to CDC/DLS guidelines for disposal of hazardous waste.

All reusable syringes and other non-disposable glassware that contact blood should be decontaminated with a freshly prepared bleach solution (a 10% dilution of commercial sodium hypochlorite (bleach) or equivalent) before re-use or disposal.

3. Computerization; Data-System Management

a. Software and knowledge requirements

Data are processed and reviewed with instrument software provided by the instrument manufacturer or equivalent software from a different company. The reviewed data are entered into a relational database.

b. Sample information

Information pertaining to particular specimens is entered into a database either manually or electronically transferred. Data for samples from each analytical run are processed into a single file using data analysis software that provides blood concentration results along with corresponding calibration curve, quality control, and blank data. The result file is transferred electronically into the database. No personal identifiers are used, and all samples are referenced to a blind coded sample identifier.

c. Data maintenance

Integrity of specimen and analytical data generated by this method involves visual inspection of all peak integrations, proofreading all transcribed data, storage of data in multiple computer systems, and redundant data archiving. Original data files contain traceable header information (e.g., date, analytical run number, sample type and sample identification) and are stored on recordable media on site. Data is accessed directly by Ethernet connection to the instrument computer. The raw data are also archived on the shared network drive along with relevant meta-data including peak integrations, calibration curves, blanks, and isotope corrections. Processed results files are transferred electronically into the local area network (LAN) and stored in a shared directory. Processed data is loaded into the database system using an automated data import module.

d. Information security

Information security is managed at multiple levels. The information management systems that contain the final reportable results are restricted through user ID, password and smart card security access. The computers and instrument systems that contain the raw and processed data files require specific knowledge of software manipulation techniques and physical location. Site security is provided at multiple levels through restricted access to the individual laboratories, buildings, and site. Confidentiality of results is protected by referencing results to blind coded specimen IDs (no names or personal identifiers).

4. Procedures for Collecting, Storing, and Handling Specimens; Criteria for Specimen Rejection

a. Special instructions

No special instructions such as fasting or special diets are required.

b. Specimen collection

Isopropyl alcohol, which may be used to disinfect the venipuncture site, can contaminate the collected sample and cause nonspecific interferences of the analytical measurement. Contamination is prevented by drying the site that has been swabbed with isopropyl alcohol with a gauze bandage and allowing it to air dry for 5 to 10 sec.

The specimen type is whole blood collected in specially cleaned,[4] 7-mL or 10-mL drawn glass tubes containing potassium oxalate and sodium fluoride anticoagulant. Additional information on preparation of these blood collection tubes can be found in Section 6.d.

c. Specimen handling

The CDC-prepared blood collection tubes contain anticoagulant that inhibits metabolism and prevents coagulation. Metabolic inhibition increases specimen shelf life by minimizing metabolic impact on blood VOC levels during storage. Once specimens have been collected, they are mixed thoroughly to completely dissolve and distribute the anticoagulant. Because blood is perishable and VOCs are highly volatile, care is taken to ensure that specimens are kept refriferated (i.e., 2–6 °C) during storage and shipment. All specimens are placed on wet ice or into a refrigerator within 30 min of collection. In addition, specimens are shipped with enough wet ice or equivalent cooling material to ensure that the specimens remain cool (but not frozen) throughout the shipment process. Shipment is scheduled to ensure that they will arrive at CDC on normal business days to guarantee their proper processing upon arrival. Specimens are not frozen or stored at

freezer temperatures at any time during specimens collection and shipment. Specimens are shipped within 1 to 2 days of collection so that they are typically analyzed within 2 to 3 weeks of collection.

Specimen stability has been demonstrated for analytes measured by this method for 16 weeks at refrigerated temperatures (2–6 °C). Note that blood specimens change with time of refrigerated storage. After 10 weeks of storage the blood often begins to thicken and is therefore difficult to handle. Even though analytical results may not change over this time, specimens may be less amenable to analysis. Certain volatile organic compounds are produced naturally, and metabolism may alter their concentration with storage.

Storage at freezing temperatures results in cell rupture. In addition, freezing of blood can lead to breakage of blood collection tubes and loss of specimens in some cases. Because VOCs are lost whenever the containers in which they are contained are opened, blood specimens are not transferred to another container.

d. Specimen quantity

The blood collection tube is filled to capacity to minimize headspace losses. Headspace losses depend upon the blood-air partition constant of a compound. This method requires a minimum of 3 mL of blood. However, specimens may be diluted with low-VOC water, which requires adjustment to the dilution factor and limit of detection (LOD). Diluting a specimen is not recommended for initial analysis of a blood specimen, but may be necessary if VOC levels are above the concentration of the highest standard.

e. Unacceptable specimens

The criteria for unacceptable specimens are a low volume, failure to maintain specimen temperature between 2 °C and 6 °C, , suspected contamination, use of an untreated blood collection tube, and significant clotting of the specimen.

Failure to obtain adequate specimen volume is obvious when the specimens are received. Visual inspection of the blood collection tube reveals when estimated blood volume is less than the required 3 mL. Maintenance of temperature during shipment is verified by examining the shipment temperature upon receipt. Clotting is indicated by failure of the specimen to flow when the blood collection tube is inverted. Clotting can occur from failure to properly mix the specimen and anticoagulant as described above. A description of reasons for each rejected specimen is recorded in the relational database as the specimens are logged into the laboratory.

5. Procedures for Microscopic Examinations; Criteria for Rejecting Inadequately Prepared Slides

Not applicable

6. Preparation of Reagents, Calibration Materials, Control Materials, and All Other Materials; Equipment and Instrumentation

a. Reagents and sources

1) Solvents

Solvents and how they are used are listed below;

<u>HPLC grade acetone</u> is sometimes used for primary dilution of neat native standards and labeled analogs for improved solubility of nonpolar compounds. Before use, HPLC

grade acetone is verified through analytical measurement not to bias significantly the analytical measurement.

Purge and trap grade methanol is used for all intermediate native standards and isotopically labeled internal standards. Before use, purge and trap grade methanol must first be shown not to significantly bias the analytical measurement.

HPLC grade water is primarily used to produce low-VOC water. Variability in contaminant levels requires testing of product lots. This water is further processed by nitrogen sparging and distillation to further reduce VOCs before use. Methods for this procedure are based on previously published techniques for removing residual VOCs from reagent water.[5] Water is validated to contain no detectable levels of those VOCs being analyzed.

2) Calibration and Control Materials

Compounds used for preparation of calibration standards and quality control materials are listed in Table 1 and are purchased from companies meeting guidelines of International Organization of Standards Guide 34. Recommended isotopically labeled internal standards listed in Table 2 can be used. Other isotopic analogs may be used because of availability and cost limitations as long as there are no interfering chromatographic or mass spectral interferences and the isotope is stable. All chemicals are used without further purification unless required. Native standard materials are at least 97% pure. Isotopically labeled internal standards are of sufficient chemical and isotopic purity to produce levels needed for accurate quantitation and impurities do not interfere with analyses of the other VOC analytes.

Table 1. Reagents for calibration and control materials

Compound	Analyte Code	Formula	NFPA 704			
			Health	Flammability	Instability	Notice
1,1,1,2-Tetrachloroethane	V4CE	CCl_3CH_2Cl	2*	1*	0*	--
1,1,1-Trichloroethane	VTE	CH_3CCl_3	2	1	0	--
1,2,3-Trichloropropane	VTP	$ClCH_2CH(Cl)CH_2Cl$	2	2	1	--
1,2-Dibromoethane	VDE	$BrCH_2CH_2Br$	3	0	0	--
1,2-Dichlorobenzene	V1D	$C_6H_4Cl_2$	2	2	0	--
1,2-Dichloroethane	V2A	CH_2ClCH_2Cl	3	3	0	--
1,3-Dichlorobenzene	V3B	$C_6H_4Cl_2$	2*	2*	0*	--
1,4-Dichlorobenzene	VDB	$C_6H_4Cl_2$	2	2	0	--
2,5-Dimethylfuran	2DF	C_6H_8O	3	3	0	--
α,α,α-Trifluorotoluene	VTFT	$C_6H_5CF_3$	0	3	0	--
α-Pinene	VAPN	$C_{10}H_{16}$	1	3	0	--
Benzene	VBZ	C_6H_6	2	3	0	--
Benzonitrile	VBZN	C_7H_5N	3	2	0	--
Bromodichloromethane	VBM	$CHBrCl_2$	2*	1*	0*	--
Bromoform	VBF	$CHBr_3$	3	0	0	--
Carbon Tetrachloride	VCT	CCl_4	3	0	0	--
Chlorobenzene	VCB	C_6H_5Cl	3	3	0	--
Chloroethane	VCE	CH_3CH_2Cl	2	4	0	--
Chloroform	VCF	$CHCl_3$	2	0	0	--
Cyclohexane	VC06	C_6H_{12}	1	3	0	--
Dibromochloromethane	VCM	$CHBr_2Cl$	2	3	1	--
Ethyl Acetate	VEA	$CH_3CO_2CH_2CH_3$	1	3	0	--
Ethylbenzene	VEB	$C_6H_5CH_2CH_3$	2	3	0	--
Ethyl Ether	VDEE	$CH_3CH_2OCH_2CH_3$	2	4	2	--
Furan	VFN	C_4H_4O	2	4	1	--
Isobutyronitrile	VIBN	$(CH_3)_2CHCN$	3	3	0	--
Isopropylbenzene	VIPB	$C_6H_5CH(CH_3)_2$	2	3	1	--
m/*p*-Xylene	VXY	$C_6H_4(CH_3)_2$	2	3	0	--
Methylcyclopentane	VMCP	$(CH_2)_4CHCH_3$	1	3	0	--
Methylene Chloride	VMC	CH_2Cl_2	2	1	0	--
Methyl Isobutyl Ketone	VMIK	$(CH_3)_2CHCH_2C(O)CH_3$	2	3	--	--
Methyl *tert*-Butyl Ether	VME	$(CH_3)_3COCH_3$	2	3	0	--
n-Heptane	V07N	$CH_3(CH_2)_5CH_3$	1	3	0	--
n-Hexane	V06	$CH_3(CH_2)_4CH_3$	1	3	0	--
Nitrobenzene	VNB	$C_6H_5NO_2$	3	2	1	--
n-Octane	V08N	$CH_3(CH_2)_6CH_3$	1	3	0	--
o-Xylene	VOX	$C_6H_4(CH_3)_2$	2	3	0	--
Styrene	VST	$C_6H_5CH{=}CH_2$	2	3	2	--
Tetrachloroethylene	V4C	$CCl_2{=}CCl_2$	2	0	0	--
Tetrahydrofuran	VTHF	C_4H_8O	2	3	1	--
Toluene	VTO	$C_6H_5CH_3$	2	3	0	--
Trichloroethylene	VTC	$CHCl{=}CCl_2$	2	1	0	--
Vinyl bromide	VVB	$CH_2{=}CHBr$	2	4	1	--

*estimated

Table 2. Isotopically labeled internal standards

Compound	Formula	NFPA 704			
		Health	Flammability	Instability	Notice
1,1,1,2-Tetrachloroethane-$^{2}H_2$	$CCl_3C^2H_2Cl$	2*	1*	0*	--
1,1,1-Trichloroethane-$^{2}H_3$	$C^2H_3CCl_3$	2	1	0	--
1,2,3-Trichloropropane-$^{2}H_5$	$ClC^2H_2C^2H(Cl)C^2H_2Cl$	2	2	1	--
1,2-Dibromoethane-$^{13}C_2$	$Br^{13}CH_2{}^{13}CH_2Br$	3	0	0	--
1,2-Dichlorobenzene-$^{13}C_6$	$^{13}C_6H_4Cl_2$	2	2	0	--
1,2-Dichloroethane-$^{2}H_4$	$C^2H_2ClC^2H_2Cl$	3	3	0	--
1,3-Dichlorobenzene-$^{13}C_6$	$^{13}C_6H_4Cl_2$	2*	2*	0*	--
1,4-Dichlorobenzene-$^{13}C_6$	$^{13}C_6H_4Cl_2$	2	2	0	--
2,5-Dimethylfuran-$^{13}C_2$	$(^{13}CH_3)_2C_4H_2O$	3	3	0	--
4-Methyl-2-pentanone-$^{13}C_6$	$(^{13}CH_3)_2{}^{13}CH{}^{13}CH_2{}^{13}C(O){}^{13}CH_3$	2	3	--	--
α,α,α-Trifluorotoluene-$^{2}H_5$	$C_6{}^2H_5CF_3$	0	3	0	--
α-Pinene-$^{2}H_3$	$C_9H_{13}C^2H_3$	1	3	0	--
Benzene-$^{13}C_6$	$^{13}C_6H_6$	2	3	0	--
Benzonitrile-$^{2}H_5$	$C_7{}^2H_5N$	3	2	0	--
Bromodichloromethane-$^{13}C_1$	$^{13}CHBrCl_2$	2*	1*	0*	--
Bromoform-$^{13}C_1$	$^{13}CHBr_3$	3	0	0	--
Carbon Tetrachloride-$^{13}C_1$	$^{13}CCl_4$	3	0	0	--
Chlorobenzene-$^{13}C_6$	$^{13}C_6H_5Cl$	3	3	0	--
Chloroethane-$^{2}H_5$	$C^2H_3C^2H_2Cl$	2	4	0	--
Chloroform-$^{13}C_1$	$^{13}CHCl_3$	2	0	0	--
Cyclohexane-$^{2}H_{12}$	$(C^2H_2)_6$	1	3	0	--
Dibromochloromethane-$^{13}C_1$	$^{13}CHBr_2Cl$	2	3	1	--
Ethyl acetate-$^{2}H_8$	$C^2H_3CO_2C^2H_2C^2H_3$	1	3	0	--
Ethylbenzene-$^{13}C_6$	$^{13}C_6H_5CH_2CH_3$	2	3	0	--
Ethyl Ether-$^{2}H_{10}$	$C^2H_3C^2H_2OC^2H_2C^2H_3$	2	4	2	--
Furan-$^{2}H_4$	$C_4{}^2H_4O$	2	4	1	--
Isobutyronitrile-$^{2}H_6$	$(C^2H_3)_2CHCN$	3	3	0	--
Isopropylbenzene-$^{2}H_5$	$C_6{}^2H_5CH(CH_2)_2$	2	3	1	--
m/*p*-Xylene-$^{13}C_6$	$^{13}C_6H_4(CH_3)_2$	2	3	0	--
Methylcyclopentane-$^{2}H_{12}$	$(C^2H_2)_4C^2HC^2H_3$	1	3	0	--
Methylene Chloride-$^{13}C_1$	$^{13}CH_2Cl_2$	2	1	0	--
Methyl Isobutyl Ketone-$^{13}C_6$	$(^{13}CH_3)_2{}^{13}CH{}^{13}CH_2{}^{13}C(O){}^{13}CH_3$	2	3	--	--
Methyl *tert*-Butyl Ether-$^{2}H_{12}$	$(C^2H_3)_3COC^2H_3$	2	3	0	--
n-Heptane-$^{2}H_{16}$	$C^2H_3(C^2H_2)_5C^2H_3$	1	3	0	--
n-Hexane-$^{2}H_{14}$	$C^2H_3(C^2H_2)_4C^2H_3$	1	3	0	--
Nitrobenzene-$^{13}C_6$	$^{13}C_6H_5NO_2$	3	2	1	--
n-Octane-$^{2}H_{18}$	$C^2H_3(C^2H_2)_6C^2H_3$	1	3	0	--
o-Xylene-$^{2}H_6$	$C_6H_4(C^2H_3)_2$	2	3	0	--
Styrene-$^{13}C_6$	$^{13}C_6H_5CH{=}CH_2$	2	3	2	--
Tetrachloroethylene-$^{13}C_1$	$^{13}CCl_2{=}CCl_2$	2	0	0	--
Tetrahydrofuran-$^{2}H_8$	$C_4{}^2H_8O$	2	3	1	--
Toluene-$^{13}C_7$	$^{13}C_6H_5{}^{13}CH_3$	2	3	0	--
Trichloroethylene-$^{13}C_1$	$^{13}CHCl{=}CCl_2$	2	1	0	--
Vinyl bromide-$^{2}H_3$	$C^2H_2{=}C^2HBr$	2	4	1	--

*estimated

b. Preparation of glassware

Glassware that is found to have detectable levels of VOC residue is solvent rinsed and vacuum baked to ensure removal of contamination for all VOCs being analyzed. All glassware is kept in a vacuum oven at sufficient temperature of greater than 40°C and

vacuum of less than 10^{-2} Torr to prevent VOC recontamination. Before use, the glassware is cooled to room temperature under vacuum. When glassware is removed from the oven it is sealed with polytetrafluoroethylene (PTFE) lined caps, when appropriate.

c. Preparation of headspace vial septa

Headspace vial septa design is verified to provide sufficient seal to maintain detection above the LOD. Septa are cleaned by vacuum baking with temperature greater than -40 °C and vacuum pressure less than 10^{-2} Torr and verified through analysis of the bulk material to be free of those VOCs being analyzed.[6] After cleaning, septa are stored in a vacuum oven of sufficient vacuum and temperature to prevent VOC recontamination.

d. Preparation of blood collection tubes

Blood collection tubes (e.g., Vacutainers) obtained from commercial sources contain high levels of VOC residue in the butyl rubber stoppers. This residue can mask the levels of VOC analytes originally in the blood at the time of specimen collection, and thus prevent accurate exposure assessment. The most commonly encountered blood collection tube VOC contaminants are listed in Table 3. Blood collection tube lot variation is avoided by purchasing in batches of 10,000, which lasts several years. The selected lot is prescreened for VOC residue levels. To prevent blood specimen and specimen sample contamination, the VOCs are removed from blood collection tubes using a special cleaning method.[4] A combination of solvent swelling and vacuum baking is used to remove residue levels from the rubber stopper that interfere with accurate quantitation. Following treatment of the blood collection tubes, the tubes are labeled with a new expiration date that reflects a 1-year shelf life. The shelf life of a blood collection tubes is limited mainly by the amount of time the blood collection tube can remain under vacuum, however VOC residue levels from the stopper can increase with time if deeply penetrated VOCs are not completely removed. Blood collectiontubes are supplied by Division of Laboratory Sciences (DLS) staff for all blood VOC studies.

The procedure for cleaning blood collection tube rubber stoppers involves removing the stoppers from the glass section of the tube. Stoppers are solvent swelled in boiling purge and trap grade methanol and vacuum baked for at least 3 weeks. The glass tube and anticoagulant salt are vacuum baked to remove any adsorbed residue.

Once cleaned, the blood collection tubes are reassembled and re-evacuated through a needle with sufficient vacuum. Vacuum draw and contamination of the cleaned tubes is evaluated by taking a convenience sample of at least 5 tubes per batch of 300. Tubes are checked that they can fully draw VOC-free water to capacity and this water is confirmed to have levels below detection for those analytes being quantified. For this evaluation the VOC free water is stored in the blood collection tubes oriented horizontally for 7–14 days at room temperature and then analyzed.

Table 3. Analytes most commonly found to contaminate blood collection tubes

Analyte
Benzene
Benzonitrile
Bromoform
Chloroform
Cyclohexane
1,2-Dichlorobenzene
1,4-Dichlorobenzene
2,5-Dimethylfuran
Ethylbenzene
Furan
n-Hexane
Methylcyclopentane
Methyl Isobutyl Ketone
Styrene
Tetrahydrofuran
Tetrachloroethylene
Toluene
m/*p*-Xylene
o-Xylene

e. Preparation of blank water

Distilling, dispensing, and storing of water are performed to minimize contamination from the surrounding environment and validated by comparison with an established reference or by standard addition. HPLC grade water is used as the starting material. The HPLC grade water is cleaned by heated sparging with nitrogen, boiling and refluxing, hermetic dispensing into pre-cleaned ampules (cleaned in accordance with 6.b), and flame sealing with a water torch.[5] After production, the flame seal is verified to be leak tight. At least 3 convenience samples are pulled from a lot of approximately 375 25-mL ampules and verified to have VOC levels below detection for analytes being quantified.

f. Preparation of polypropylene (body) syringes

Plastic syringes may be used to sample blood specimens from blood collection tubes, if properly clean to remove any interfering VOC residue. Syringes are to be Luer lock tipped, either 3- or 5-mL, and made of polypropylene (body) containing no latex, rubber or silicone. Polypropylene (body) syringes typically have high alkane residue (Table 4) that can significantly contaminate the blood specimens and samples. This residue is to be removed by vacuum oven processing at full vacuum and verified to be clean of initial residue with serum containing known VOC concentrations. Typical processing conditions are a temperature of 95°C for 5 weeks, however, temperature and duration of baking can be varied to achieve efficient and successful cleaning. Serum used for the evaluation must have low VOC levels (i.e., below standard level 2) for those analytes identified as syringe residue. For evaluation of an uncleaned or cleaned lots, 3 mL of room temperature serum is drawn into a convenience sample of 0.5% of the total uncleaned lot or 1% of each vacuum oven batch (using at least 3 but no more than 15 syringes) and allowed to stand for 1 min. After the standing time, the serum is prepared and analyzed

as a typical sample. To validate the acceptability of a cleaned syringe lot, VOC levels for all analytes being analyzed must be below LOD for each vacuum oven cleaning lot.

Table 4. Analytes most commonly found to contaminate polypropylene (body) syringes

Analyte
n-Hexane
n-Heptane
n-Octane

g. Preparation of native analytical standards

1) Handling of neat compounds

Inexpensive analytes purchased as neat liquids in flame sealed ampules are discarded after use. Expensive compounds (e.g., custom synthesis products) are saved for future use in flame sealed ampules. All compounds stored for future use that are expected to exceed the manufacturer's expiration date must be stored in an explosion-proof -70 °C freezer. However, purity must be revalidated by quantitation upon reuse. Short-term storage of neat standards that are not to exceed the manufacturers expiration date are stored at 2–6 °C in a chemical storage refrigerator separate from blood specimens, blanks and quality control materials.

2) Filling and sealing of glass ampules

Neat standard materials to be stored for reuse are transferred to glass ampules, typically 1 mL, and filled under three-quarters capacity. Ampules are chilled throughout the aliquoting process. Pipettes are conditioned with the material before transferred to the storage ampules. Liquid is placed in the bottom of the ampule and is not adhering to the neck of the ampule before flame sealing. Sealed ampules are leak checked.

3) Final concentrations of the standards

Standards are formulated starting with the primary stock solutions prepared from neat materials diluted with either purge and trap grade methanol or HPLC grade acetone. Lower concentration primary stock solutions involve only a single serial dilution of the highest concentration stock. Intermediate levels are formulated from the primary stock solutions in purge and trap grade methanol using only a single dilution step. The working standards are prepared in low-VOC water using a single dilution of the corresponding intermediate levels and are separated by no greater than a factor of 5 ranging from low ppt to low ppb levels. The water is verified to have VOCs below detectable levels for the analytes of interest. Positive displacement pipettes are used for transfer of all liquids in the µL range with at least 2% accuracy. Class A volumetric flasks are used to make all standards. The primary stock solution concentrations are based on the gravimetric measure of mass transferred to the volumetric flask.

4) Aqueous working standards

Aqueous working standards are typically formulated in volumes of 25-mL quantities with low-VOC water and added internal standard. However, volumes ranging down to 5-mL and larger than 25-mL may be used to adjust concentration where spike quantities of the intermediate standard and internal standard are not be below 40 µL. Each of the aqueous working standards (3.0 mL) is transferred into cleaned 10-mL headspace vials using a gas-tight glass barrel/PTFE plunger pipetter. The vials are immediately sealed

with recently cleaned caps and grouped by concentration in separate wide mouth sample jars to prevent cross contamination. Furthermore, the standard set is stored in a dedicated refrigerator at 2–6ºC and analyzed as part of an analytical run within 1 week.

h. Preparation of isotopically labeled internal standard solutions

1) Primary isotopically labeled internal standard stock solutions

Primary isotopically labeled internal standard stock solutions are made by dilution of the neat compound into purge and trap grade methanol. These solutions are stored in 1-mL ampules and flame sealed as described in Section 6.e. Concentrations of the primary labeled internal standard stock solutions are analyte dependent and range from 0.7 to 12 mg/mL. The primary isotopically labeled internal standard stock solutions are stored in a freezer below -60 °C.

2) Secondary isotopically labeled internal standard stock solutions

The secondary isotopically labeled internal standard stock solution is made by combining primary stock solutions and diluting to concentrations between standard levels 2 and 5. Solutions are mixed thoroughly and 0.25 mL of these solutions are flame sealed in chilled 1-mL ampules as described above in Section 6.e. Ampulized stock solutions are stored in a freezer below -60 °C.

3) Working isotopically labeled internal standard solution

The working isotopically labeled internal standard solution is prepared daily from the ampulized secondary stock solution. The secondary stock solution is added to the standard formulations, water blanks, quality control samples, and specimen samples proportionally. Final labeled internal standard concentrations in samples vary depending on the analyte and are less than standard level 5 but greater than standard level 2. For storage the working solution is transferred directly from the formulation flask to cleaned 2-mL screw cap vials inset with PTFE lined septa. Vials are filled to leave no headspace and stored at 4 °C no longer than 2 days.

i. Preparation of quality control materials

Quality control (QC) materials are prepared at three concentration levels in bovine serum. Residue is removed from bovine serum by either sorption or volatilization under hermetic conditions; however, certain compounds are difficult to remove while maintaining the properties of the serum. Target and measured concentrations vary because of significant background levels that might not be removed during the cleaning process or adsorption/diffusion loss during sample preparation. If QC batches are small (<200 ampules for each level), the characterized mean is determined by analysis of at least 10 runs extending over different samples, batches, days, and instruments. For larger QC batches 20 runs are preferred. The low concentration QC material is typically between standard level 1 and 3, the medium QC concentrations are between the low and high QC levels, and the high concentration QC material is between standard level 3 and 5. The QC pool is thoroughly mixed under hermetic conditions. At least 7 mL is transferred to the ampule and flame sealed with a water torch, and storage below -60 °C. Ideally, the ampule should have a headspace volume as small as possible. If the headspace value exceeds 30%, then the mixing and temperature of the QC should be the same as when the QC is characterized. Highly nonpolar VOCs may partition significantly (>15%) between the bovine serum and headspace with temperature variations of > 0.5 °C. Short-term storage up to -20 °C may occur, but does not exceed 6 weeks. The concentration consistency across the lot is evaluated by comparing samples prepared at the beginning, middle, and

end of the batch. If this comparison reveals variability of more than 25% for any analyte, the lot is reformulated.

j. Proficiency testing materials

Proficiency testing (PT) materials are prepared at four levels from neat compounds in a manner similar to the intermediate standard materials. PT intermediate solutions are prepared, aliquoted into ampules, and flame sealed using the same preparation technique as described in Section 6.e. The PT reference materials are purchased from a different International Organization of Standards Guide 34 certified chemical company than those used in the formulation of the standards. PT solutions are prepared at intermediate concentrations and diluted in the same manner as the standards. If the concentration of a PT sample exceeds the highest standard level, PTs are to be diluted and reanalyzed. A proficiency testing coordinator, independent from the sample analysis team, blind-codes the PT stock ampules and administers and verifies accuracy of quantified results of four PT samples at each of the four concentration levels and one sample at any of the four different levels.

k. Clean-up procedure for the 5-mL Luer lock gas-tight syringe

Each blood sample is delivered from the blood collection tube to the headspace vial using a cleaned 5-mL Luer lock syringe. Disposable syringes are promptly disposed of in sharps containers if the needle is still attached or biological waste containers if the needle is removed. Reusable headspace syringes are decontaminated with a 10% bleach solution and thoroughly cleaned of VOC residue with rinses of filtered deionized water and purge and trap grade methanol followed by vacuum baking. Syringe cleaning batches are verified to be clean by analysis of 2 water control samples prepared using two randomly selected syringes with each sample run.

l. Instrumentation and operation

SPME of the headspace sample is performed using a PAL system (CTC Analytics, Switzerland) autosampler. Samples are queued on an autosampler tray and maintained at 15 ± 0.5 °C until they are analyzed. During analysis the samples are transferred to an agitating incubator set to at least 350 rpm and 40 ± 1 °C as the headspace is sampled with a 75-µm Carboxen-PDMS coated SPME fiber (Supelco, Bellefonte PA) for consistently specified time period of at least 6 min and no more than 15 min. The SPME fiber is then immediately transferred into the GC injection port fitted with a glass liner with an i.d. of 1 to 2 mm and held at 250 ± 0.5 °C. The sample is introduced into an Agilent DB-VRX column (40 m x 0.18 mm x 1 µm film) via pulsed splitless injection set at 50 psi. The length of the column extending into the GC inlet port should be adjusted to achieve optimal peak shape (i.e., symmetrical) and minimize column degradation (e.g., 4-6 mm past the column ferrule). After 1.0 min, but no more than 2 min, the injection port pressure is then dropped to maintain a constant flow of 1.1 ± 0.1 mL/min of helium. In-line, after the injection port, is a cryogenic trap. At the start of the GC run the cryotrap is set to approximately -100 °C for at least 1 min, but no more than 2 min, then ballistically heated to approximately 225 ºC (13.0 ºC/sec). The GC oven temperature is programmed to ramp from 0 °C (1.5 min hold) at 7 °C/min to 140 °C, then 40 °C/min to 220 °C (for at least a 4.5 min hold). Quantitation by a quadrupole MS is performed using SIM of each primary quantitation ion, confirmation ion, and internal standard ion using at least a 15-ms dwell time for each. Examples of possible ions are shown in Table 5. Ideally, ions selected should have the best combination of the highest abundance and be unique as possible with the least amount of spectral interference. Furthermore, the internal standard (ISTD) fragment should

correspond to either the primary quantitation or confirmation ion and the ratio of primary and confirmation ion should be within 25%. If a different ISTD fragment from either the primary quantitation or confirmation ion is used, then ensure that the ratios of the primary quantitation and confirmation are within 25% of the NIST mass spectral database spectrum. When required, qualitative analyses are performed using full mass scan from *m/z* 21 to 500. Identification of unknowns is established by comparison of GC retention time with that of a known standard and mass spectral data.

Sample queues run for extended time periods of up to 24 hours. All samples awaiting analysis are racked into chilled trays (15 ± 1 °C). If the measurement is delayed to the next day, samples are left on a cooled sample tray at 15 ± 1 °C. Samples are not placed in a refrigerator that has not been recently vented.

The SPME fiber assembly can trap VOCs and is evaluated before use. Typically, a conditioned SPME fiber is conditioned by baking in the GC inlet at 250 °C for a minimum of 5 hours to ensure VOC contaminants fully partition out of the fiber assembly. A fiber blank, prepared by injecting the fiber without sampling a vial, is evaluated using the same analytical GC-MS method as the unknowns to confirm that all background VOC concentrations are below the LOD. During the analytical run, the SPME fiber remains in the GC injection port until ready to collect the next sample and is not exposed to the laboratory air for more than 1 min to reduce the influence of ambient air contamination. A SPME fiber conditioner may be used instead of keeping the fiber parked in the GC injection port until the next run. If a fiber conditioner is used for the conditioning, then duration, temperature and helium (or nitrogen) flow rate settings (e.g., 5 min at 270°C and 5 mL/min for 5 min) should be chosen to ensure removal of any interfering compounds from the previous run or that might be collected from the laboratory environment.

The analysis of VOCs in whole blood at parts-per-trillion levels is an extremely complex measurement. There are no alternative analysis approaches that achieve the combined sensitivity and specificity over the broad range of compounds described in this method.

At times when the analytical system fails, the prepared samples are stored between 2 and 15 °C for no more than 48 hours before analysis.

Preventive maintenance (PM) of GC/MS instruments are to be performed at least once a year as specified by the manufacturer. More frequent PM may be required for a heavily used instrument, especially when the instrument is not achieving detection of concentrations above the LOD for all analytes. Preventive maintenance of PAL autosamplers is not specified by the manufacturer, thus repairs are performed as needed.

Table 5. Example of ions used for the internal standard and the quantification and confirmation of compounds

Compound	ISTD (m/z)	Native (m/z)	Confirm (m/z)
1,1,1,2-Tetrachloroethane	**137**	**131**	**133**
1,1,1-Trichloroethane	**102**	**97**	**99**
1,2,3-Trichloropropane	**116**	**110**	75
1,2-Dibromoethane	**111**	107	**109**
1,2-Dichlorobenzene	**152**	**146**	148
1,2-Dichloroethane	**67**	62	**64**
1,3-Dichlorobenzene	**152**	**146**	148
1,4-Dichlorobenzene	**152**	**146**	148
2,5-Dimethylfuran	**98**	95	81
α,α,α-Trifluorotoluene	**151**	**146**	145
α-Pinene	**96**	**93**	136
Benzene	**84**	**78**	77
Benzonitrile	**108**	**103**	76
Bromodichloromethane	**86**	**83**	**85**
Bromoform	**174**	**173**	**175**
Carbon Tetrachloride	**120**	**117**	**119**
Chlorobenzene	**118**	**112**	77
Chloroethane	**69**	**64**	**66**
Chloroform	**86**	**85**	**83**
Cyclohexane	**96**	**84**	69
Dibromochloromethane	**130**	**129**	**127**
Ethyl Acetate	**96**	70	**88**
Ethyl Ether	**84**	**74**	59
Ethylbenzene	**97**	**91**	106
Furan	**72**	**68**	39
Isobutyronitrile	**73**	**68**	54
Isopropylbenzene	**110**	**105**	120
m/*p*-Xylene	**97**	**91**	106
Methyl Isobutyl Ketone	**106**	**100**	58
Methyl *tert*-Butyl Ether	**82**	**73**	57
Methylcyclopentane	**96**	**84**	69
Methylene Chloride	**85**	**84**	49
n-Heptane	**82**	**71**	70
n-Hexane	**66**	**57**	41
Nitrobenzene	**129**	**123**	77
n-Octane	**98**	**85**	114
o-Xylene	**112**	91	**106**
Styrene	**110**	**104**	103
Tetrachloroethylene	**169**	**166**	**164**
Tetrahydrofuran	**78**	72	**71**
Toluene	**98**	**91**	92
Trichloroethylene	**133**	**130**	**132**
Vinyl Bromide	**111**	**106**	**108**

7. Calibration and Calibration Verification

All calibration standards are prepared in water as a matrix because it proved to be difficult to consistently obtain reduced VOC background levels in serum or whole blood below

detectable levels. Matrix spike experiments (matrix validation) were performed to verify that calibration curves in whole blood and water had the same slope (Table 6). These results validate the use of water-based calibrators for quantifying VOCs in whole blood.

Table 6. Matrix comparison (matrix validation) of trends consisting of 15 different concentrations for the analytical range

Compound	Difference between slopes† (%)
1,1,1,2-Tetrachloroethane	0.04
1,1,1-Trichloroethane	0.52
1,2,3-Trichloropropane	1.64
1,2-Dibromoethane	1.62
1,2-Dichlorobenzene	0.91
1,2-Dichloroethane	4.19
1,3-Dichlorobenzene	0.15
1,4-Dichlorobenzene	0.37
2,5-Dimethylfuran	0.11
α,α,α-Trifluorotoluene	0.46
α-Pinene	2.26‡
Benzene	0.45
Benzonitrile	2.99
Bromodichloromethane	0.37
Bromoform	2.69
Carbon Tetrachloride	0.32
Chlorobenzene	1.01
Chloroethane	0.58
Chloroform	0.91
Cyclohexane	0.42
Dibromochloromethane	1.23
Ethyl Acetate	1.42
Ethyl Ether	3.39
Ethylbenzene	0.23
Furan	1.34
Isobutyronitrile	0.81
Isopropylbenzene	0.67
m/*p*-Xylene	5.95
Methyl Isobutyl Ketone	2.88
Methyl-*tert*-Butyl Ether	1.38
Methylcyclopentane	1.42
Methylene Chloride	1.76
n-Heptane	1.01
n-Hexane	1.65
Nitrobenzene	4.34
n-Octane	1.32
o-Xylene	0.42
Styrene	1.44
Tetrachloroethylene	0.45
Tetrahydrofuran	1.93
Toluene	0.42
Trichloroethylene	1.18
Vinyl Bromide	0.71

†Files 14099N, 14211E a&b, 14329Y
‡Files 19233N, 19234N, 19239N

a. Instrument response calibration

A set of at least five calibrators is analyzed in each analytical run and used for the quantitation of analytes in all samples from that run. Linear calibration curves are constructed for each analyte from the response ratios (native peak area/ISTD peak area) of the calibrators, which are separated in concentration by no more than a factor of 5. The slope and intercept of curves are determined by linear least squares of data weighted 1/X. Calibration curves for some compounds can be linearized by universal transform by adjusting for background and internal standard ion contribution to the standard ion and/or exclusion of nonlinear portion of the curve. Calibration curves are composed of at least five standard levels that span the range of detectable levels in samples, and achieve a squared coefficient of determination of at least 0.98. The highest point on the calibration curve is above the expected range of results for non-occupationally exposed people and the lowest calibrator is near or below the measurable detection limits. If a VOC concentration is above the high standard in the calibration curve, a new specimen sample may be prepared as described in section 4.d, otherwise concentrations exceeding the highest calibrator are identified as out of range.

b. Calibration verification

Calibration accuracy is verified with each run by analysis of water blank and quality control samples. A full set of calibrators is typically analyzed with each analytical run of blood samples, however a standard set from the previous or following run may be used. Absolute accuracy is verified by proficiency test at least every 6 months.

8. Procedure Operation Instructions; Calculations; Interpretation of Results

a. Analysis of blood samples

Prior to analysis, all blood specimens are mixed by a rotating or rocking mixer for at least 30 min. QC samples are to be mixed by a rotating or rocking mixer for at least 2 hrs before their preparation. For analysis, blood, bovine serum QC, and water blank samples are transferred to standard 10-mL headspace vials as 3-mL aliquots via separate 5-mL Luer lock syringes fitted with disposable needles. Each sample is immediately spiked with the working internal standard solution, which is delivered by positive displacement pipet, and capped. Sample quantities are verified gravimetrically. All materials are to be cleaned in accordance with methods described in Section 6.

b. Data analysis

Samples are quantified by their analyte ion peak area (or peak height) to internal standard ion peak area (or peak height) ratio, which compensates for loss after sample preparation, as well as variation in partitioning and SPME extraction efficiency. Blood, water blank, and QC sample concentrations, determined using the standard response curves, are multiplied by the appropriate dilution factor, which are determined by sample.

c. Data Processing

1) Peak Integration

Each peak is visually inspected and peak integration is corrected if the integrator erroneously integrates a peak. The integration approach for all samples is kept consistent for a specific target ion. However, if the absolute ion signal is not at least a factor of 3 above the peak-to-peak noise then peak integration is not adjusted or values

are not reported. For levels measured above the LOD, confirmation ion signal is quantified.

2) Excluding calibrators

Calibrator data is only excluded if the data significantly affects (>10%) the detectable result and the cause affecting only that standard is identified. Scenarios that might only affect a single standard include a poor seal on a headspace vial, a cracked secondary standard ampule, no or low addition of internal standard, and contamination of the standard set during storage. However, standards level 6, 7, or both can be excluded if the calibration curve is nonlinear over this region and all QCs and unknowns fall below standard level 5.

3) Excluding blood sample data

Blood sample data is excluded if no or low ISTD is added to the sample. If the ISTD level is increased or decreased by a factor of 3 relative to the previous and following run blood samples, the blood sample is flagged for repeat analysis for confirmation of initial results. Absolute internal standard response is evaluated for consistency among the standards, water blanks, QCs and blood samples. An unusually high internal standard level can occur if the ISTD is added twice. A low or absent ISTD response can occur if no internal standard is added, an intermediate standard vial was cracked, or a vial cap seal was poor.

d. Formal Quality Control Material Evaluation

Quality control sample results are formally evaluated by an independent quality control officer following import of data into a relational database. The QC samples analyzed within an analytical run are evaluated against the characterized means and standard deviation limits determined by the QC officer. The QC samples are evaluated using modified Westgard rules as specified by DLS SAS program.[7,8] Any failure of QC rules for an analyte results in rejection of the corresponding data for that analyte on the specific run in question. Once the source of the QC problem is identified, the samples are subsequently reanalyzed.

e. Additional Quality Assurance Data Evaluation

Other quality parameters are examined in addition to evaluation of quality control specimen for acceptable precision and accuracy. These include evaluation of confirmation ion ratios, sufficient internal standard response, and water blank sample bias.

f. Blood sample repeat limits

Blood samples that yield concentrations higher than the 95th percentile of 2009-2010 or 2013-2014 National Health and Nutrition Examination Survey (NHANES) population as described in Section 13 are repeated. This action is performed to ensure that the specimen was not inadvertently contaminated during the sample preparation process.

Repeat measurements of specimens stored at 2–6 °C indicate that whole blood VOC samples can be banked for a total of 16 weeks if the blood remains unclotted and homogenized. Because these are whole blood specimens, longer storage time results in samples which are harder to manipulate, producing additional analytical problems. Thus, even though analytical results may not change over this time, samples may be less amenable to analysis.

9. Reportable Range of Results

a. Reportable Limits

The lowest reportable value is the higher of the detection limit and the lowest standard. The upper reportable value is the highest linear standard.

b. Limits of Detection

The detection limit is chosen where the 5th percentile of the distribution of samples with analyte levels at the limit of detection intersects with the 95th percentile of the distribution of blank samples.[9] The distribution of samples with analyte levels at the LOD are deduced by extrapolation of results from samples at three different concentrations near the LOD consisting of at least 60 samples each. Assay detection limits change with improvements in sensitivity, precision, and sample integrity.

c. Accuracy

Absolute accuracy is evaluated by blind analysis of independently prepared and certified proficiency test materials as described in section 10.c. Absolute accuracy may also be verified by spiked recovery. The percent recoveries must fall between 85 and 155%, except at 3 x LOD, where percent recovery must fall between 80-120%. Relative accuracy is evaluated upon comparison of characterized QC mean values with those obtained on each run. Error in relative accuracy should not exceed the precision of the characterized QC samples as defined in the DLS procedures, which is based on standard practices.[7]

d. Precision

Precision is evaluated by analysis of QC samples described in section 10.b. Precision of the characterized QC samples as defined in the DLS procedures, which is based on standard practices.[7]

e. Analytical Specificity

Analytical specificity is established by confirming similarity (within 25%) of quantitation ion response ratios (native peak area/ISTD peak area) to those of the confirmation ion. In addition, primary and confirmation ion retention times relative to the ISTD ion retention time are to be within 2 s of the retention time differences established using the standards. This rentention time requirement is also to be applied to integrated peaks that fall below the LOD.

Additional steps taken to achieve analytical specificity involves removing interfering compounds from the sample analysis system. Interferences that have their source in the measurement apparatus itself are examined by measuring instrument blanks. All materials and reagents used for this assay are screened and treated to remove possible interferences as described above in Section 6. The presence of co-eluting interferences is monitored by using water blanks.

f. Ruggedness testing

Ruggedness testing was performed to assess the potential of important analytical variables that affect results. The variables that are found to have a substantial influence on the final analytical results include diffusion loss from delayed sample capping, formulation errors through the addition of ISTD to all samples, and errors in sample weight. These variables were varied to examine their influence on the analytical results and were optimized to achieve sensitivity and high throughput. Ruggedness testing results for five

representative analytes that span the range of analyte volatilities and polarities (see Table 8) of the entire analyte panel are given in Tables 8-12.

Table 7. Physical Constants

Compound	Boiling point (ºC)	Henry's Law constant	Water solubility (mg/L) @ 25 ºC
Furan	34.39	0.2140	10400
MTBE	56.17	0.0631	21400
Benzene	79.05	0.2754	1590
Tetrachloroethylene	117.4	1.7783	133.3
1,4-Dichlorobenzene	173.3	0.0776	125.4

Table 8. Furan ruggedness data

Five Tested Parameters	Final method level or choice	Result for analyte (ng/mL)	Lower level	Result for analyte at lower level (ng/mL)	Higher level	Result of analyte at higher level (ng/mL)
Diffusion loss from delayed sample capping (X9006R)	t = 0 min	0.086	t = 0 min	0.086	t = 5 min	0.079
Volume of ISTD added to lowest standard (A08346(3))	333 µL of ISTD intermediate	0.010	317 µL	0.010	367 µL	0.011
Volume of standard spiking solution added to make lowest standard (A08346(3))	0.010 ng/mL for SS#1	0.009	-10.0 %	0.010	10.0 %	0.011
Volume of ISTD added to unknown with concentration equivalent to lowest standard (A08346(3))	40.0 µL of ISTD	0.010	35.0 µL	0.0121	45.0 µL	0.009
Error in weight of unknown sample with concentration equivalent to lowest standard (A08346(3))	3.15 g of blood	0.010	2.80 g	0.009	3.59 g	0.012

Table 9. Methyl-*tert*-Butyl Ether ruggedness data

Five Tested Parameters	Final method level or choice	Result for analyte (ng/mL)	Lower level	Result for analyte at lower level (ng/mL)	Higher level	Result of analyte at higher level (ng/mL)
Diffusion loss from delayed sample capping (X9006R)	t = 0 min	0.093	t = 0 min	0.092	t = 5 min	0.092
Volume of ISTD added to lowest standard (A08346(3))	333 µL of ISTD intermediate	0.010	317 µL	0.009	367 µL	0.011
Concentration of lowest standard (A08346(3))	0.010 ng/mL for SS#1	0.010	-10.0 %	0.009	10.0 %	0.011
Volume of ISTD added to unknown with concentration equivalent to lowest standard (A08346(3))	40.0 µL of ISTD	0.010	35.0 µL	0.011	45.0 µL	0.009
Error in weight of unknown sample with concentration equivalent to lowest standard (A08346(3))	3.15 g of blood	0.010	2.80 g	0.009	3.59 g	0.011

Table 10. Benzene ruggedness data

Five Tested Parameters	Final method level or choice	Result for analyte (ng/mL)	Lower level	Result for analyte at lower level (ng/mL)	Higher level	Result of analyte at higher level (ng/mL)
Diffusion loss from delayed sample capping (X9006R)	t = 0 min	0.063	t = 0 min	0.063	t = 5 min	0.057
Volume of ISTD added to lowest standard (A08346(3))	333 µL of ISTD intermediate	0.010	317 µL	0.011	367 µL	0.013
Concentration of lowest standard (A08346(3))	0.010 ng/mL for SS#1	0.011	-10.0 %	0.009	10.0 %	0.011
Volume of ISTD added to unknown with concentration equivalent to lowest standard (A08346(3))	40.0 µL of ISTD	0.012	35.0 µL	0.014	45.0 µL	0.011
Error in weight of unknown sample with concentration equivalent to lowest standard (A08346(3))	3.15 g of blood	0.012	2.80 g	0.011	3.59 g	0.014

Table 11. Tetrachloroethylene ruggedness data

Five Tested Parameters	Final method level or choice	Result for analyte (ng/mL)	Lower level	Result for analyte at lower level (ng/mL)	Higher level	Result of analyte at higher level (ng/mL)
Diffusion loss from delayed sample capping (X9006R)	t = 0 min	0.053	t = 0 min	0.053	t = 5 min	0.050
Volume of ISTD added to lowest standard (A08346(3))	333 µL of ISTD intermediate	0.006	317 µL	0.006	367 µL	0.007
Concentration of lowest standard (A08346(3))	0.006 ng/mL for SS#1	0.006	-16.7 %	0.005	16.7 %	0.007
Volume of ISTD added to unknown with concentration equivalent to lowest standard (A08346(3))	40.0 µL of ISTD	0.006	35.0 µL	0.006	45.0 µL	0.005
Error in weight of unknown sample with concentration equivalent to lowest standard (A08346(3))	3.15 g of blood	0.006	2.80 g	0.005	3.59 g	0.006

Table 12. 1,4-Dichlorobenzene ruggedness data

Five Tested Parameters	Final method level or choice	Result for analyte (ng/mL)	Lower level	Result for analyte at lower level (ng/mL)	Higher level	Result of analyte at higher level (ng/mL)
Diffusion loss from delayed sample capping (X9006R)	t = 0 min	0.209	t = 0 min	0.209	t = 5 min	0.207
Volume of ISTD added to lowest standard (A08346(3))	333 µL of SS intermediate	0.027	317 µL	0.025	367 µL	0.030
Concentration of lowest standard (A08346(3))	0.025 ng/mL for SS#1	0.027	-8.0 %	0.023	8.0 %	0.027
Volume of ISTD added to unknown with concentration equivalent to lowest standard (A08346(3))	40.0 µL of ISTD	0.028	35.0 µL	0.032	45.0 µL	0.025
Error in weight of unknown sample with concentration equivalent to lowest standard (A08346(3))	3.15 g of blood	0.028	2.80 g	0.025	3.59 g	0.032

10. Quality Assessment and Proficiency Testing

a. Quality Assessment

Quality assurance and quality control procedures follow standard practices.[7] Before each experimental run, checks are made on the stability of the analytical system. Standards and quality control materials are added to each day's run sequence. At least two quality assessment sample types are prepared with the blood samples and analyzed in each run: a water blank and at least one QC level. In addition to these quality control samples, a water blank is also prepared with the standards. Signal-to-noise and retention times from the lowest calibrator are evaluated from the previous run to verify method and instrument performance.

b. Establishing QC limits

Limits for each QC level are established for a new QC batch by performing at least 10, if QC batches are small (<200 for each level), separate analyses (but ideally 20) extending over different samples, batches, days, and instruments. One instrument is to characterize no more than two samples from one ampule per day. The mean, standard deviations (i.e., within run, among run, and overall), and control limits are determined from this QC characterization data set. Individual quality control charts for the characterization runs are created, examined, and quality control limits are used to verify assay precision and accuracy on a daily basis. Relative standard deviations for the QC samples are in most cases less than 15%. Standard deviations are larger for analytes with high background levels in the bovine serum.

c. Proficiency Testing

Certified standard reference materials from the National Institute of Standards & Technology (NIST) are the first choice for independent validation of method accuracy. However, NIST only certifies a few of the VOCs that are measured. For example, NIST does not produce a reference standard for benzene. Because the issue of NIST traceability has long been recognized as a limitation with organic standards, we use reference materials from companies who are accredited with International Organization for Standardization (ISO) Guide 34 certification. Guide 34 is recognized by NIST, the international reference material body and other government agencies. PT samples and calibration standards are checked against the currently validated reference standard set. If a concentration for a compound in the PT sample or calibration standard is found to differ by more than 15% from the reference standard, then a validation standard containing the compound in question along with a control compound is formulated using a NIST or Guide 34 material to verify and correct the inaccuracy.

The PT results are evaluated by a PT Coordinator. Five PT samples are analyzed at least twice a year using the same method described for blood specimens. The analysis passes proficiency testing if >80% of the results deviate <25% from the known value. If an analyte fails to meet these minimum PT criteria, the lab will take remedial actions, i.e., determine the cause of the error or errors, correct them and document their actions. Patient results reported during the period when PT was unsatisfactory or unacceptable will be reviewed. If the review identifies patient results were adversely affected, those results will be addressed.

Accuracy is also verified by spiked recovery from blood. Because blood is an unstable matrix, no standard reference material is available. Thus, it is necessary to prepare these samples in-house using the intermediate standard solutions. The accuracy basis for this

method is established by determining the recovery of spiked blood specimen samples. The percent recoveries fall between 85 and 115%.

Relative accuracy is evaluated upon comparison of characterized QC mean values with those obtained on each run. Error in relative accuracy should not exceed the precision of the characterized QC samples. If such error occurs, the source of error is identified and the data corresponding to the analyte with the failed QC is not reported.

11. Remedial Action if Calibration or QC Systems Fail to Meet Acceptable Criteria

a. Internal reference area counts

The internal standard is used to compensate for matrix differences and diffusion losses that can result from sample handling prior to analysis. Because sample matrixes vary for the standards, QCs and among the unknowns, typical differences in the internal standard ion count can be as much as a factor of 10 depending on the analyte. If the labeled ion counts of a sample does fall more than a factor of 3 of the median of values among the samples of similar matrixes, this indicates that there might be a poor seal on the headspace vials, the SPME fiber is collection efficiency is poor, or the instrumental sensitivity has fallen below tolerable limits. These causes should be investigated and remedied. Once sensitivity has been reestablished further steps are not necessary.

b. Analyte in blank material

If an inordinately large amount of analyte is measured in the blank water sample, but this is not seen in the remainder of the samples, this indicates a temporary contamination of the blank. The source of this incident should be investigated to prevent repeat occurrences but no further action is required. Sample results associated with analytical runs that have blank samples greater than or equal to the LOD are not to be reported. However, sample results that exceed 4x the measured blank level may be reported.

c. Analyte in all samples

If an inordinately large amount of analyte is present in all measurements for a particular day, there is a continual source of contamination. Steps should be taken to identify and remove the contamination source. Contamination specific to analytes can include contamination from blood collections tubes, contamination of sample processing materials, and change in lab air background level and internal standard contamination because the standard set is prepared at a different time as unknowns. If contamination persists the following steps are taken:

1. Check the sample preparation and instrument areas for use of the contaminating agent.
2. Discard all open containers of reagents used in sample preparation.
3. Evaluate sample processing materials including reagent, syringes, pipets, sample vials, and seals.

d. QC sample outside of confidence limits

If one or more of the quality control sample concentration results fall outside the control limits which is defined in the division policy and procedure manual, investigate causes described above to isolate and correct the problem. Also, verify the integrity of the QC material and review data for indications that the QC ampule was not already cracked. Note that in all cases the supervisor should be consulted for the appropriate corrective actions. No analytical results may be reported for runs not in statistical control.

12. Limitations of Method; Interfering Substances and Conditions

This method is an isotope dilution mass spectrometry method, widely regarded as the definitive method for the measurement of organic toxicants in human body fluids. Alteration of particular aspects of this method can result in major biases. Care is required to produce non-contaminated blanks, blood collection tubes, and quality control materials. The quantification range and limits of detection are to be determined as described above in Section 9.

13. Reference Ranges (Normal Values)

Reference ranges for blood VOCs are based on NHANES survey data included in the National Reports on Human Exposure to Environmental Chemicals (http://www.cdc.gov/exposurereport/). The population sample is designed to examine the influence of age, sex, race/ethnicity, urban/rural status and region of the country on blood VOC levels.

An example of VOC blood levels reference ranges from the Fourth National Report on Human Exposure to Environmental Chemicals is given in Table 13.

Table 13. Blood VOC reference ranges reported in the 2009 Fourth National Report on Human Exposure to Environmental Chemicals

Analyte	Detection Limit (ng/mL)	NHANES Cycle	Number	Mean (ng/mL)	Median (ng/mL)	95th Percentile (ng/mL)
1,1,1,2-Tetrachloroethane	0.040	2009-2010	3280	NC	<LOD	<LOD
1,1,1-Trichloroethane	0.010	2009-2010	3333	NC	<LOD	<LOD
1,2,3-Trichloropropane	0.040	2009-2010	3260	NC	<LOD	<LOD
1,2-Dibromoethane	0.015	2009-2010	3212	NC	<LOD	<LOD
1,2-Dichlorobenzene	0.025	2009-2010	3074	NC	<LOD	<LOD
1,2-Dichloroethane	0.010	2009-2010	3358	NC	<LOD	<LOD
1,3-Dichlorobenzene	0.025	2009-2010	3294	NC	<LOD	<LOD
1,4-Dichlorobenzene	0.040	2009-2010	3205	NC	0.043	2.13
2,5-Dimethylfuran*	0.011	2009-2010	3332	NC	< LOD	0.171
α,α,α-Trifluorotoluene	0.040	2015 - 2016	3077	NC	<LOD	<LOD
α-Pinene	0.040	N/A	N/A	N/A	N/A	N/A
Benzene*	0.024	2009-2010	3236	NC	< LOD	0.307
Benzonitrile	0.150	2015-2016	3028	NC	<LOD	<LOD
Bromodichloromethane	0.006	2015-2016	3077	NC	<LOD	0.013
Bromoform	0.008	2015-2016	3046	NC	<LOD	0.01
Carbon Tetrachloride	0.005	2009 - 2010	3240	NC	<LOD	<LOD
Chlorobenzene	0.011	2009-2010	3236	NC	<LOD	<LOD
Chloroethane	0.045	2015-2016	3042	NC	<LOD	<LOD
Chloroform	0.008	2015-2016	2989	NC	0.009	0.047
Cyclohexane	0.020	2015-2016	2965	NC	<LOD	<LOD
Dibromochloromethane	0.005	2015-2016	3087	NC	<LOD	0.011
Ethyl Acetate	0.016	2015 - 2016	2965	NC	<LOD	<LOD
Ethyl Ether	0.040	2015 - 2016	3029	NC	<LOD	<LOD
Ethylbenzene*	0.024	2009 - 2010	3209	NC	<LOD	0.175
Furan	0.025	2009 - 2010	3167	NC	<LOD	0.103
Isobutyronitrile	0.040	2015 - 2016	2981	NC	<LOD	0.53
Isopropylbenzene	0.040	2009 - 2010	3250	NC	<LOD	<LOD
m- and p-Xylene*	0.034	2009 - 2010	3138	0.087	0.072	0.466
Methylcylclopentane	0.020	2015 - 2016	2899	NC	<LOD	<LOD
Methylene Chloride	0.250	2009 - 2010	2878	NC	<LOD	<LOD
Methyl Isobutyl Ketone	0.100	N/A	N/A	N/A	N/A	N/A
Methyl-tert-Butyl Ether	0.010	2007 - 2008	2964	NC	<LOD	0.007
n-Heptane	0.100	2015 - 2016	2991	NC	<LOD	<LOD
n-Hexane	0.122	2009 - 2010	3266	NC	<LOD	<LOD
Nitrobenzene	0.300	2009 - 2010	3200	NC	<LOD	<LOD
n-Octane	0.100	2015 - 2016	3000	NC	<LOD	<LOD
o-Xylene*	0.024	2009 - 2010	2944	NC	<LOD	0.129
Styrene	0.030	2009 - 2010	1320	NC	<LOD	0.132
Tetrachloroethene	0.048	2009 - 2010	3302	NC	<LOD	0.099
Tetrahydrofuran	0.125	2015 - 2016	2979	NC	<LOD	<LOD
Toluene*	0.025	2009 - 2010	2185	0.085	0.065	0.83
Trichloroethylene	0.012	2009 - 2010	3342	NC	<LOD	<LOD
Vinyl bromide	0.045	2015 - 2016	3063	NC	<LOD	<LOD

< LOD - Result below detection limit
N/A – No reference range available
NC – not calculated because high proportion of results were below LOD
*note value combines smokers and nonsmokers

Exposure to cigarette smoke is known to be the primary source of benzene, toluene, ethylbenzene, xylenes and styrene (BTEXS) exposure in the U.S. population.[10] Therefore, reference ranges for these compounds vary significantly between smokers and nonsmokers. Blood levels measured in smokers and nonsmokers in the 2015 and 2016 cycle are given in Tables 14 and 15, respectively.

Table 14. NHANES 2015–2016 population VOC blood levels for smokers

Compound	Number of Specimens	Geometric Mean (ng/mL)	Median (ng/mL)	95th Percentile (ng/mL)
2,5-Dimethylfuran	831	0.078	0.102	0.343
Benzene	824	0.153	0.178	0.642
Toluene	822	0.405	0.456	1.50
Ethylbenzene	830	0.068	0.075	0.202
o-Xylene	827	0.039	0.039	0.106
m/*p*-Xylene	830	0.174	0.188	0.582
Styrene†	290	0.068	0.072	0.180

†2013-2014

Table 15. NHANES 2015–2016 population VOC blood levels for nonsmokers

Compound	Number of Specimens	Geometric Mean (ng/mL)	Median (ng/mL)	95th Percentile (ng/mL)
2,5-Dimethylfuran	2081	*	< 0.011	< 0.011
Benzene	2045	*	< 0.024	0.067
Toluene	2080	0.070	0.061	0.312
Ethylbenzene	2062	*	< 0.024	0.056
o-Xylene	2071	*	< 0.024	0.059
m/*p*-Xylene	2086	*	0.038	0.213
Styrene†	864†	< 0.030	< 0.030	0.068

†2013-2014

*not calculated

14. Critical Call Results ("Panic" Values)

The health effects resulting from exposure to low levels of VOCs is currently unclear. The method described here is designed for the measurement of low level exposure to VOCs, thus panic values will not be measured with this method.

15. Specimen Storage and Handling during Testing

Specimens may reach and maintain ambient temperature during preparation, however, biological samples (unknowns and QC) are to be racked into a chilled tray (15 ± 1 °C) while awaiting analysis. If the measurement is delayed to the next day, samples can be left

on a cooled sample tray at 15 °C. Samples are not to be placed in a refrigerator that has not been recently vented. Most sample queues run for extended time periods of up to 24-hr duration.

16. Alternate Methods for Performing Test and Storing Specimens if Test System Fails

The analysis of VOCs in whole blood at parts-per-trillion levels is an extremely complex measurement. There are no acceptable alternative methods for this analysis. If the analytical system fails, storage of prepared specimens at 4 °C is recommended not to exceed 24 hr.

a. Length of Time Samples may be banked

Repeat measurements of samples stored at 4 °C indicate that whole blood VOC samples may be banked for up to 16 weeks if the blood remains unclotted and homogenized.

b. Proper banking procedures

Whole blood specimens for VOC measurement are to be stored in the dark at 4 – 10 °C. Since VOCs are lost whenever the containers in which they are stored are opened. It is not appropriate to transfer the blood specimens to another container which would be more resistant to breaking.

17. Test-Result Reporting System; Protocol for Reporting Critical Calls (if Applicable)

Analytical results are reportable once the validity of the data are established by the division's QC/QA policies and procedures and are verified by a DLS statistician. This data, a cover letter, and a table of method specifications will be routed through the appropriate channels for approval (i.e. supervisor, branch chief, division director). After approval, the report will be sent to the contact person who requested the analyses. Records associated with specimen reporting and approval are maintained in the LIMS.

In addition, it is advised that reports of reference range means and percentiles should accompany all reports because the availability of VOC exposure data is limited.

Because the health effects resulting from exposure to low levels of VOCs is currently unclear, no critical call levels are set.

18. Transfer or Referral of Specimens; Procedures for Specimen Accountability and Tracking

If greater than 3 mL of specimen remain after analysis, this material should be returned to storage at 4 ^{o}C in case the sample needs to be repeated.

Standard record keeping (e.g., specimen ID, notebooks, data files, database, etc.) is used for specimen tracking. All records are maintained in accordance with the HHS Records Management guidance. (See: http://www.hhs.gov/open/records/index.html).

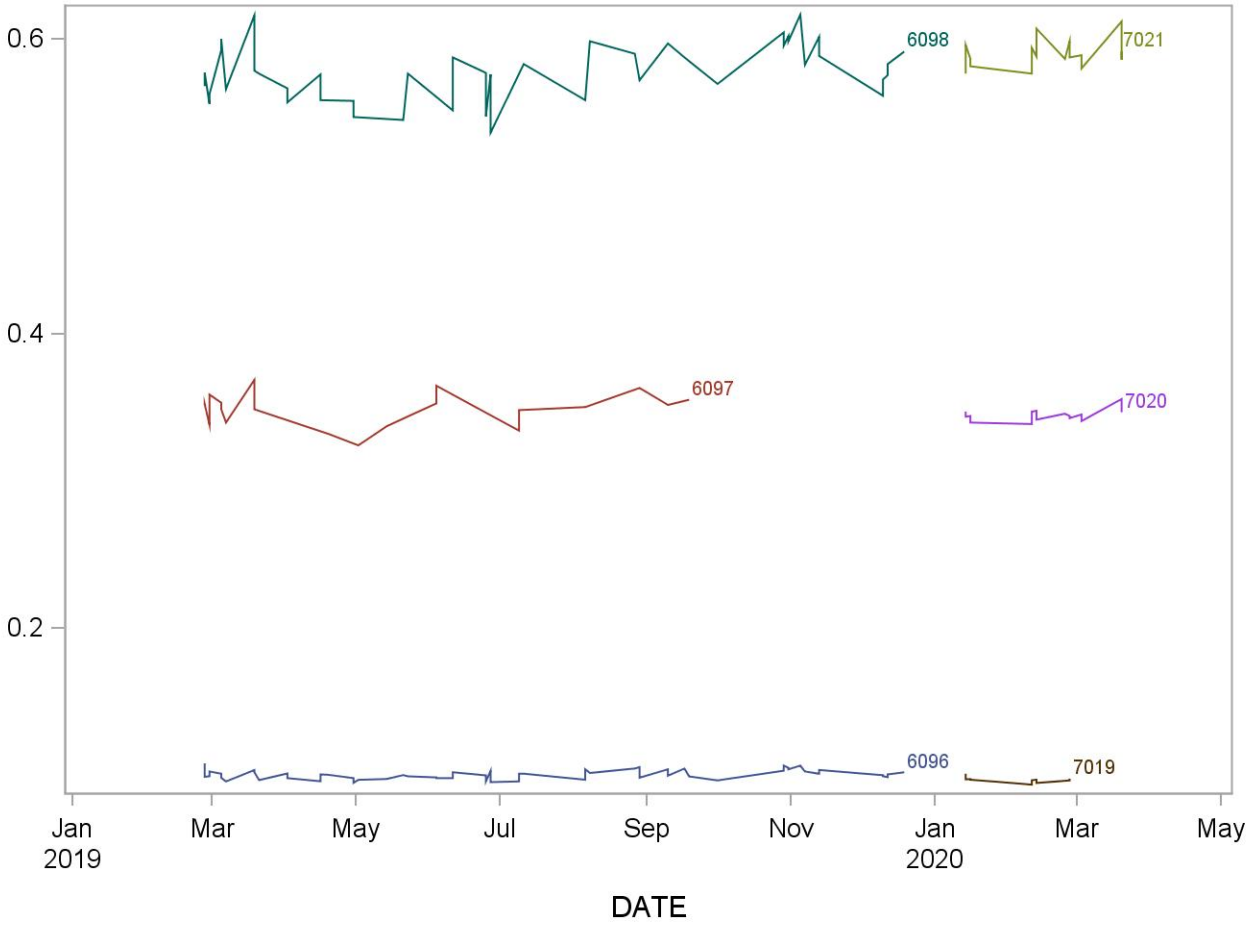
Because of the complex nature of the analyses and the unique testing capabilities of this laboratory, it is not expected that specimens will be referred to other laboratories for testing. Should such a need arise, the laboratory supervisor will consult with local subject matter experts to establish an appropriate mechanism and work process.

19. Summary Statistics and QC Graph

Please see following pages.

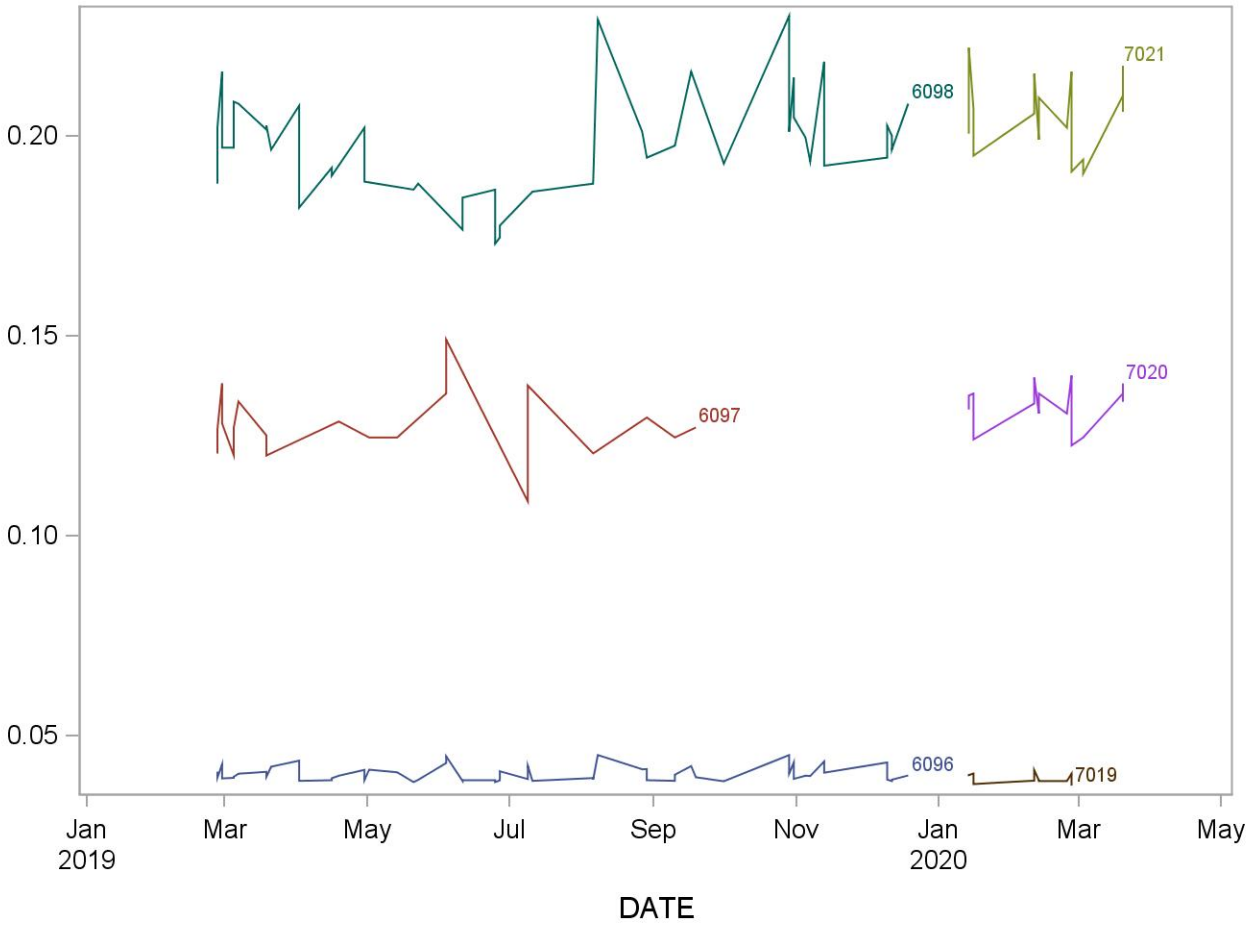
2019-2020 Summary Statistics and QC Chart
LBXVCE (Blood 1,1,1,2-Tetrachloroethane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.1004	0.0032	3.2
6097	20	26FEB19	19SEP19	0.3485	0.0114	3.3
6098	45	26FEB19	19DEC19	0.5774	0.0192	3.3
7019	11	14JAN20	27FEB20	0.0968	0.0019	1.9
7020	16	14JAN20	20MAR20	0.3448	0.0041	1.2
7021	16	14JAN20	20MAR20	0.5898	0.0100	1.7



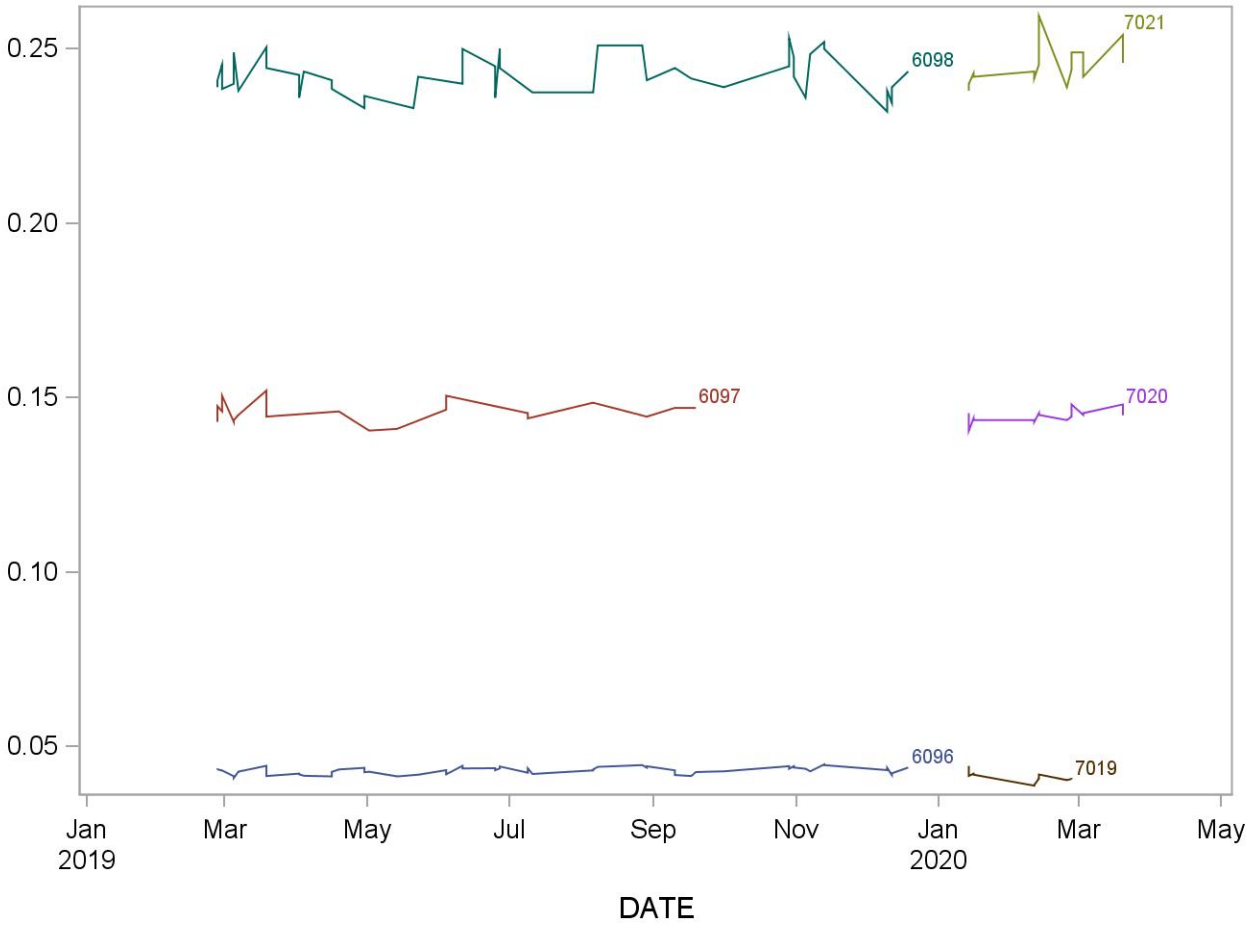
2019-2020 Summary Statistics and QC Chart
LBXVTE (Blood 1,1,1-Trichloroethane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.0404	0.0019	4.6
6097	20	26FEB19	19SEP19	0.1274	0.0085	6.7
6098	45	26FEB19	19DEC19	0.1975	0.0129	6.6
7019	11	14JAN20	27FEB20	0.0393	0.0013	3.2
7020	16	14JAN20	20MAR20	0.1321	0.0056	4.3
7021	16	14JAN20	20MAR20	0.2050	0.0097	4.7



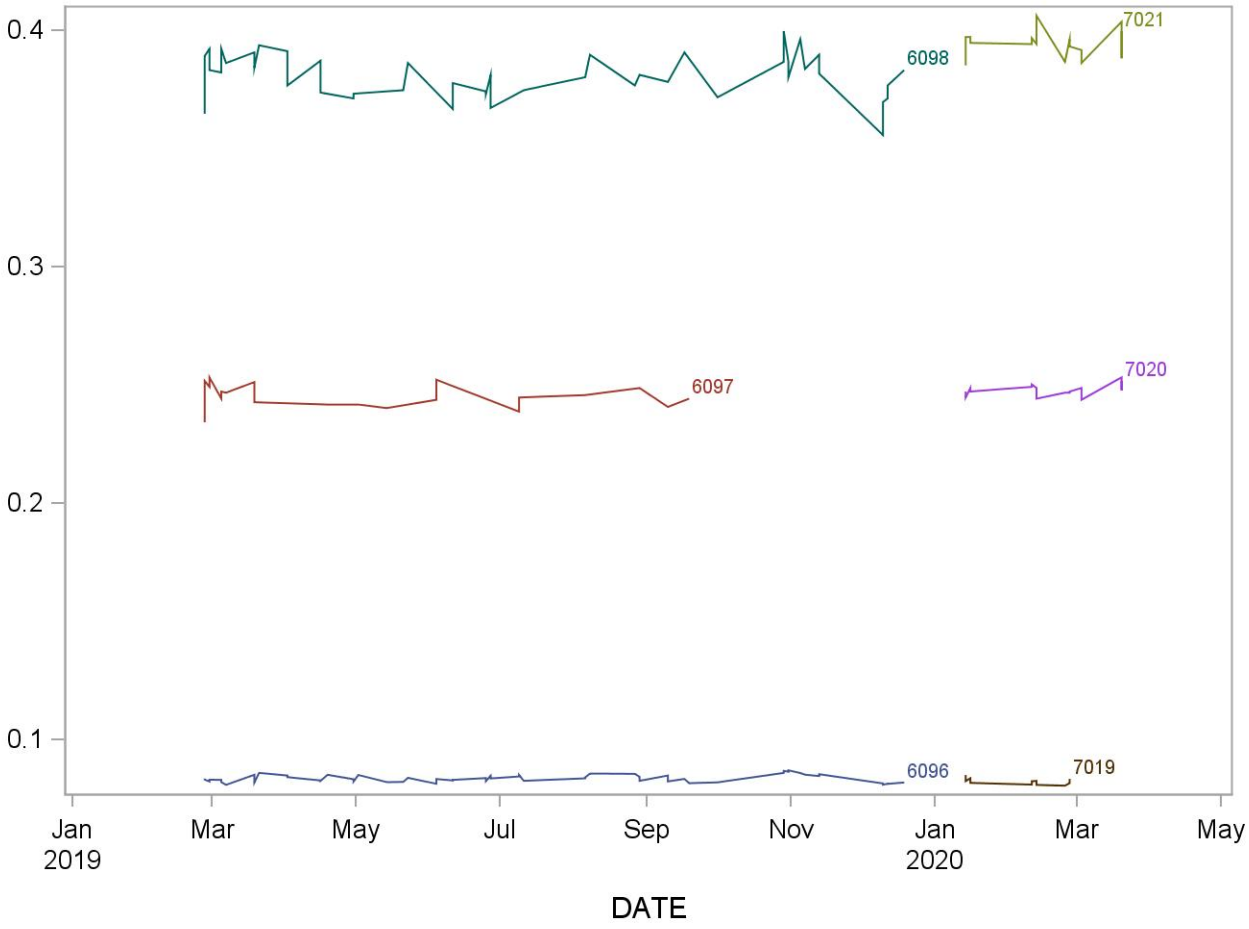
2019-2020 Summary Statistics and QC Chart
LBXVTP (Blood 1,2,3-Trichloropropane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.04295	0.00102	2.4
6097	20	26FEB19	19SEP19	0.14580	0.00304	2.1
6098	45	26FEB19	19DEC19	0.24226	0.00566	2.3
7019	11	14JAN20	27FEB20	0.04100	0.00158	3.8
7020	16	14JAN20	20MAR20	0.14481	0.00191	1.3
7021	16	14JAN20	20MAR20	0.24563	0.00604	2.5



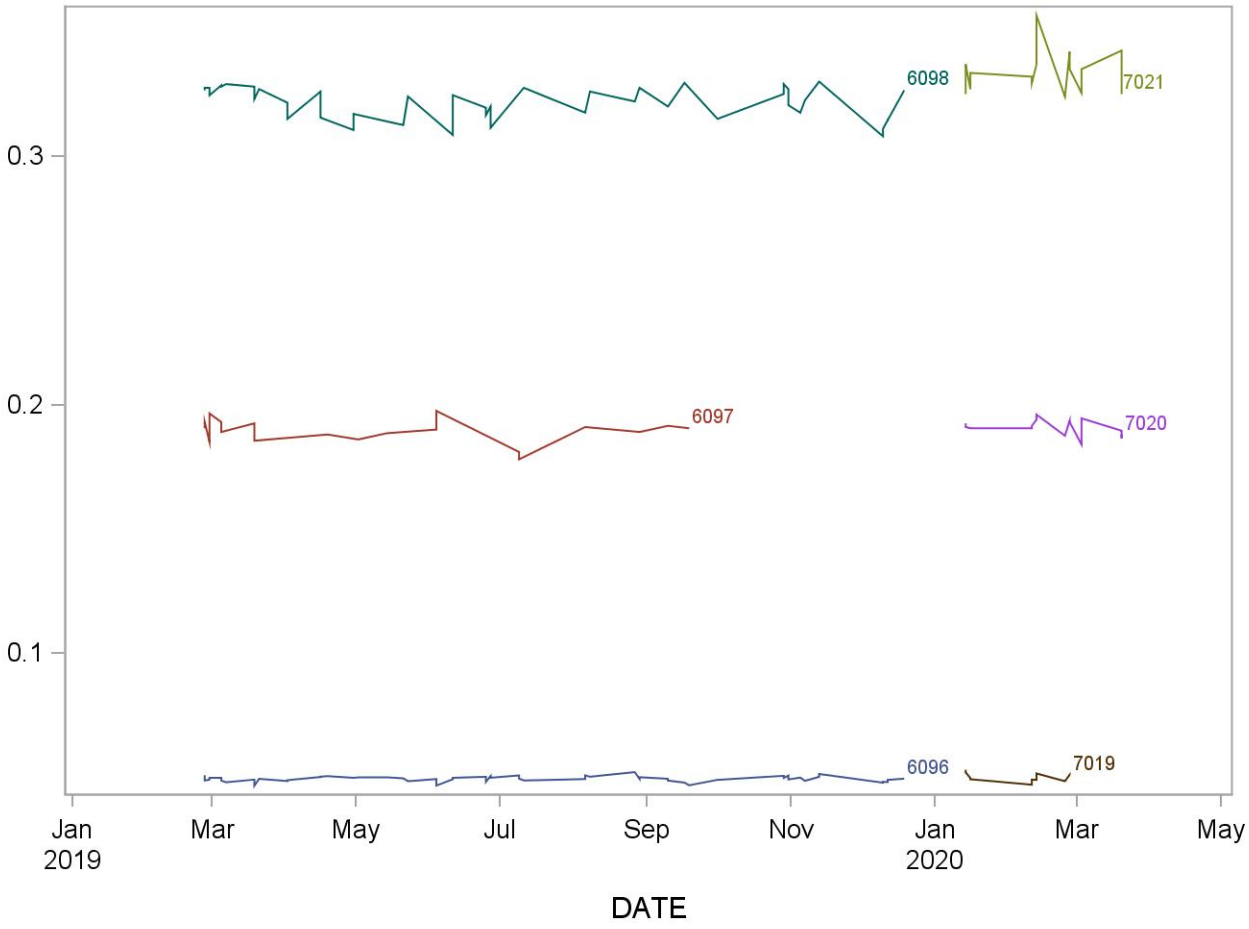
2019-2020 Summary Statistics and QC Chart
LBXVDE (Blood 1,2-Dibromoethane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.0833	0.0016	1.9
6097	20	26FEB19	19SEP19	0.2449	0.0050	2.0
6098	45	26FEB19	19DEC19	0.3806	0.0093	2.4
7019	11	14JAN20	27FEB20	0.0820	0.0014	1.7
7020	16	14JAN20	20MAR20	0.2477	0.0025	1.0
7021	16	14JAN20	20MAR20	0.3943	0.0060	1.5



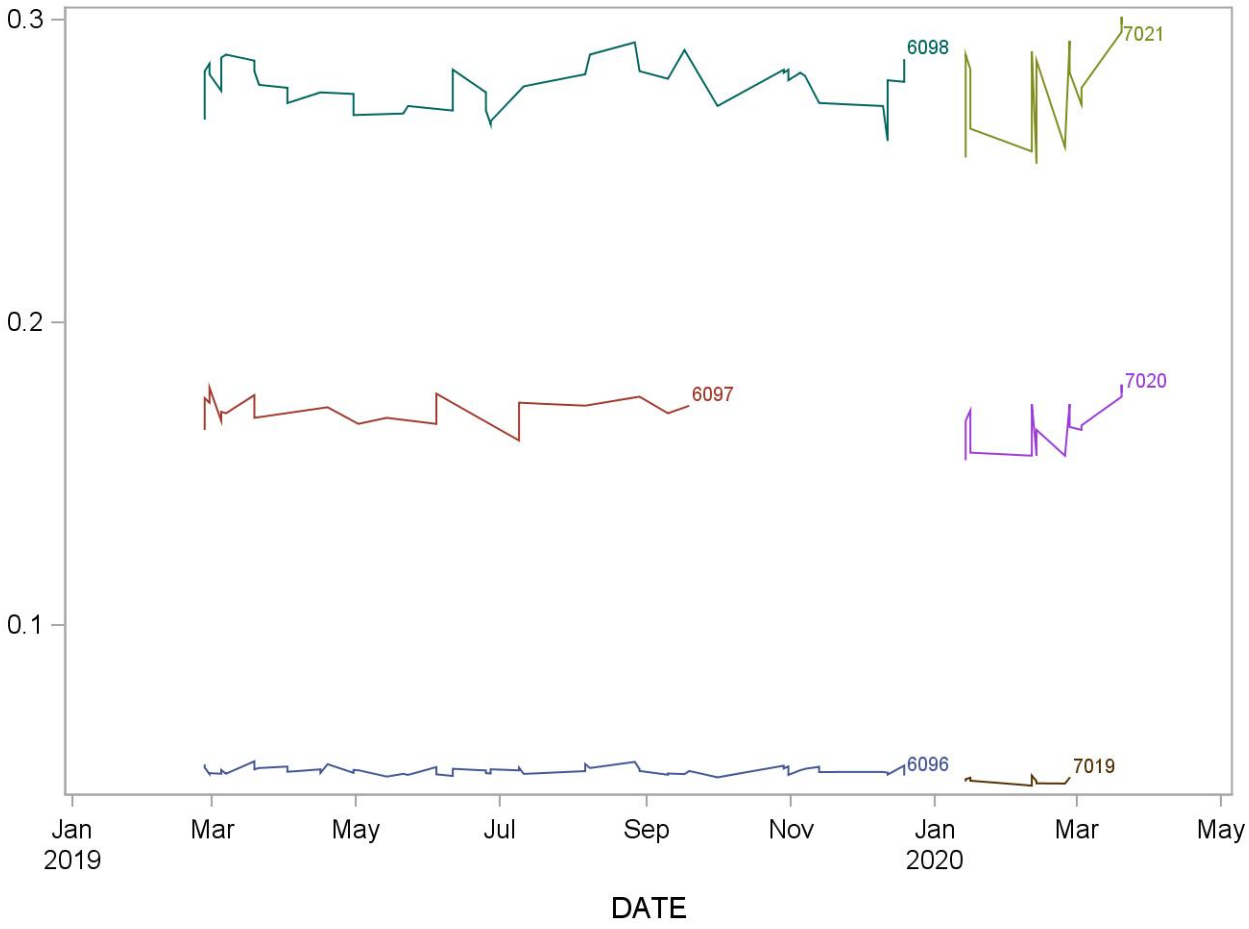
2019-2020 Summary Statistics and QC Chart
LBXV1D (Blood 1,2-Dichlorobenzene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.0494	0.0011	2.2
6097	20	26FEB19	19SEP19	0.1893	0.0046	2.5
6098	45	26FEB19	19DEC19	0.3216	0.0065	2.0
7019	11	14JAN20	27FEB20	0.0502	0.0018	3.5
7020	16	14JAN20	20MAR20	0.1908	0.0032	1.7
7021	16	14JAN20	20MAR20	0.3337	0.0084	2.5



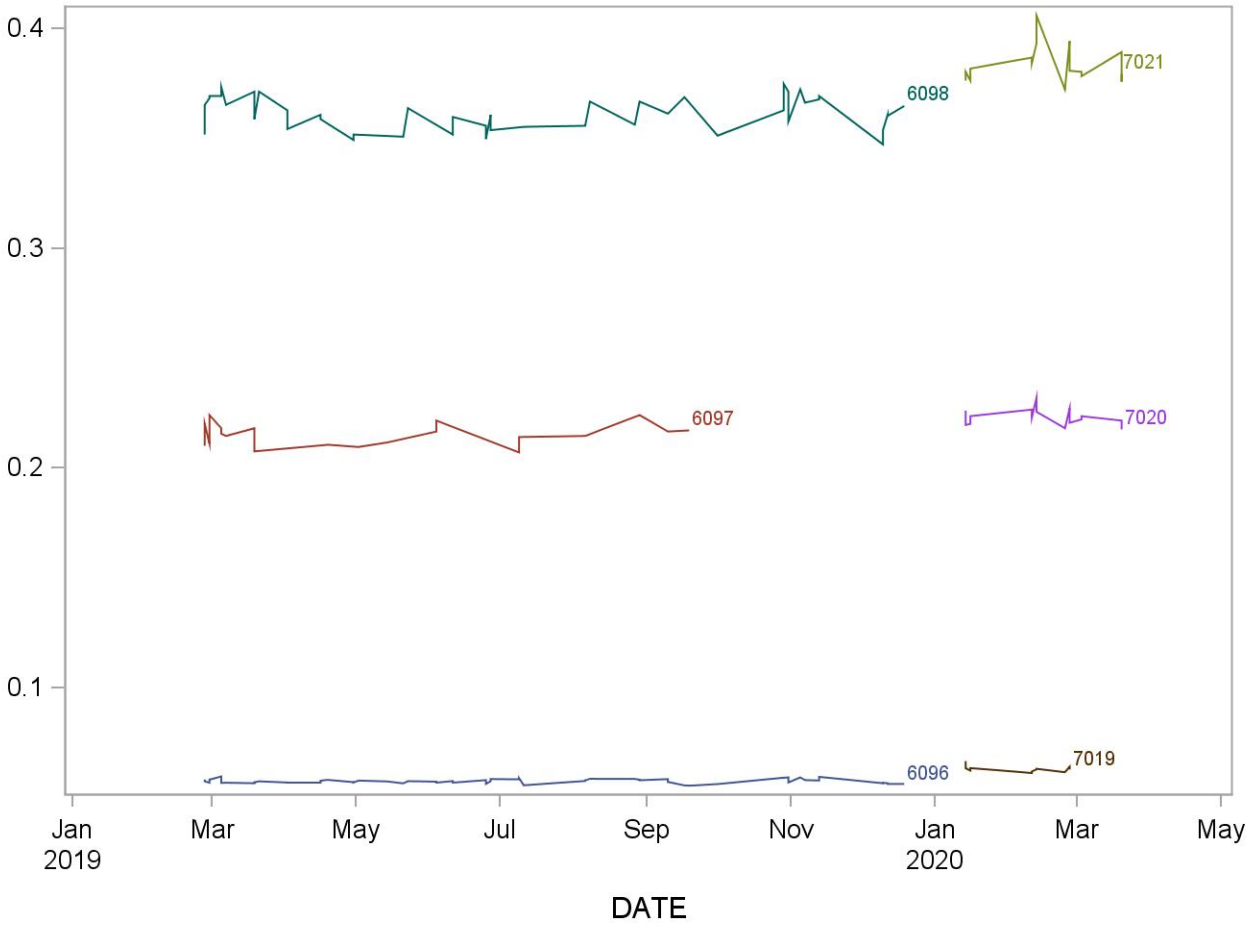
2019-2020 Summary Statistics and QC Chart
LBXV2A (Blood 1,2-Dichloroethane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.0520	0.0012	2.4
6097	20	26FEB19	19SEP19	0.1710	0.0044	2.6
6098	45	26FEB19	19DEC19	0.2782	0.0074	2.7
7019	11	14JAN20	27FEB20	0.0488	0.0010	2.1
7020	16	14JAN20	20MAR20	0.1660	0.0083	5.0
7021	16	14JAN20	20MAR20	0.2784	0.0166	6.0



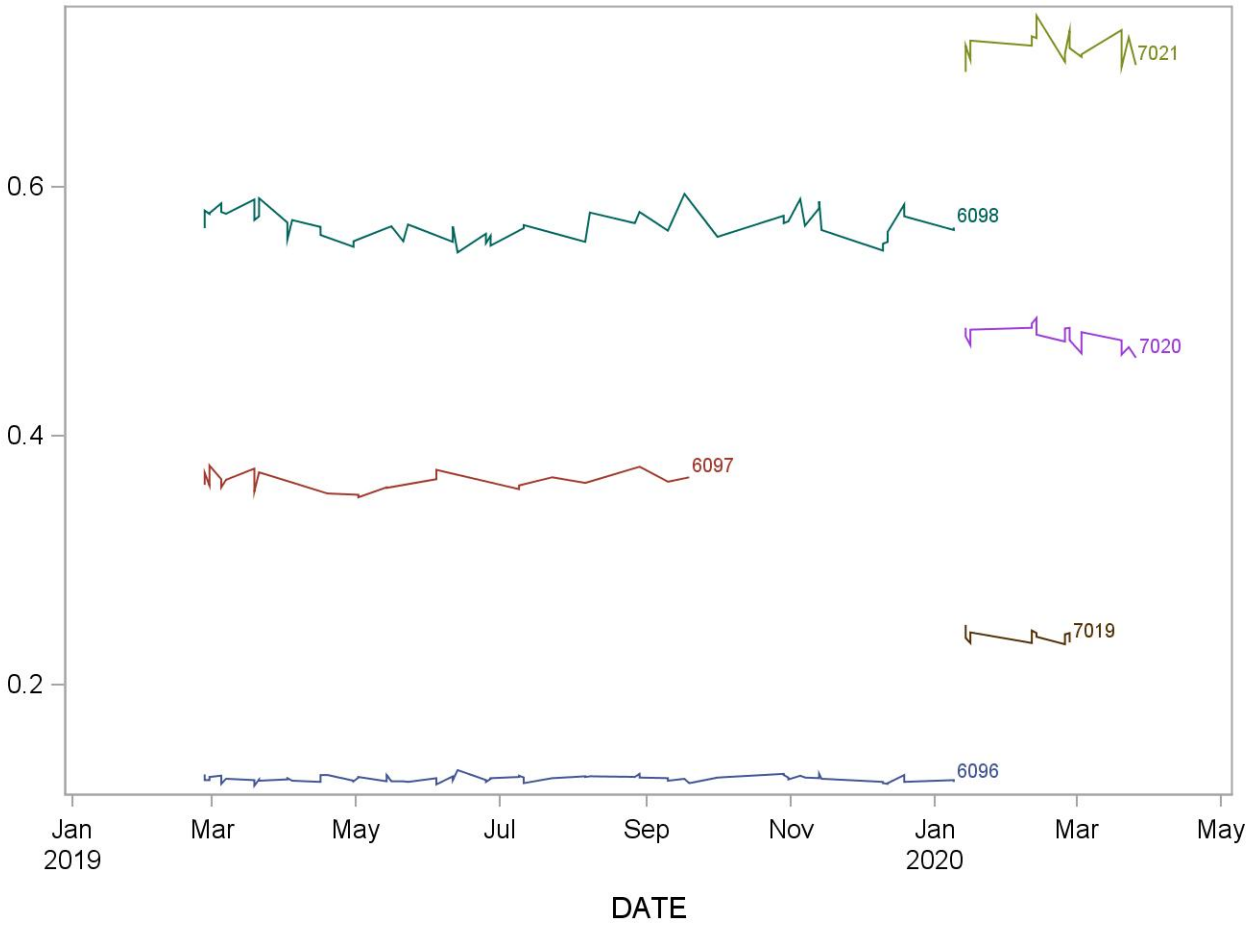
2019-2020 Summary Statistics and QC Chart
LBXV3B (Blood 1,3-Dichlorobenzene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.0576	0.0010	1.7
6097	20	26FEB19	19SEP19	0.2151	0.0050	2.3
6098	45	26FEB19	19DEC19	0.3610	0.0075	2.1
7019	11	14JAN20	27FEB20	0.0631	0.0015	2.3
7020	16	14JAN20	20MAR20	0.2228	0.0040	1.8
7021	16	14JAN20	20MAR20	0.3832	0.0086	2.3



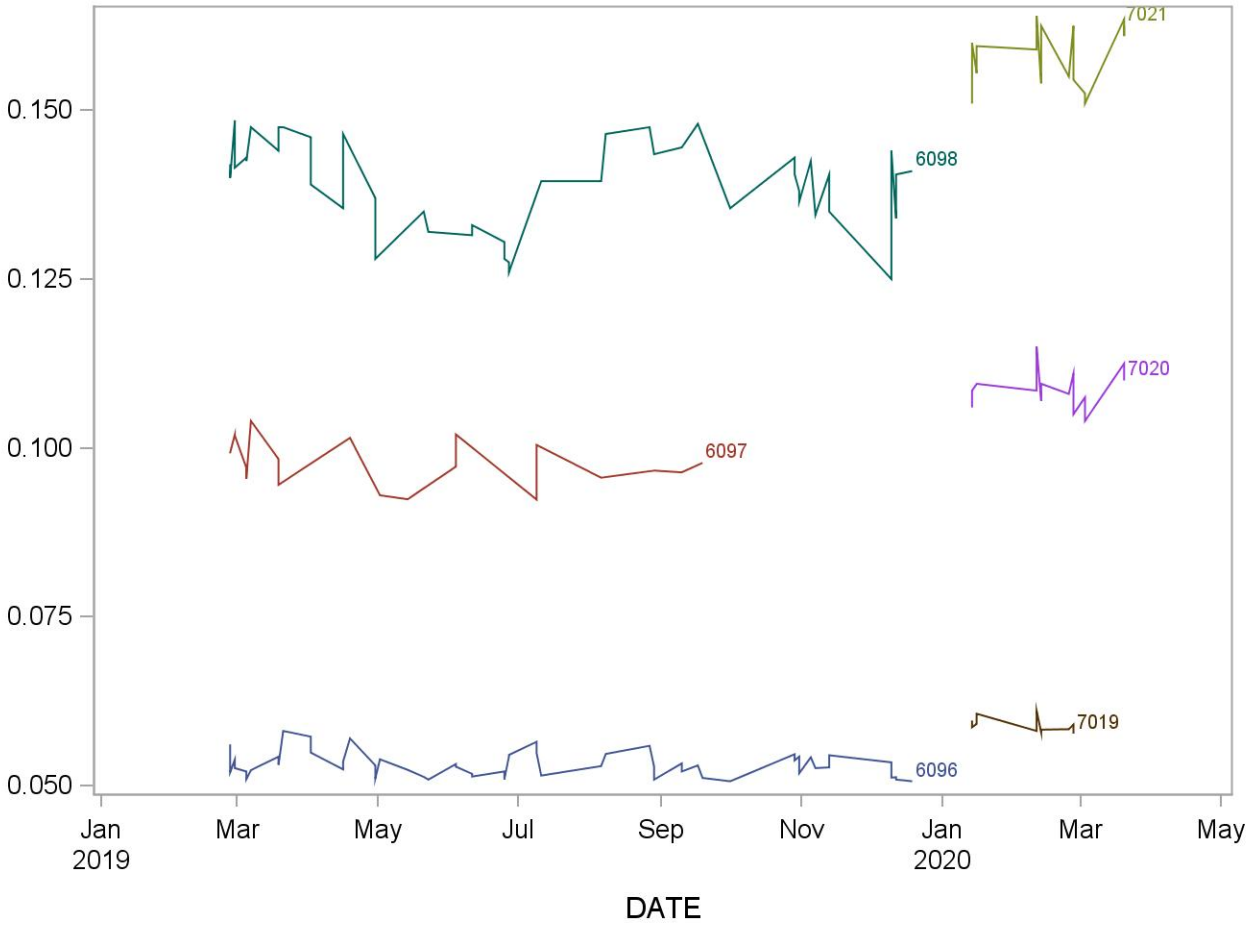
2019-2020 Summary Statistics and QC Chart
LBXVDB (Blood 1,4-Dichlorobenzene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	68	26FEB19	09JAN20	0.1245	0.0025	2.0
6097	24	26FEB19	19SEP19	0.3631	0.0072	2.0
6098	54	26FEB19	09JAN20	0.5694	0.0117	2.1
7019	12	14JAN20	27FEB20	0.2389	0.0048	2.0
7020	19	14JAN20	26MAR20	0.4785	0.0092	1.9
7021	19	14JAN20	26MAR20	0.7108	0.0118	1.7



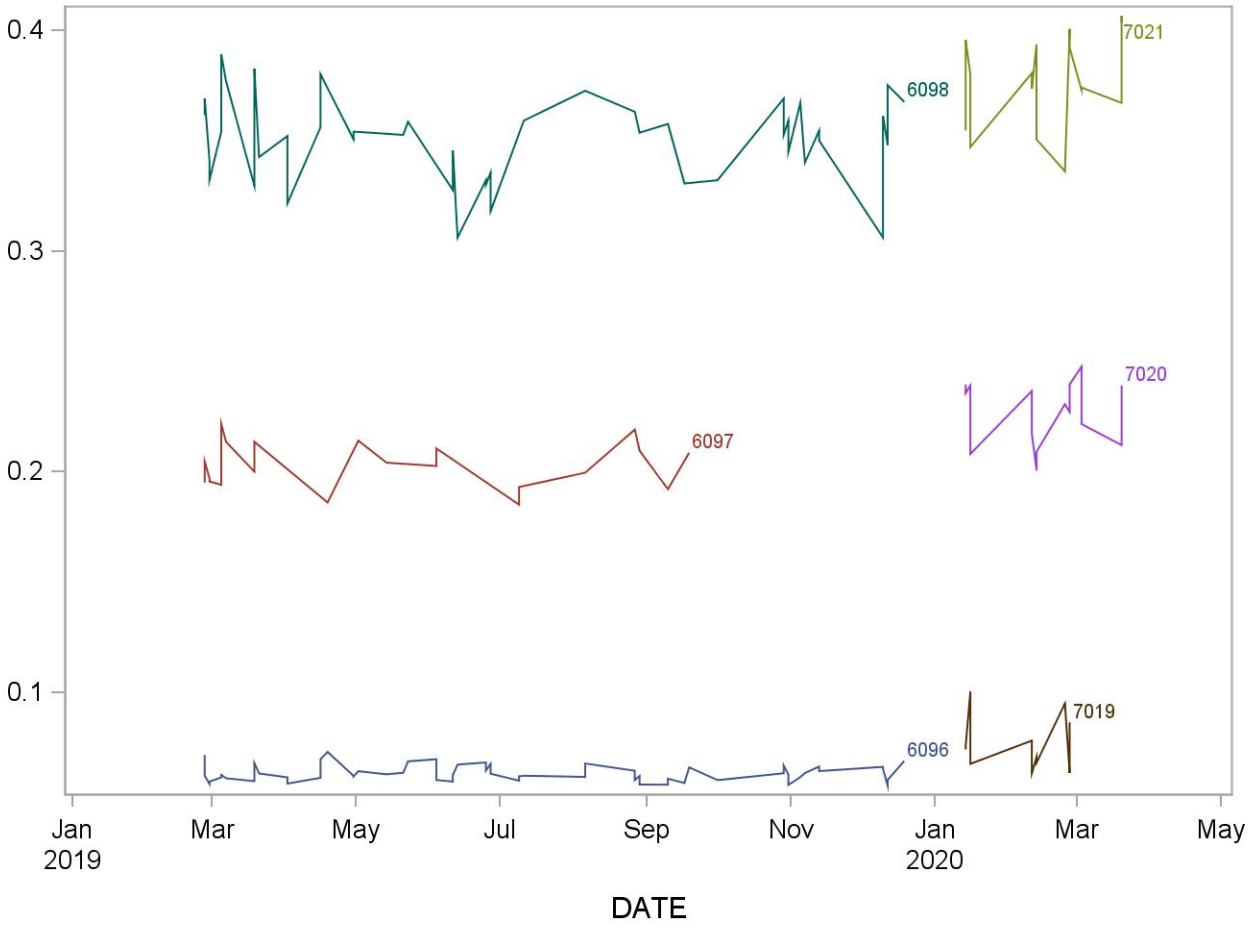
2019-2020 Summary Statistics and QC Chart
LBX2DF (Blood 2,5-Dimethylfuran (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.0531	0.0018	3.4
6097	20	26FEB19	19SEP19	0.0979	0.0034	3.5
6098	45	26FEB19	19DEC19	0.1391	0.0065	4.7
7019	11	14JAN20	27FEB20	0.0590	0.0011	1.9
7020	16	14JAN20	20MAR20	0.1089	0.0028	2.6
7021	16	14JAN20	20MAR20	0.1580	0.0046	2.9



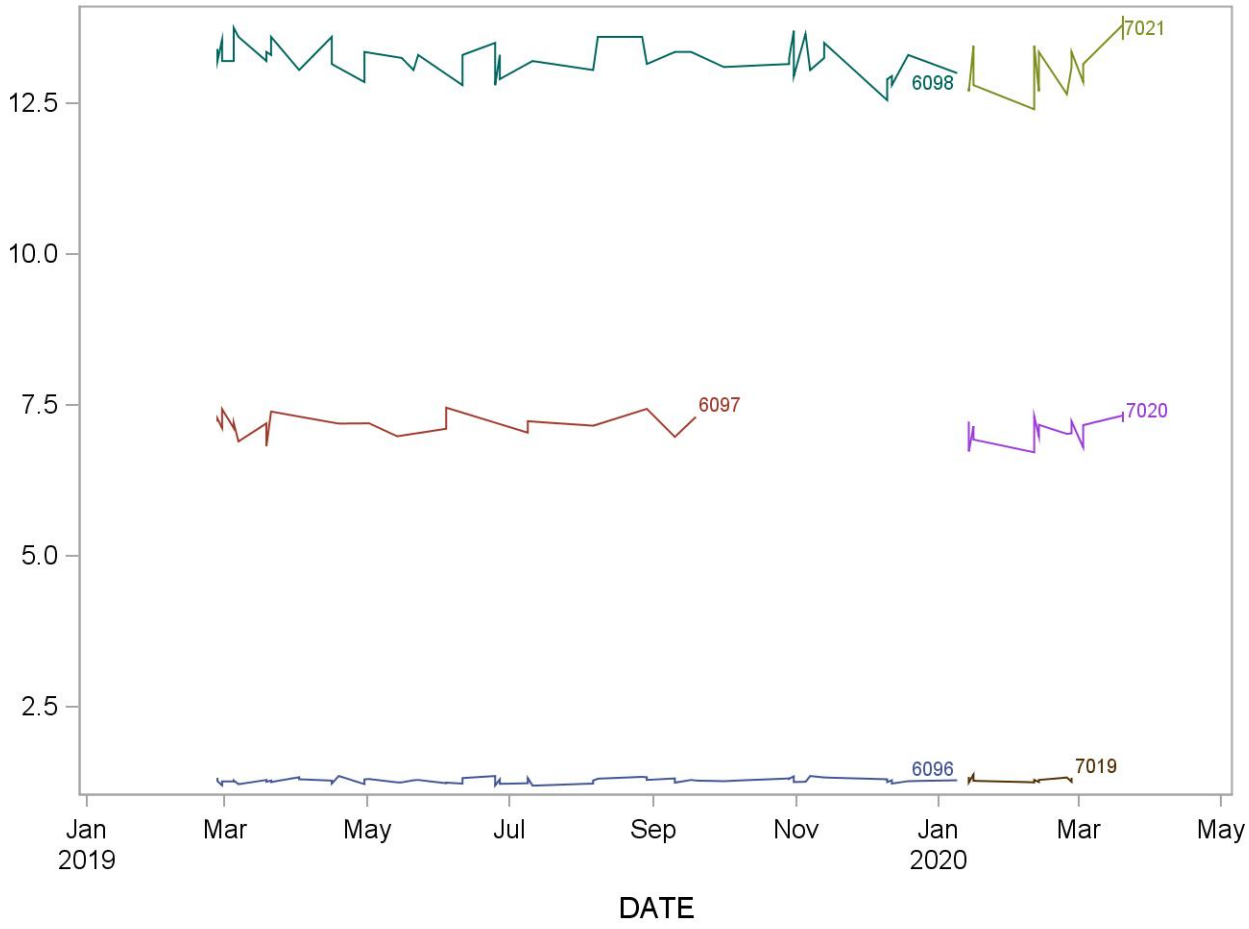
2019-2020 Summary Statistics and QC Chart
LBXVBZ (Blood Benzene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	57	26FEB19	19DEC19	0.0633	0.0037	5.8
6097	21	26FEB19	19SEP19	0.2028	0.0104	5.1
6098	45	26FEB19	19DEC19	0.3502	0.0193	5.5
7019	11	14JAN20	27FEB20	0.0766	0.0124	16.2
7020	16	14JAN20	20MAR20	0.2274	0.0142	6.2
7021	16	14JAN20	20MAR20	0.3767	0.0215	5.7



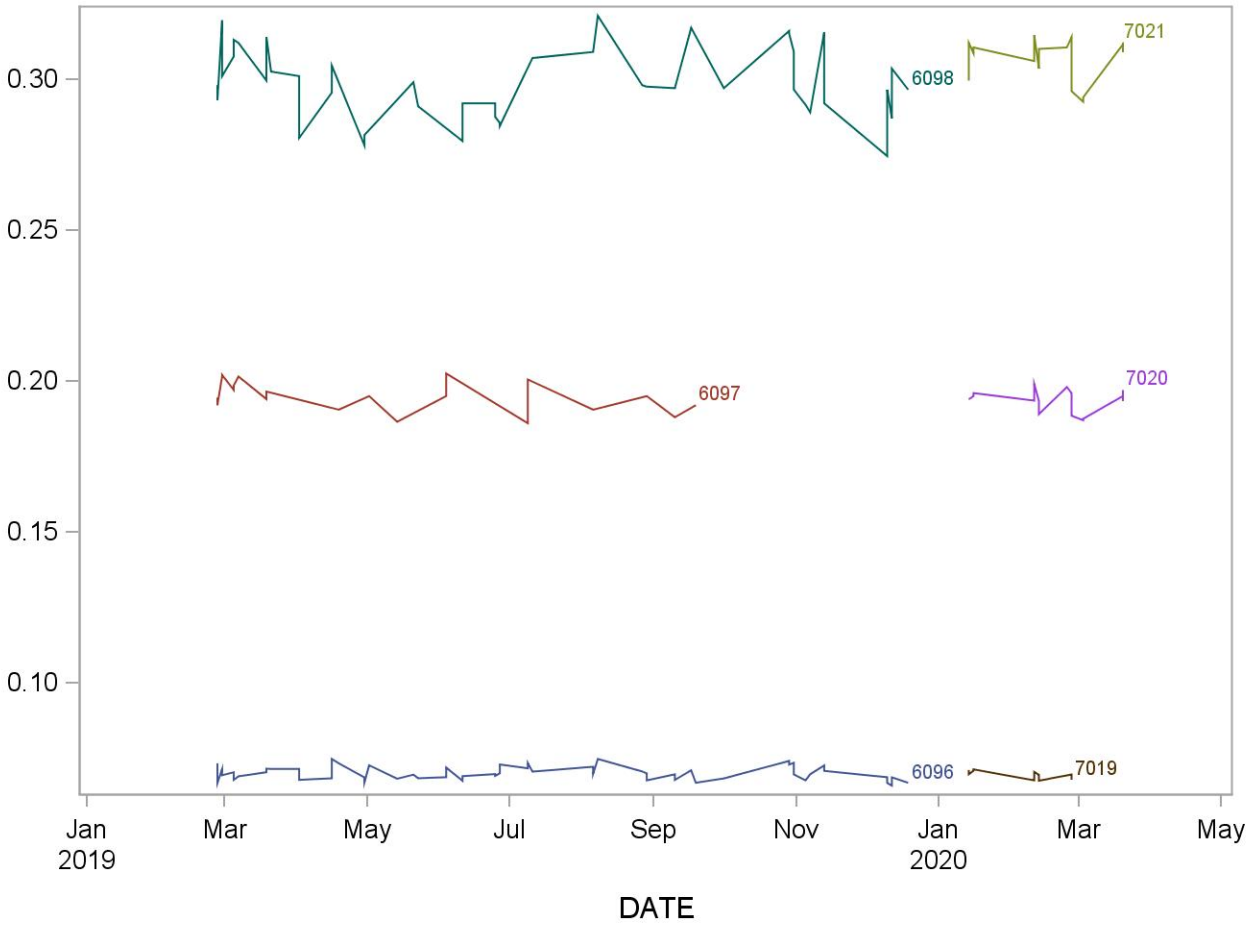
2019-2020 Summary Statistics and QC Chart
LBXVZB (Blood Benzonitrile (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	59	26FEB19	09JAN20	1.2744	0.0416	3.3
6097	21	26FEB19	19SEP19	7.1764	0.1744	2.4
6098	48	26FEB19	09JAN20	13.2292	0.2731	2.1
7019	11	14JAN20	27FEB20	1.2900	0.0432	3.4
7020	16	14JAN20	20MAR20	7.0856	0.2105	3.0
7021	16	14JAN20	20MAR20	13.1250	0.4520	3.4



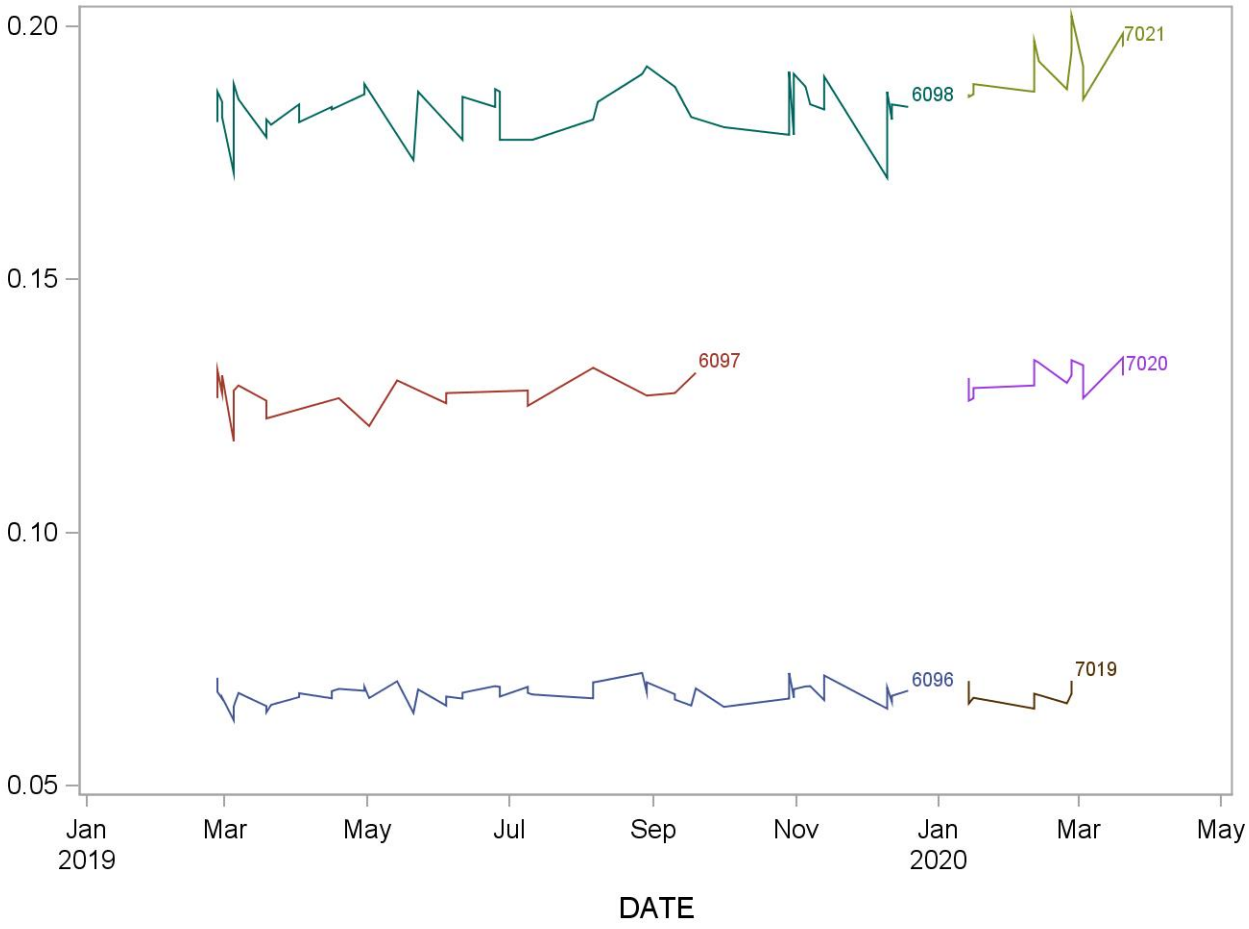
2019-2020 Summary Statistics and QC Chart
LBXVBM (Blood Bromodichloromethane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.07009	0.00226	3.2
6097	20	26FEB19	19SEP19	0.19495	0.00513	2.6
6098	45	26FEB19	19DEC19	0.29862	0.01189	4.0
7019	11	14JAN20	27FEB20	0.06958	0.00136	2.0
7020	16	14JAN20	20MAR20	0.19353	0.00369	1.9
7021	16	14JAN20	20MAR20	0.30650	0.00722	2.4



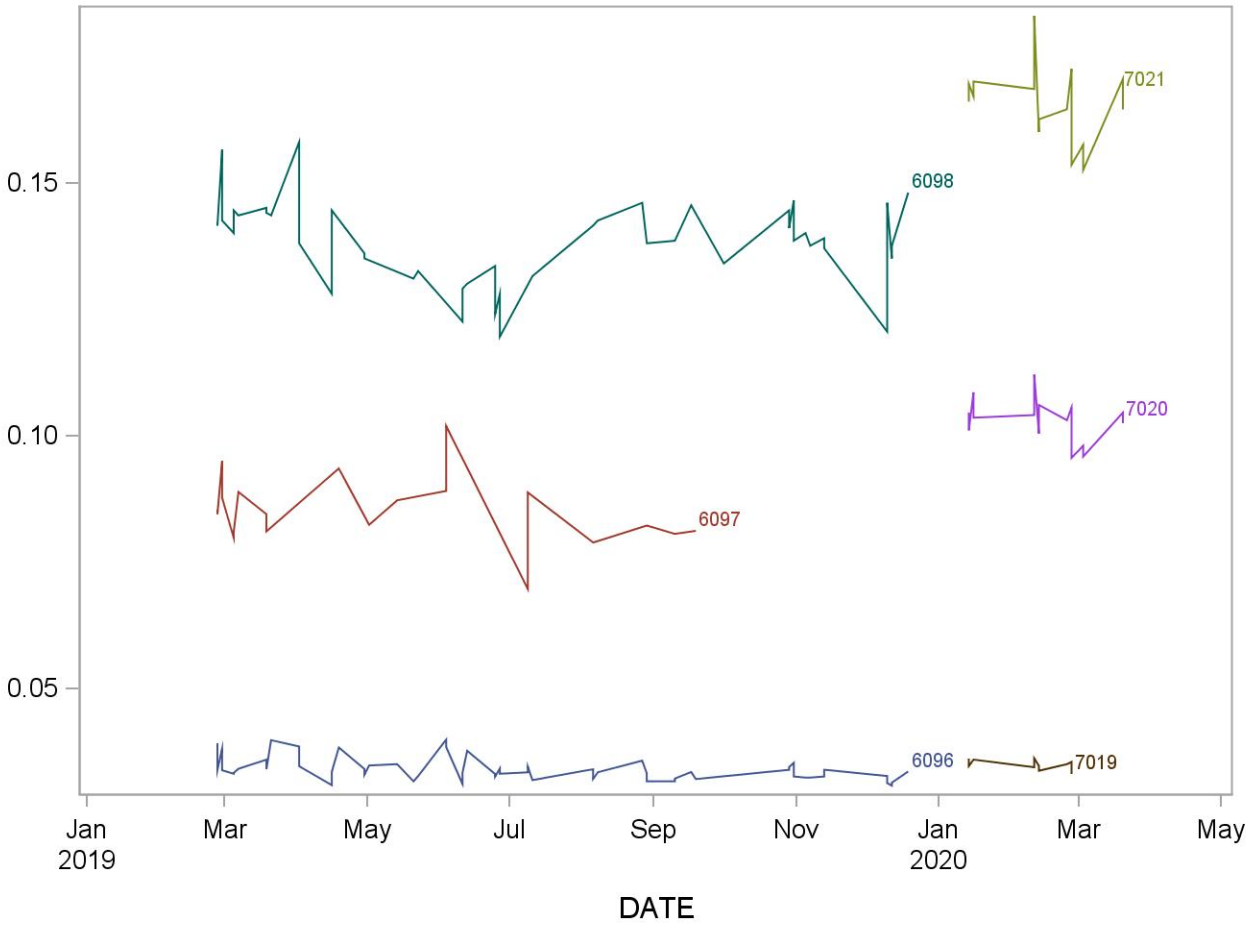
2019-2020 Summary Statistics and QC Chart
LBXVBF (Blood Bromoform (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.06813	0.00196	2.9
6097	20	26FEB19	19SEP19	0.12713	0.00364	2.9
6098	45	26FEB19	19DEC19	0.18347	0.00506	2.8
7019	10	14JAN20	27FEB20	0.06780	0.00179	2.6
7020	15	14JAN20	20MAR20	0.13060	0.00289	2.2
7021	15	14JAN20	20MAR20	0.19180	0.00538	2.8



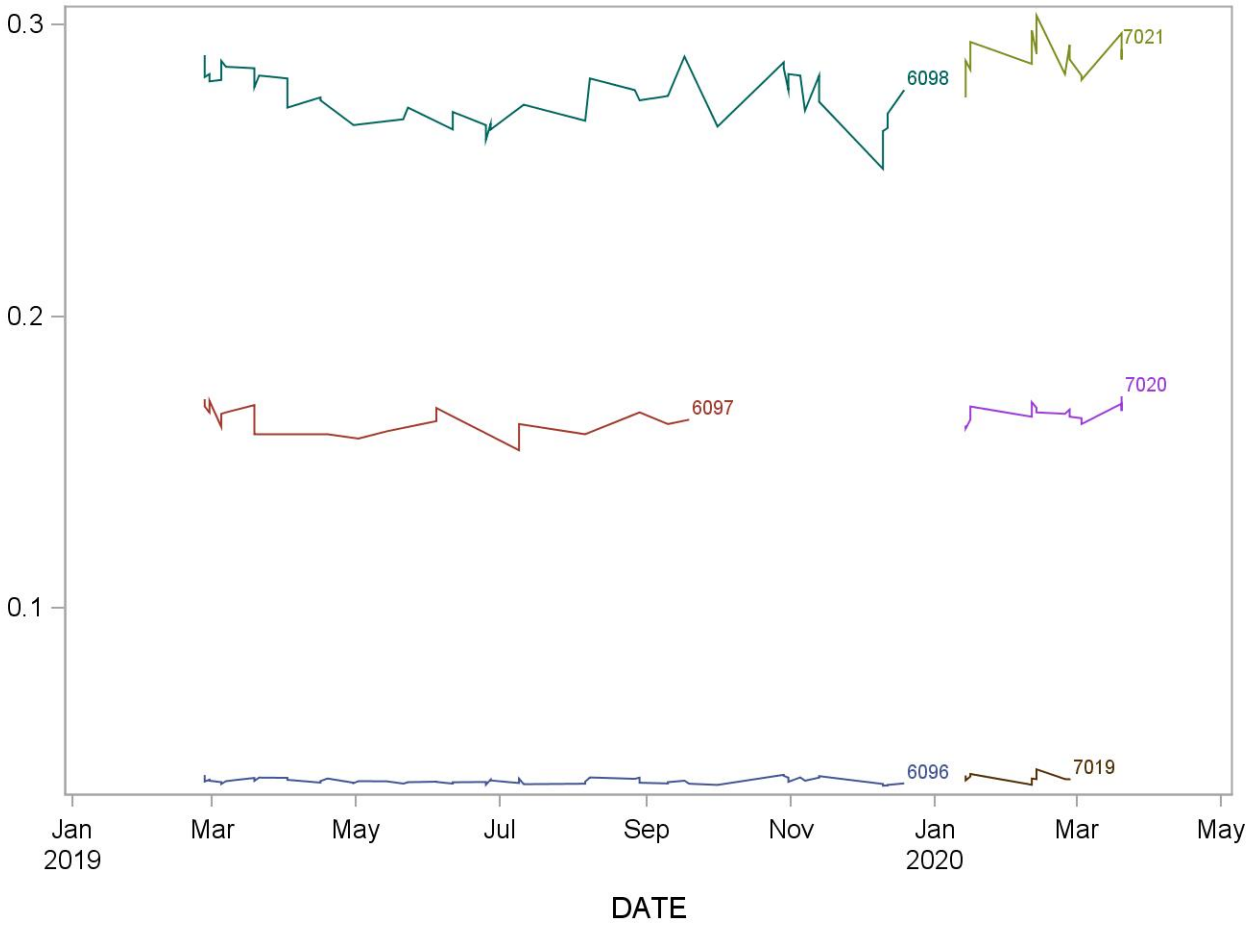
2019-2020 Summary Statistics and QC Chart
LBXVCT (Blood Carbon Tetrachloride (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	57	26FEB19	19DEC19	0.03387	0.00229	6.7
6097	20	26FEB19	19SEP19	0.08509	0.00687	8.1
6098	46	26FEB19	19DEC19	0.13828	0.00827	6.0
7019	11	14JAN20	27FEB20	0.03495	0.00102	2.9
7020	16	14JAN20	20MAR20	0.10298	0.00429	4.2
7021	16	14JAN20	20MAR20	0.16563	0.00754	4.6



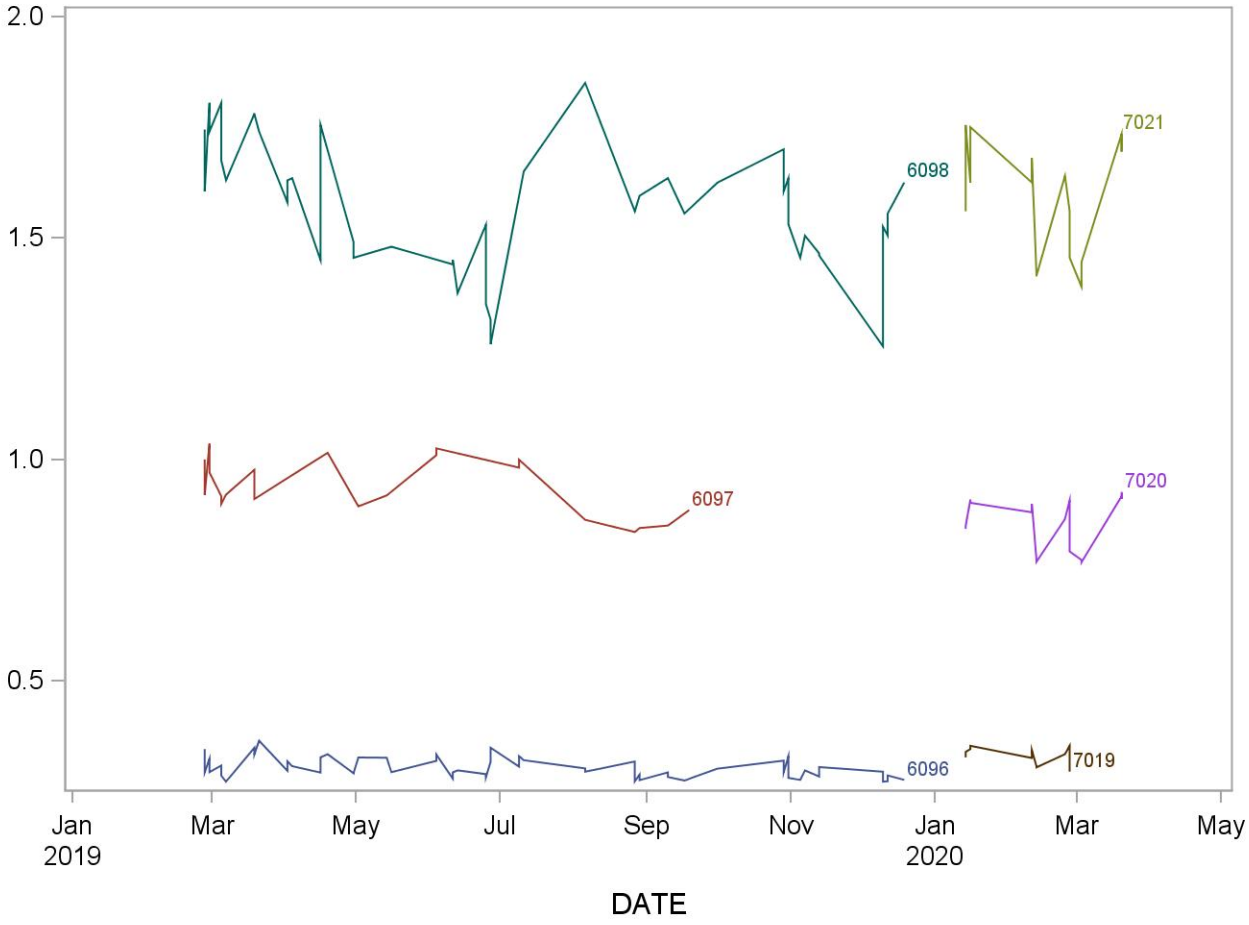
2019-2020 Summary Statistics and QC Chart
LBXVCB (Blood Chlorobenzene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.0406	0.0009	2.3
6097	20	26FEB19	19SEP19	0.1642	0.0047	2.9
6098	45	26FEB19	19DEC19	0.2748	0.0089	3.3
7019	11	14JAN20	27FEB20	0.0417	0.0013	3.2
7020	16	14JAN20	20MAR20	0.1667	0.0030	1.8
7021	16	14JAN20	20MAR20	0.2889	0.0071	2.5



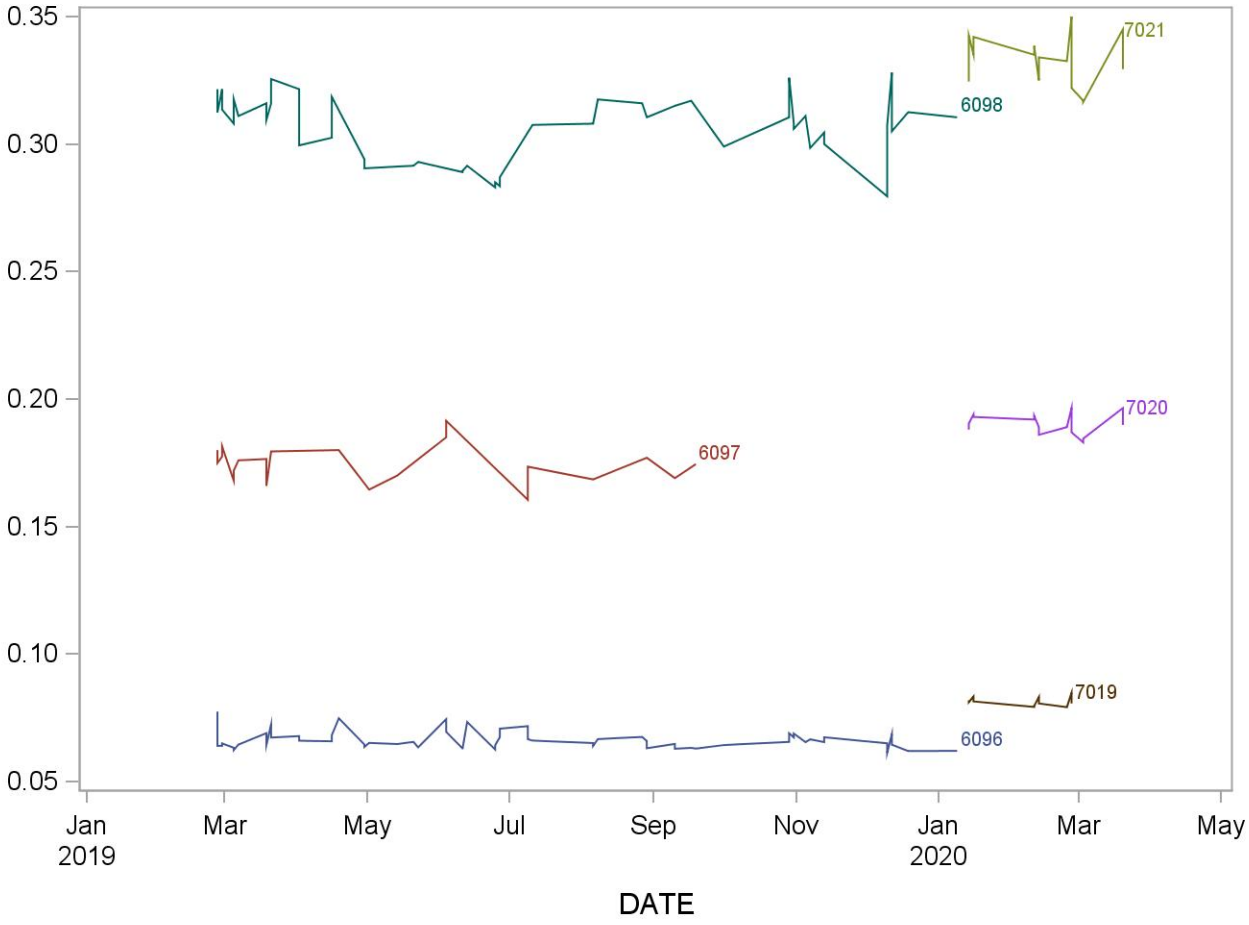
2019-2020 Summary Statistics and QC Chart
LBXVEC (Blood Chloroethane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	57	26FEB19	19DEC19	0.3022	0.0229	7.6
6097	21	26FEB19	19SEP19	0.9363	0.0636	6.8
6098	45	26FEB19	19DEC19	1.5731	0.1457	9.3
7019	11	14JAN20	27FEB20	0.3291	0.0203	6.2
7020	16	14JAN20	20MAR20	0.8547	0.0607	7.1
7021	16	14JAN20	20MAR20	1.5925	0.1319	8.3



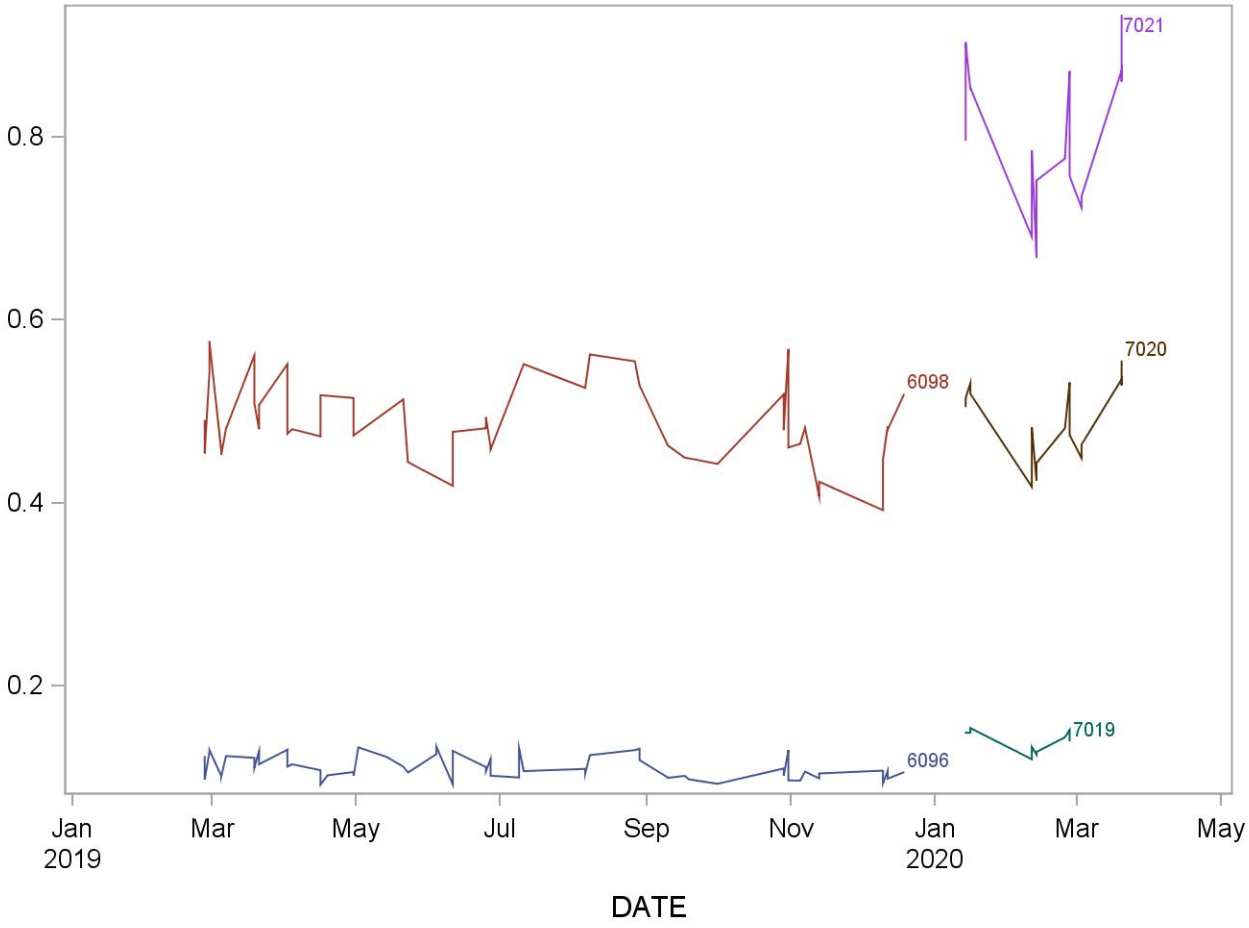
2019-2020 Summary Statistics and QC Chart
LBXVCF (Blood Chloroform (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	59	26FEB19	09JAN20	0.0662	0.0034	5.2
6097	21	26FEB19	19SEP19	0.1746	0.0073	4.2
6098	48	26FEB19	09JAN20	0.3060	0.0126	4.1
7019	11	14JAN20	27FEB20	0.0814	0.0018	2.2
7020	16	14JAN20	20MAR20	0.1903	0.0040	2.1
7021	16	14JAN20	20MAR20	0.3331	0.0100	3.0



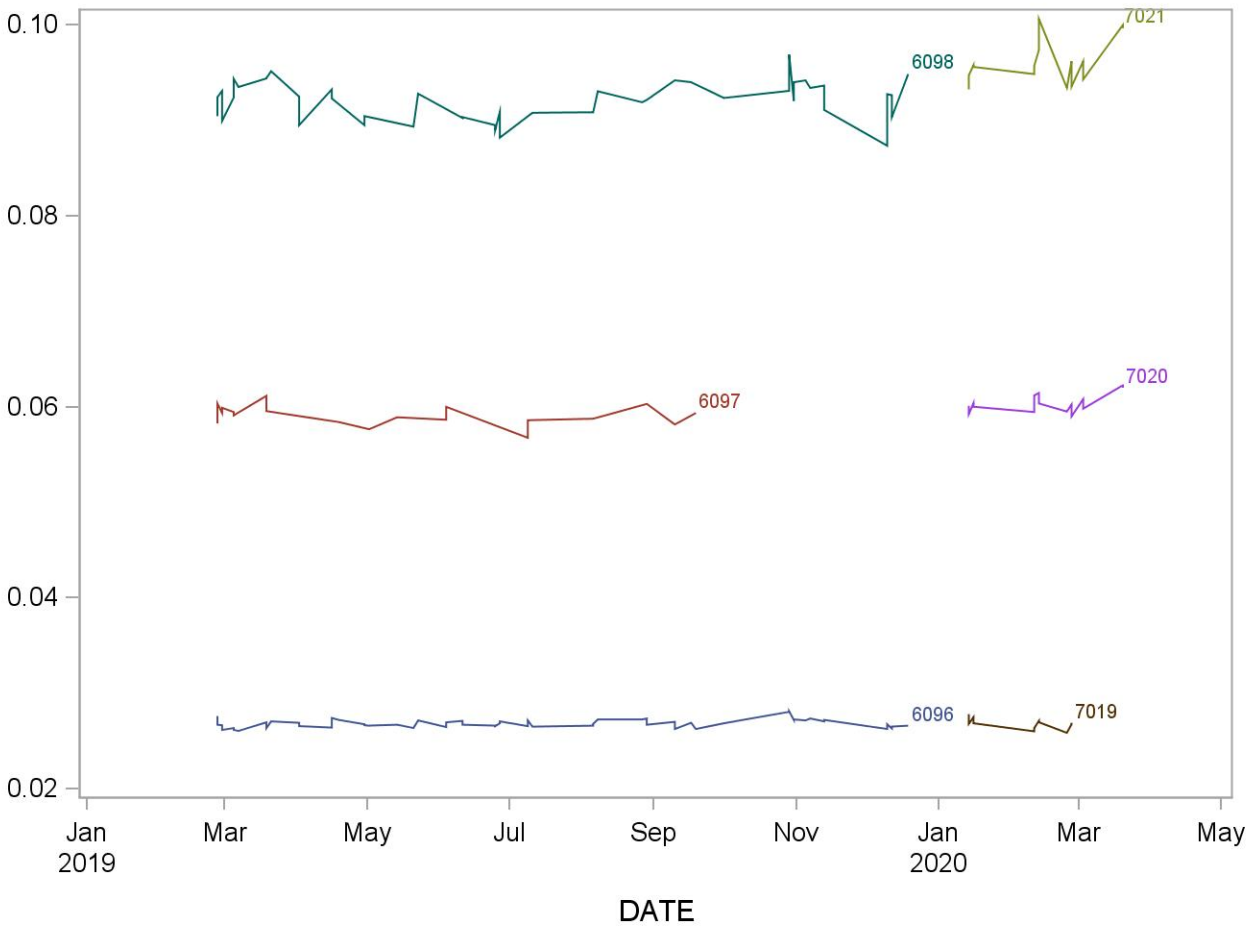
2019-2020 Summary Statistics and QC Chart
LBXVC6 (Blood Cyclohexane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	58	26FEB19	19DEC19	0.1113	0.0125	11.3
6098	47	26FEB19	19DEC19	0.4882	0.0438	9.0
7019	11	14JAN20	27FEB20	0.1403	0.0119	8.5
7020	16	14JAN20	20MAR20	0.4910	0.0427	8.7
7021	16	14JAN20	20MAR20	0.8015	0.0785	9.8



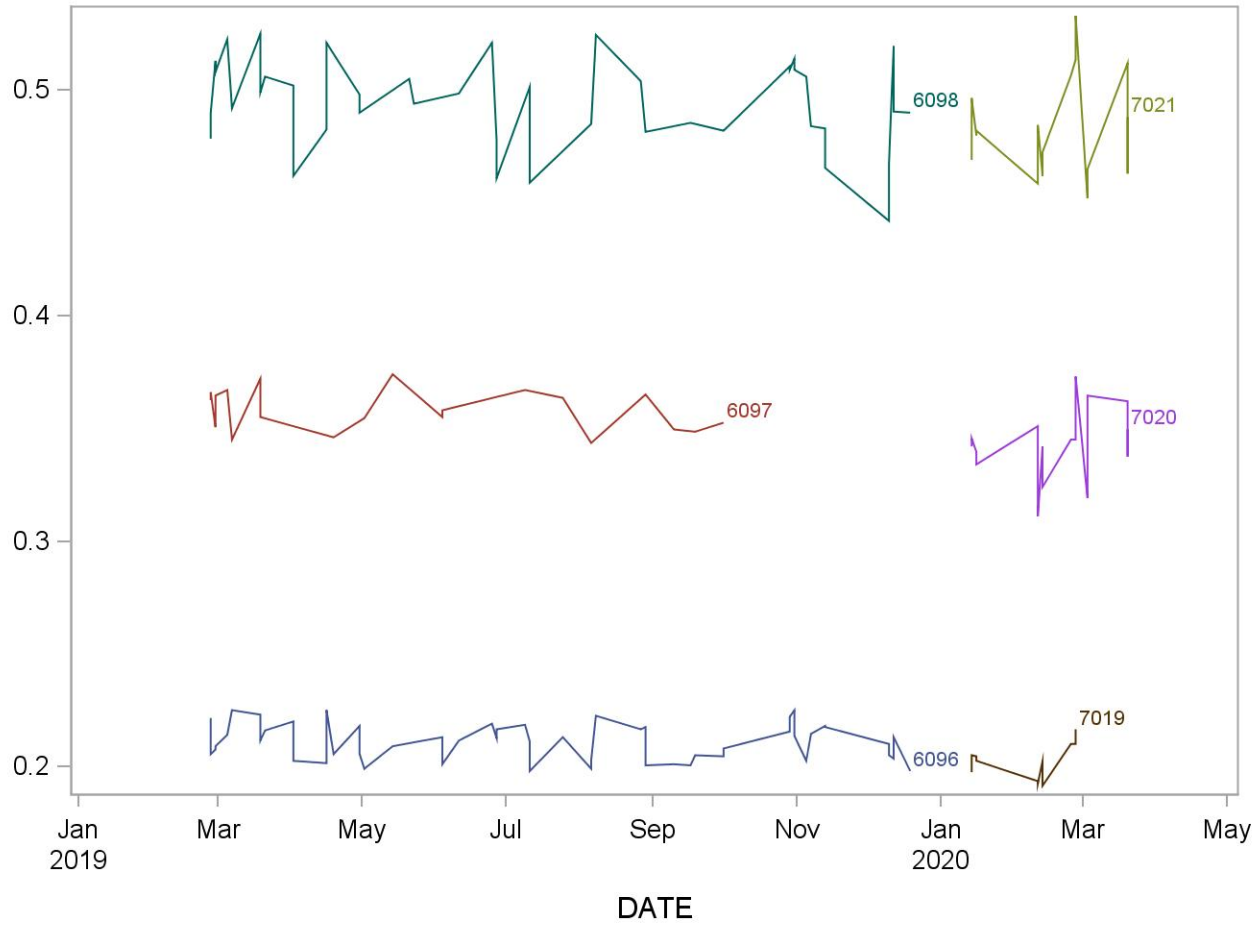
2019-2020 Summary Statistics and QC Chart
LBXVCM (Blood Dibromochloromethane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.0268	0.0004	1.6
6097	20	26FEB19	19SEP19	0.0591	0.0010	1.7
6098	45	26FEB19	19DEC19	0.0921	0.0020	2.2
7019	11	14JAN20	27FEB20	0.0268	0.0006	2.2
7020	16	14JAN20	20MAR20	0.0605	0.0011	1.7
7021	16	14JAN20	20MAR20	0.0963	0.0025	2.6



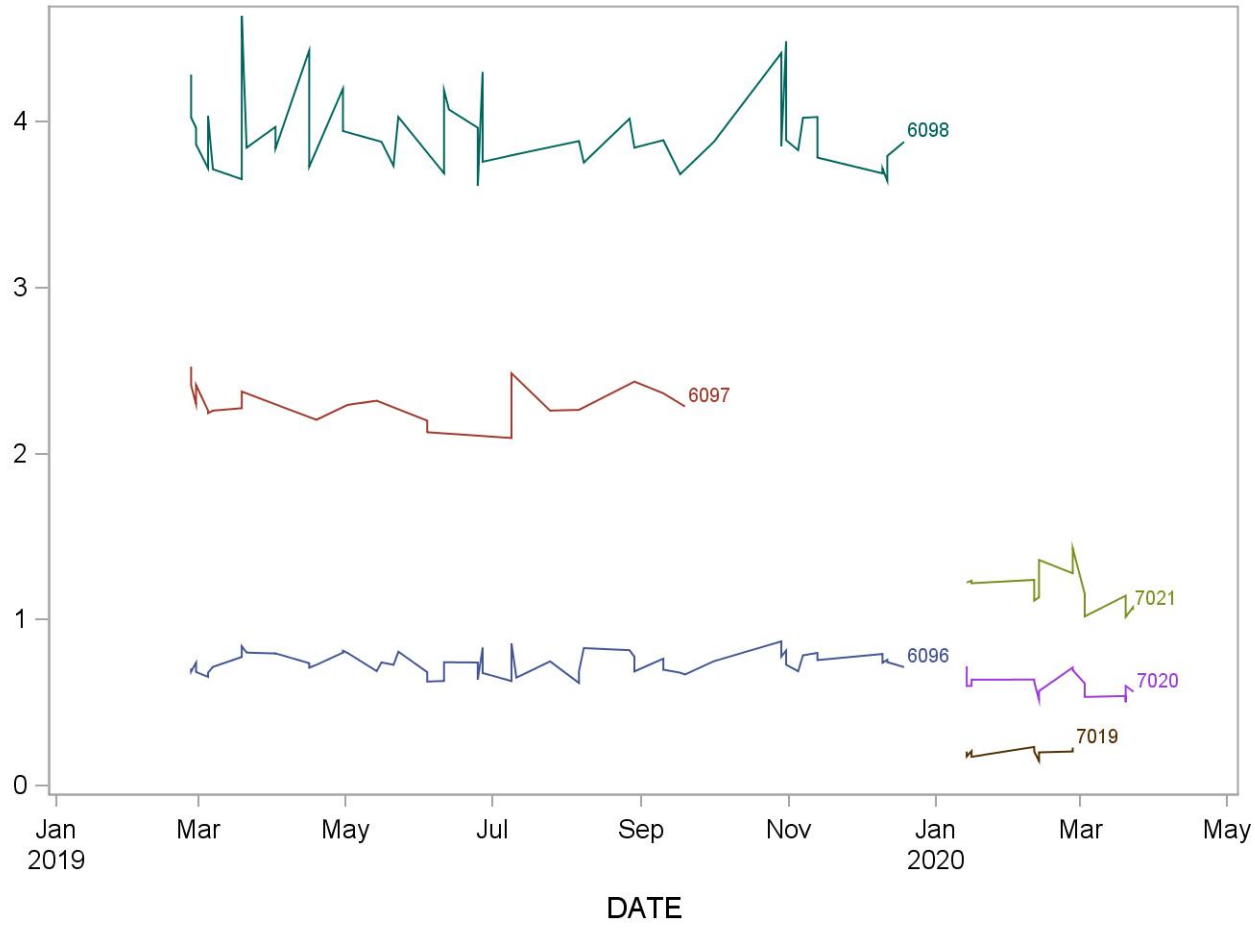
2019-2020 Summary Statistics and QC Chart
LBXVEE (Blood Diethyl Ether (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	52	26FEB19	19DEC19	0.2109	0.0080	3.8
6097	20	26FEB19	01OCT19	0.3580	0.0092	2.6
6098	42	26FEB19	19DEC19	0.4943	0.0198	4.0
7019	11	14JAN20	27FEB20	0.2024	0.0080	4.0
7020	16	14JAN20	20MAR20	0.3428	0.0162	4.7
7021	16	14JAN20	20MAR20	0.4836	0.0232	4.8



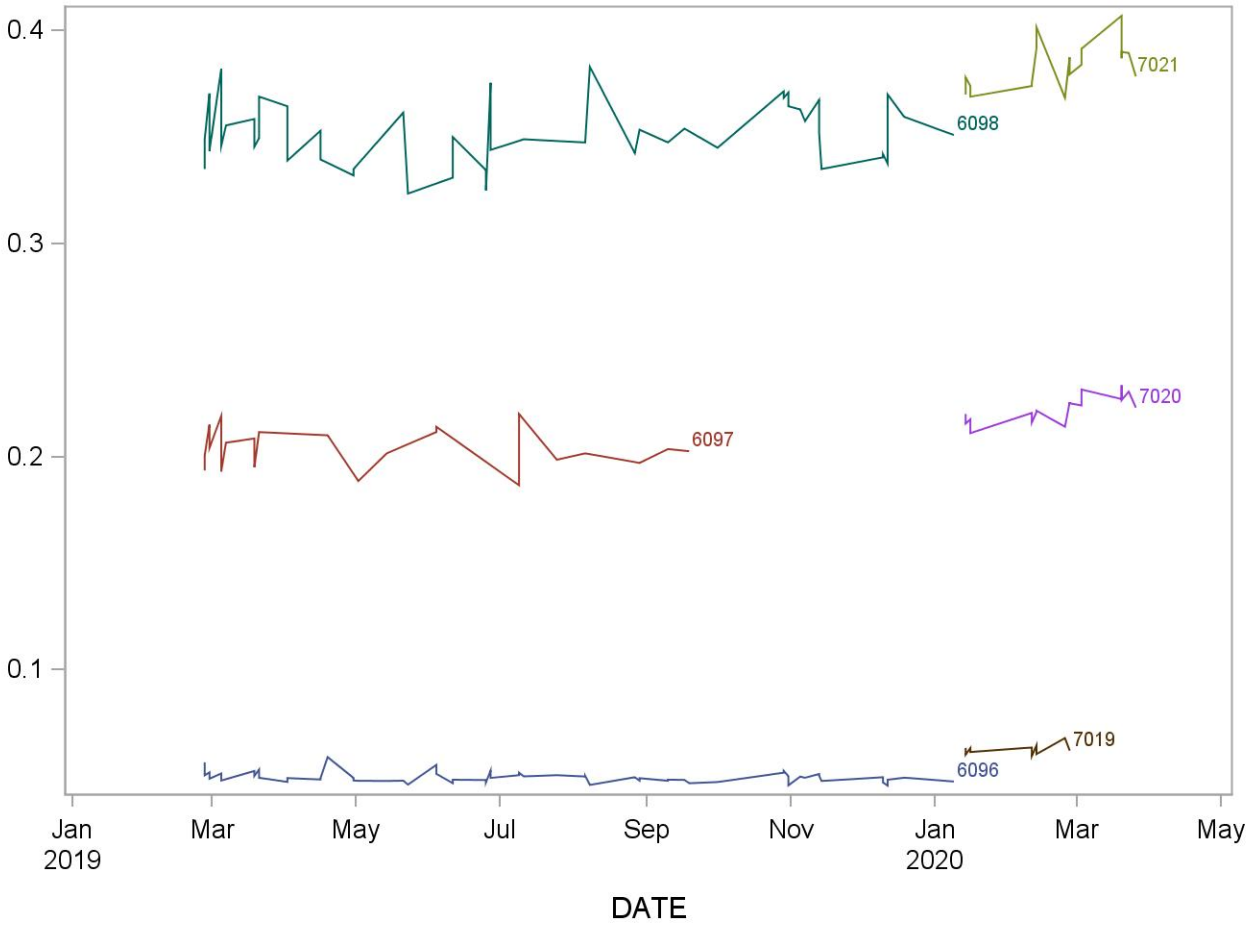
2019-2020 Summary Statistics and QC Chart
LBXVEA (Blood Ethyl Acetate (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	58	26FEB19	19DEC19	0.7391	0.0630	8.5
6097	21	26FEB19	19SEP19	2.3050	0.1091	4.7
6098	47	26FEB19	19DEC19	3.9344	0.2375	6.0
7019	10	14JAN20	27FEB20	0.1989	0.0259	13.0
7020	17	14JAN20	23MAR20	0.6029	0.0647	10.7
7021	17	14JAN20	23MAR20	1.1761	0.1166	9.9



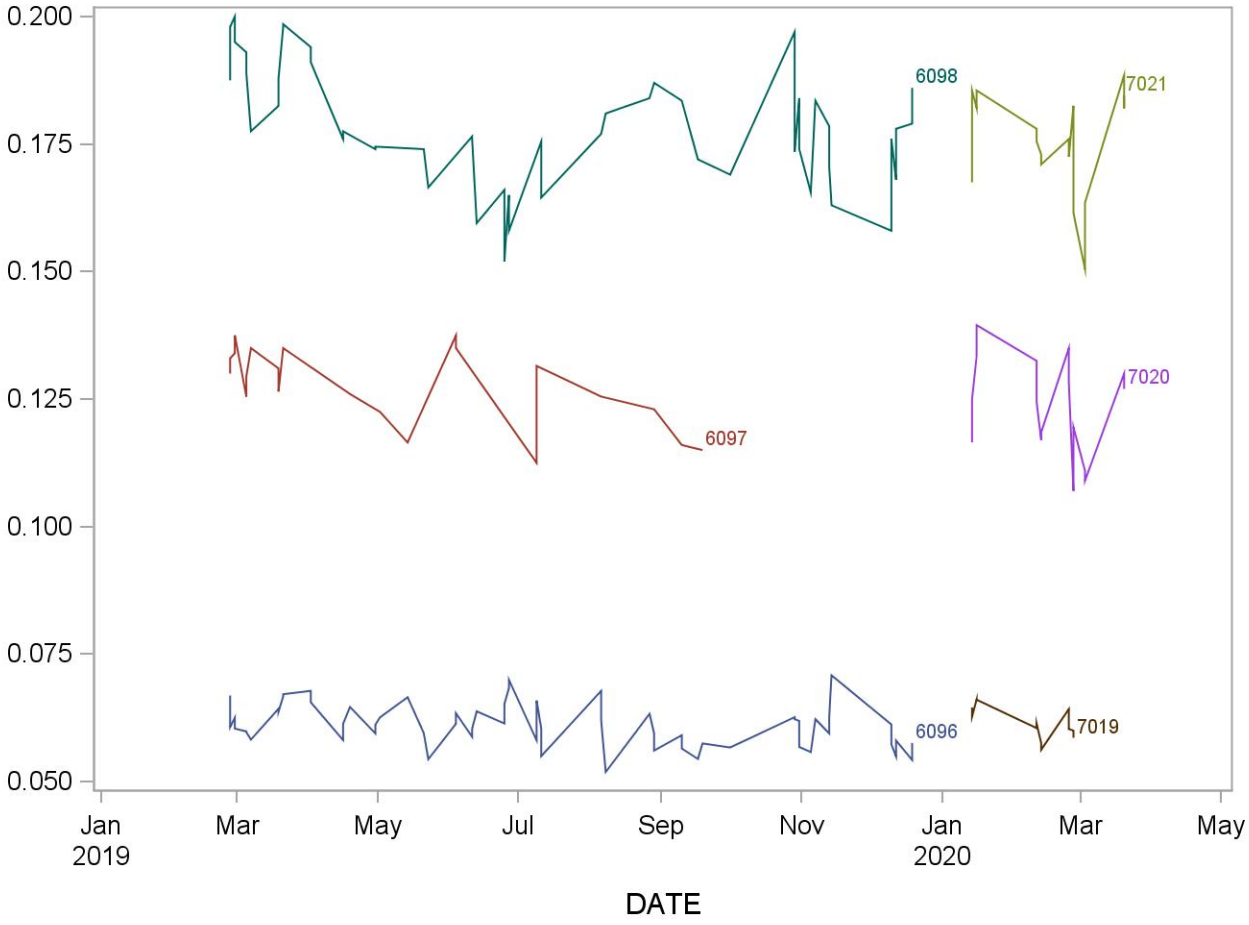
2019-2020 Summary Statistics and QC Chart
LBXVEB (Blood Ethylbenzene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	60	26FEB19	09JAN20	0.0493	0.0025	5.1
6097	22	26FEB19	19SEP19	0.2037	0.0094	4.6
6098	48	26FEB19	09JAN20	0.3518	0.0146	4.2
7019	10	14JAN20	27FEB20	0.0625	0.0025	4.0
7020	18	14JAN20	26MAR20	0.2224	0.0062	2.8
7021	18	14JAN20	26MAR20	0.3832	0.0110	2.9



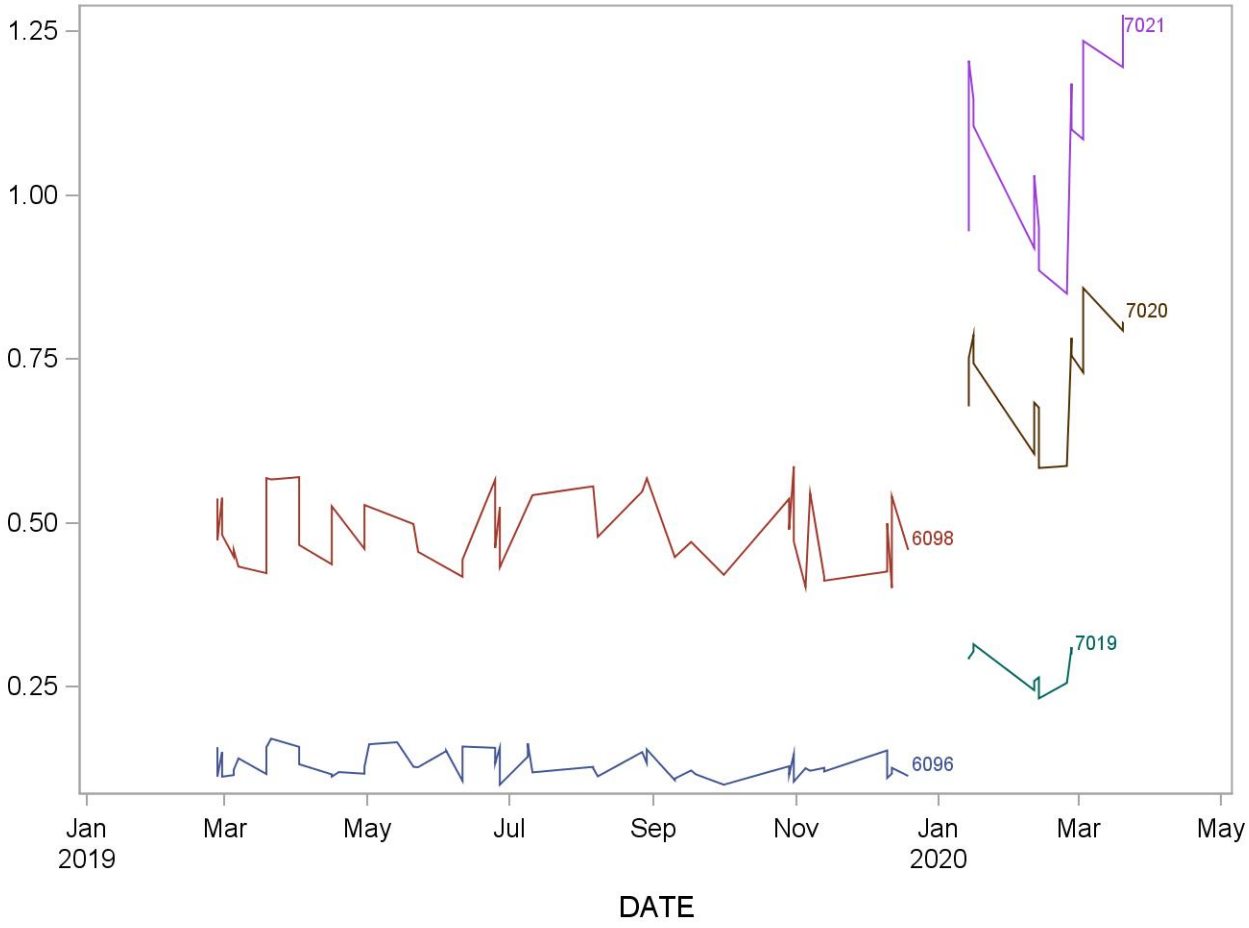
2019-2020 Summary Statistics and QC Chart
LBXVFN (Blood Furan (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	61	26FEB19	19DEC19	0.0611	0.0042	6.9
6097	21	26FEB19	19SEP19	0.1275	0.0077	6.0
6098	50	26FEB19	19DEC19	0.1783	0.0118	6.6
7019	12	14JAN20	27FEB20	0.0615	0.0033	5.3
7020	17	14JAN20	20MAR20	0.1236	0.0095	7.7
7021	17	14JAN20	20MAR20	0.1753	0.0102	5.8



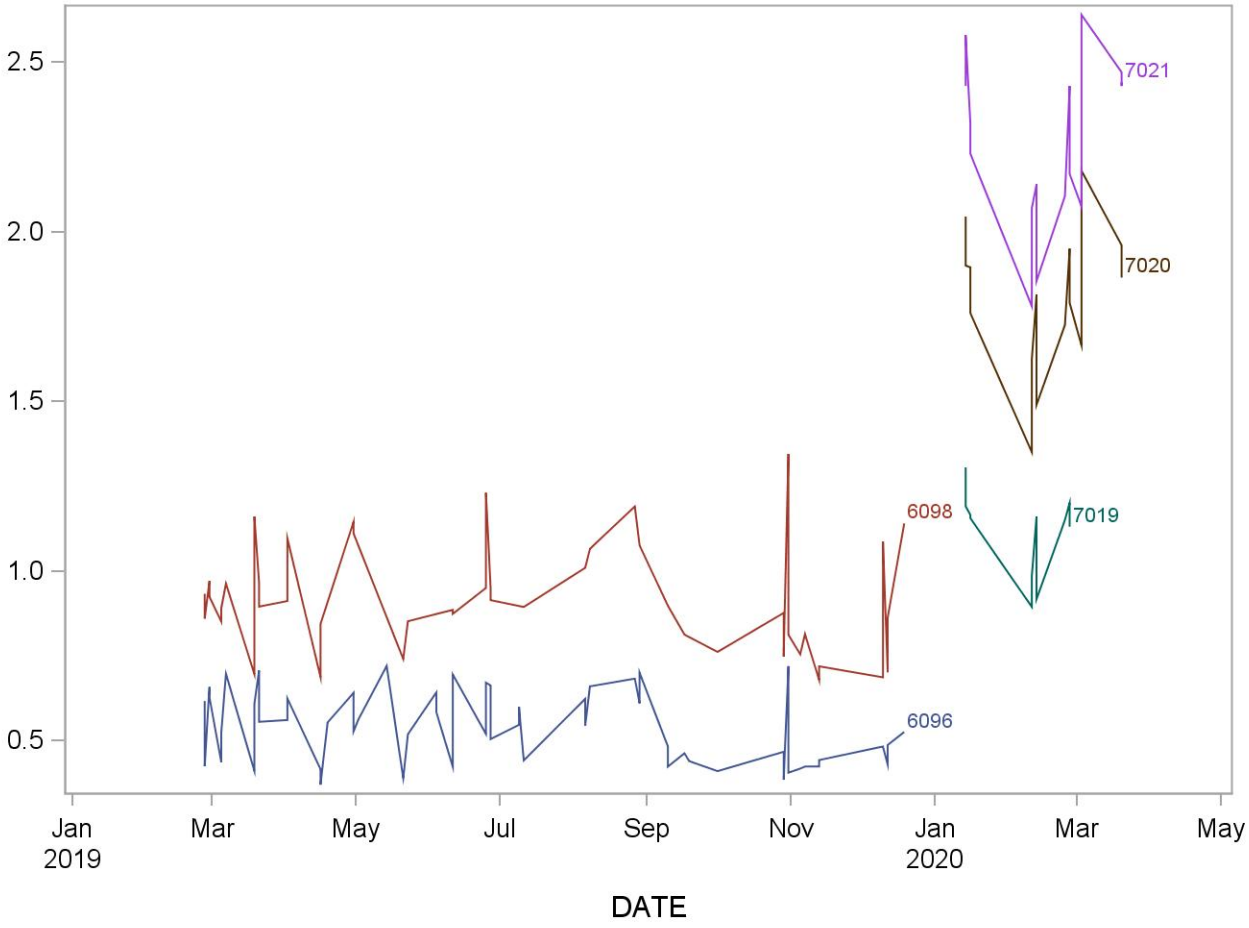
2019-2020 Summary Statistics and QC Chart
LBXV07 (Blood Heptane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.1308	0.0194	14.8
6098	45	26FEB19	19DEC19	0.4871	0.0550	11.3
7019	11	14JAN20	27FEB20	0.2788	0.0286	10.3
7020	16	14JAN20	20MAR20	0.7263	0.0835	11.5
7021	16	14JAN20	20MAR20	1.0830	0.1373	12.7



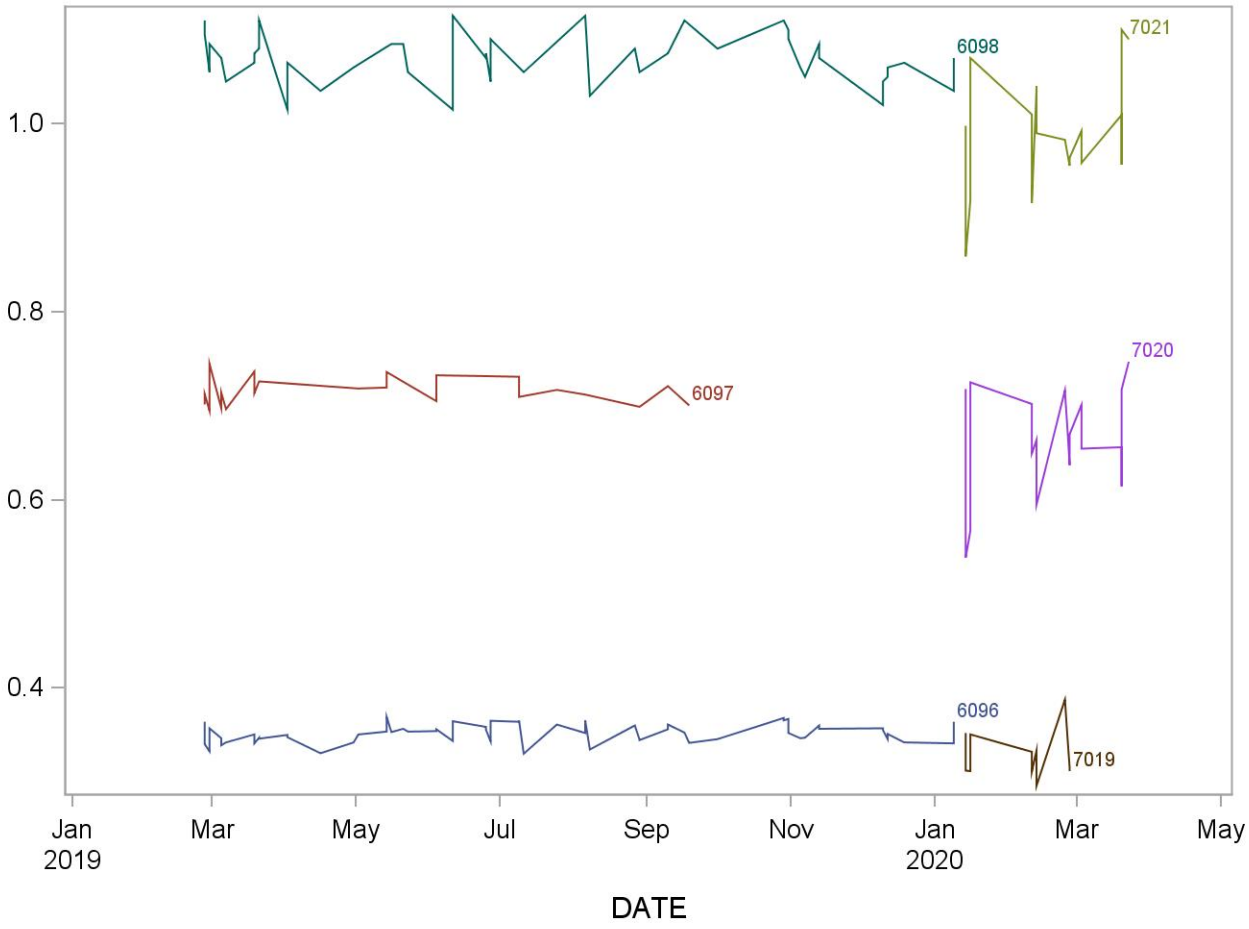
2019-2020 Summary Statistics and QC Chart
LBXV06 (Blood Hexane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	57	26FEB19	19DEC19	0.5357	0.1049	19.6
6098	46	26FEB19	19DEC19	0.9176	0.1598	17.4
7019	11	14JAN20	27FEB20	1.1137	0.1271	11.4
7020	16	14JAN20	20MAR20	1.8053	0.2058	11.4
7021	16	14JAN20	20MAR20	2.2603	0.2484	11.0



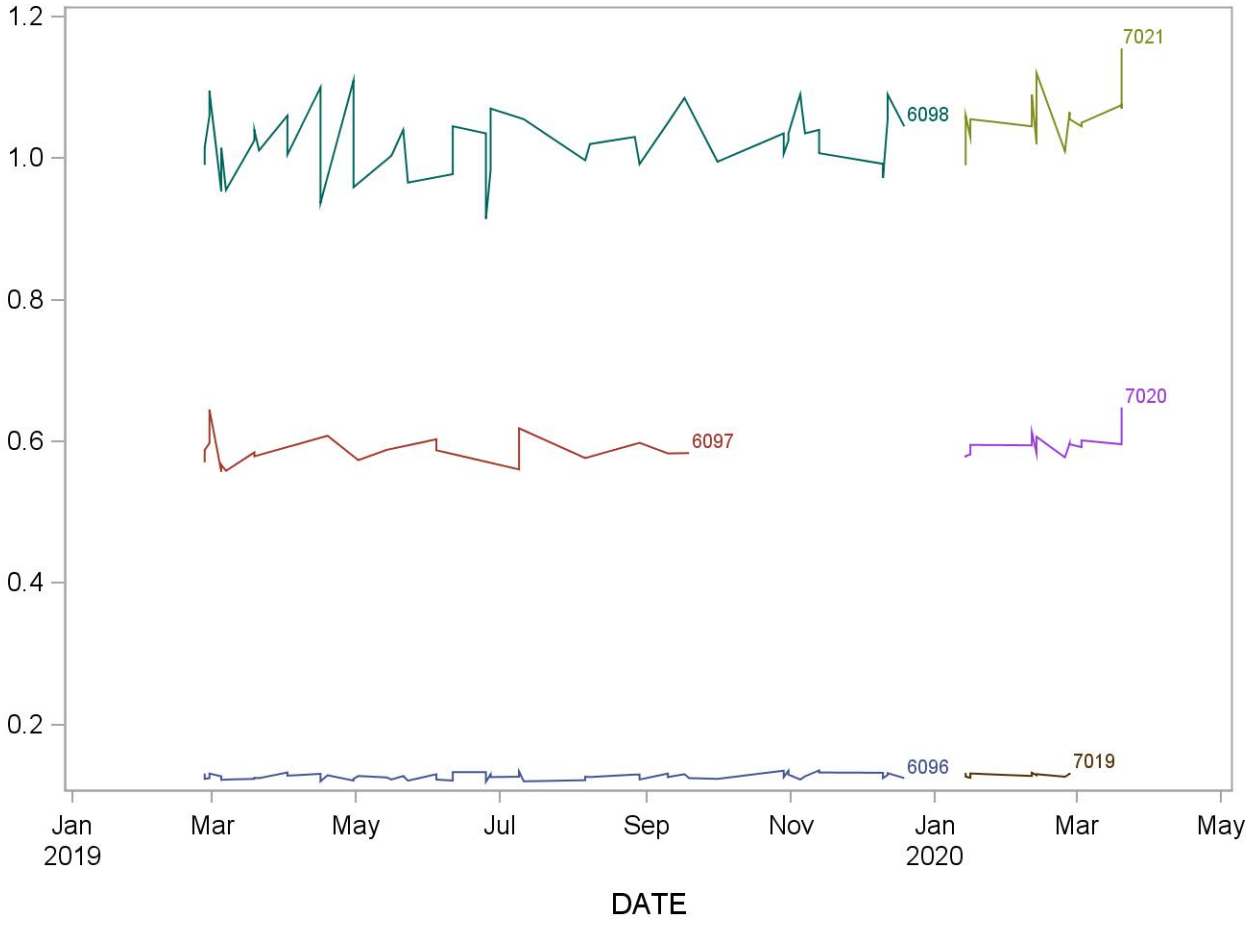
2019-2020 Summary Statistics and QC Chart
LBXVIB (Blood Isobutyronitrile (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	60	26FEB19	09JAN20	0.3515	0.0099	2.8
6097	22	26FEB19	19SEP19	0.7154	0.0145	2.0
6098	48	26FEB19	09JAN20	1.0698	0.0262	2.5
7019	11	14JAN20	27FEB20	0.3284	0.0264	8.0
7020	17	14JAN20	23MAR20	0.6631	0.0589	8.9
7021	17	14JAN20	23MAR20	0.9889	0.0630	6.4



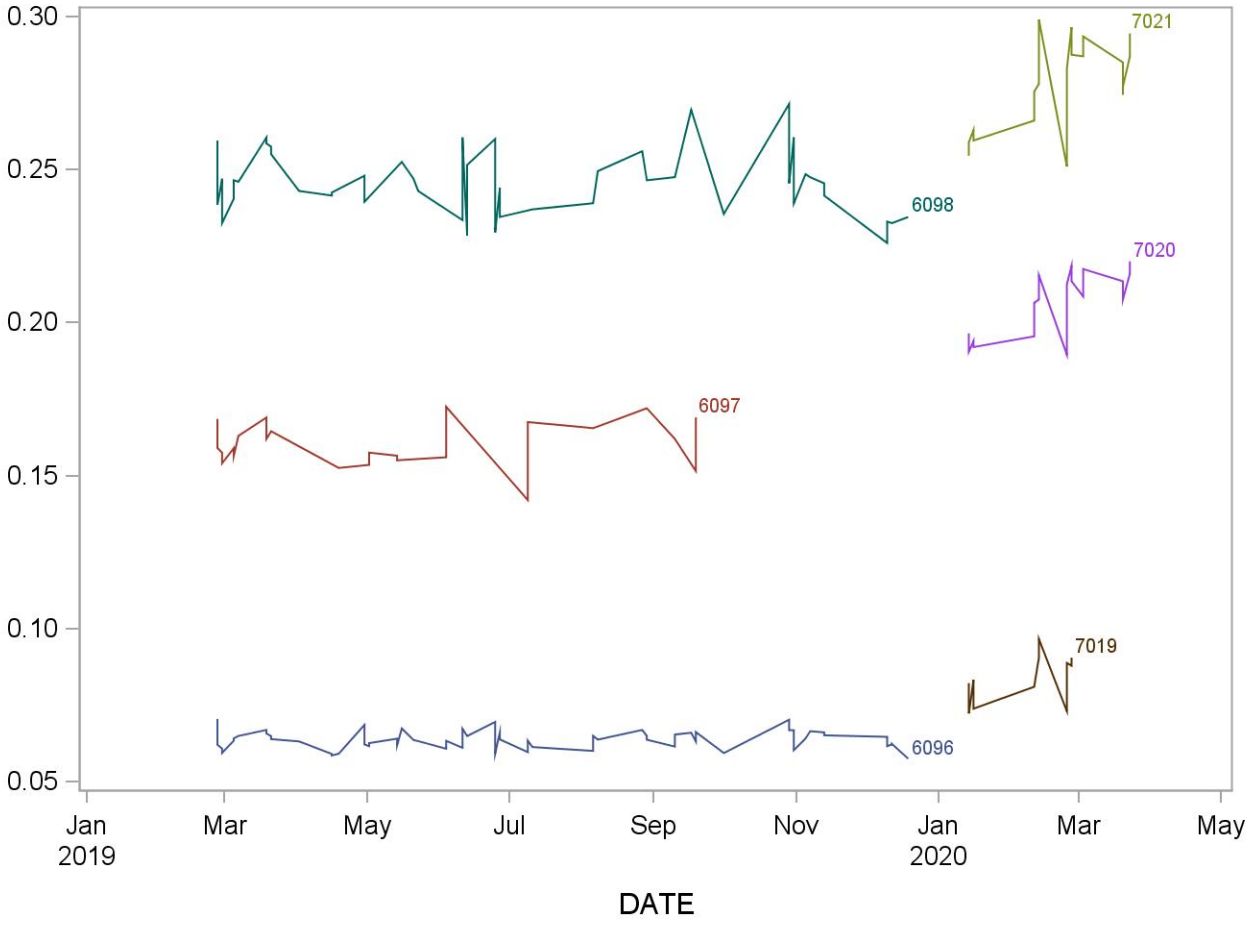
2019-2020 Summary Statistics and QC Chart
LBXVIP (Blood Isopropylbenzene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	57	26FEB19	19DEC19	0.1269	0.0043	3.4
6097	20	26FEB19	19SEP19	0.5864	0.0214	3.7
6098	46	26FEB19	19DEC19	1.0221	0.0447	4.4
7019	11	14JAN20	27FEB20	0.1292	0.0025	2.0
7020	16	14JAN20	20MAR20	0.5963	0.0174	2.9
7021	16	14JAN20	20MAR20	1.0584	0.0403	3.8



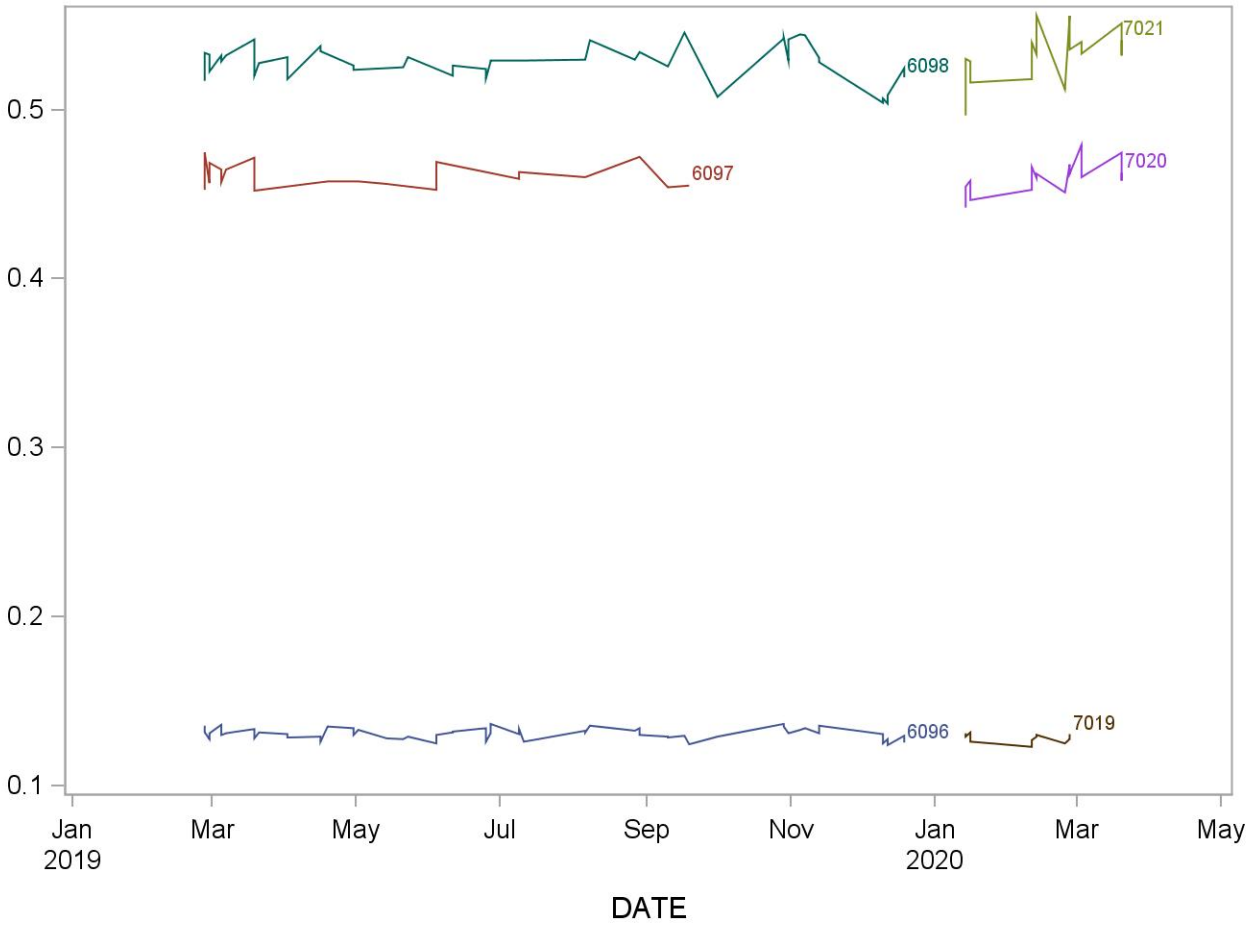
2019-2020 Summary Statistics and QC Chart
LBXVME (Blood MTBE (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	61	26FEB19	19DEC19	0.0636	0.0030	4.7
6097	24	26FEB19	19SEP19	0.1603	0.0074	4.6
6098	48	26FEB19	19DEC19	0.2454	0.0107	4.4
7019	12	14JAN20	27FEB20	0.0834	0.0077	9.3
7020	19	14JAN20	23MAR20	0.2065	0.0103	5.0
7021	19	14JAN20	23MAR20	0.2774	0.0149	5.4



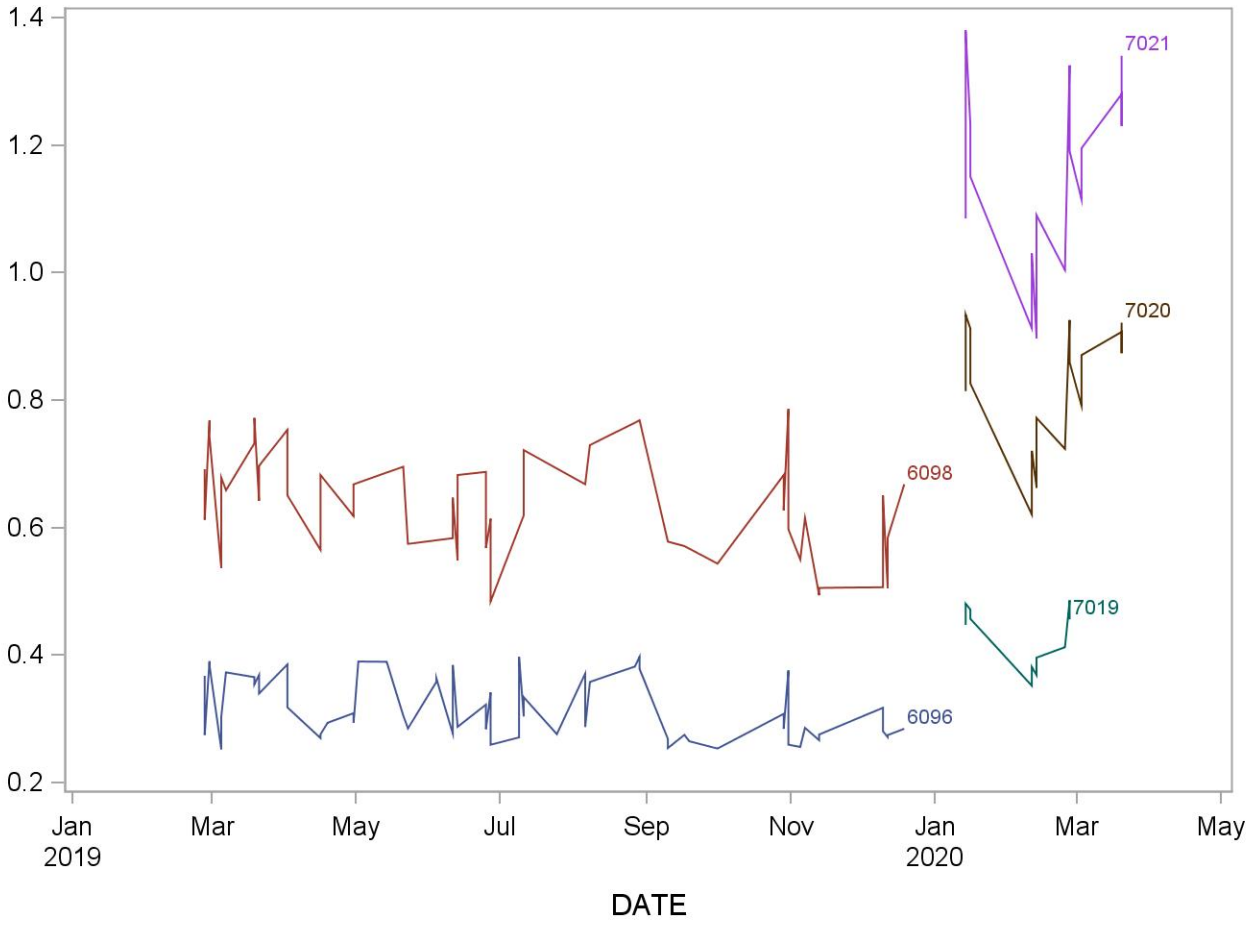
2019-2020 Summary Statistics and QC Chart
LBXVMK (Blood Methyl Isobutyl Ketone (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	57	26FEB19	19DEC19	0.1307	0.0033	2.5
6097	20	26FEB19	19SEP19	0.4609	0.0071	1.5
6098	46	26FEB19	19DEC19	0.5276	0.0107	2.0
7019	11	14JAN20	27FEB20	0.1281	0.0027	2.1
7020	16	14JAN20	20MAR20	0.4597	0.0095	2.1
7021	16	14JAN20	20MAR20	0.5323	0.0159	3.0



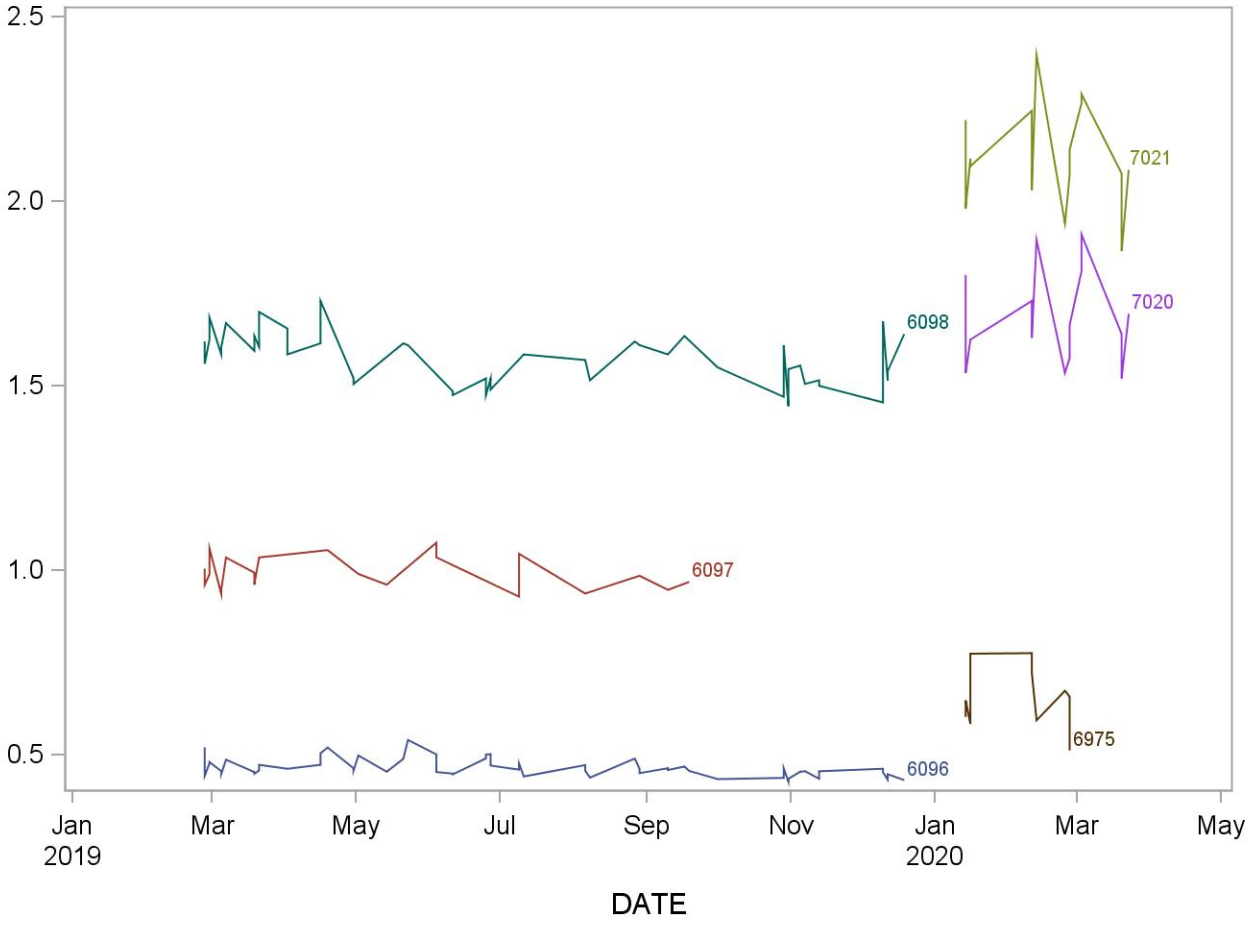
2019-2020 Summary Statistics and QC Chart
LBXVMP (Blood Methylcyclopentane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	60	26FEB19	19DEC19	0.3164	0.0478	15.1
6098	49	26FEB19	19DEC19	0.6386	0.0824	12.9
7019	11	14JAN20	27FEB20	0.4281	0.0477	11.1
7020	16	14JAN20	20MAR20	0.8208	0.0981	12.0
7021	16	14JAN20	20MAR20	1.1533	0.1456	12.6



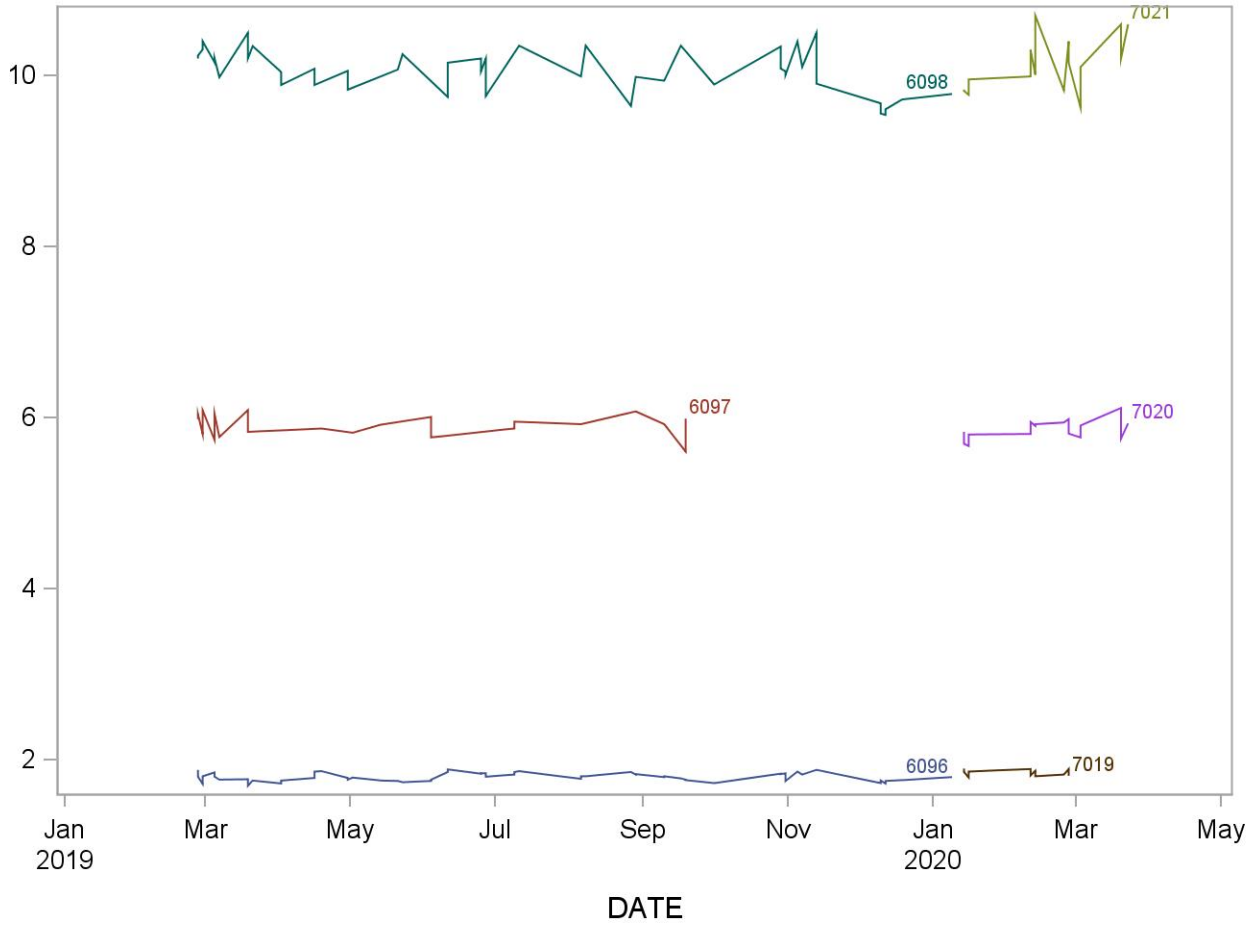
2019-2020 Summary Statistics and QC Chart
LBXVMC (Blood Methylene Chloride (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	57	26FEB19	19DEC19	0.4657	0.0243	5.2
6097	21	26FEB19	19SEP19	0.9932	0.0455	4.6
6098	46	26FEB19	19DEC19	1.5723	0.0700	4.5
6975	10	14JAN20	27FEB20	0.6547	0.0853	13.0
7020	16	14JAN20	23MAR20	1.6703	0.1269	7.6
7021	16	14JAN20	23MAR20	2.1081	0.1463	6.9



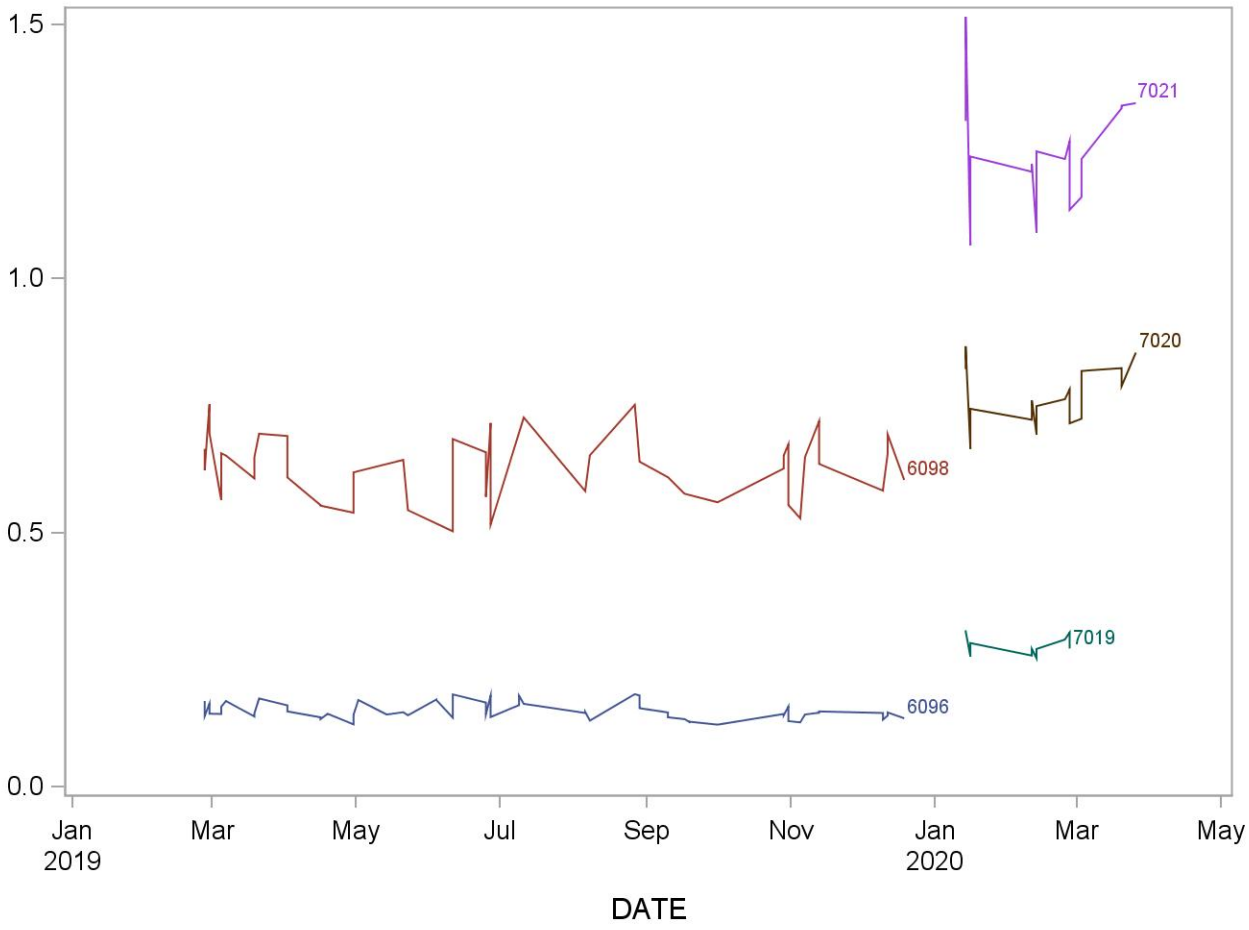
2019-2020 Summary Statistics and QC Chart
LBXVNB (Blood Nitrobenzene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	58	26FEB19	09JAN20	1.7923	0.0495	2.8
6097	21	26FEB19	19SEP19	5.9074	0.1297	2.2
6098	46	26FEB19	09JAN20	10.0546	0.2538	2.5
7019	11	14JAN20	27FEB20	1.8409	0.0383	2.1
7020	17	14JAN20	23MAR20	5.8606	0.1122	1.9
7021	17	14JAN20	23MAR20	10.1256	0.3173	3.1



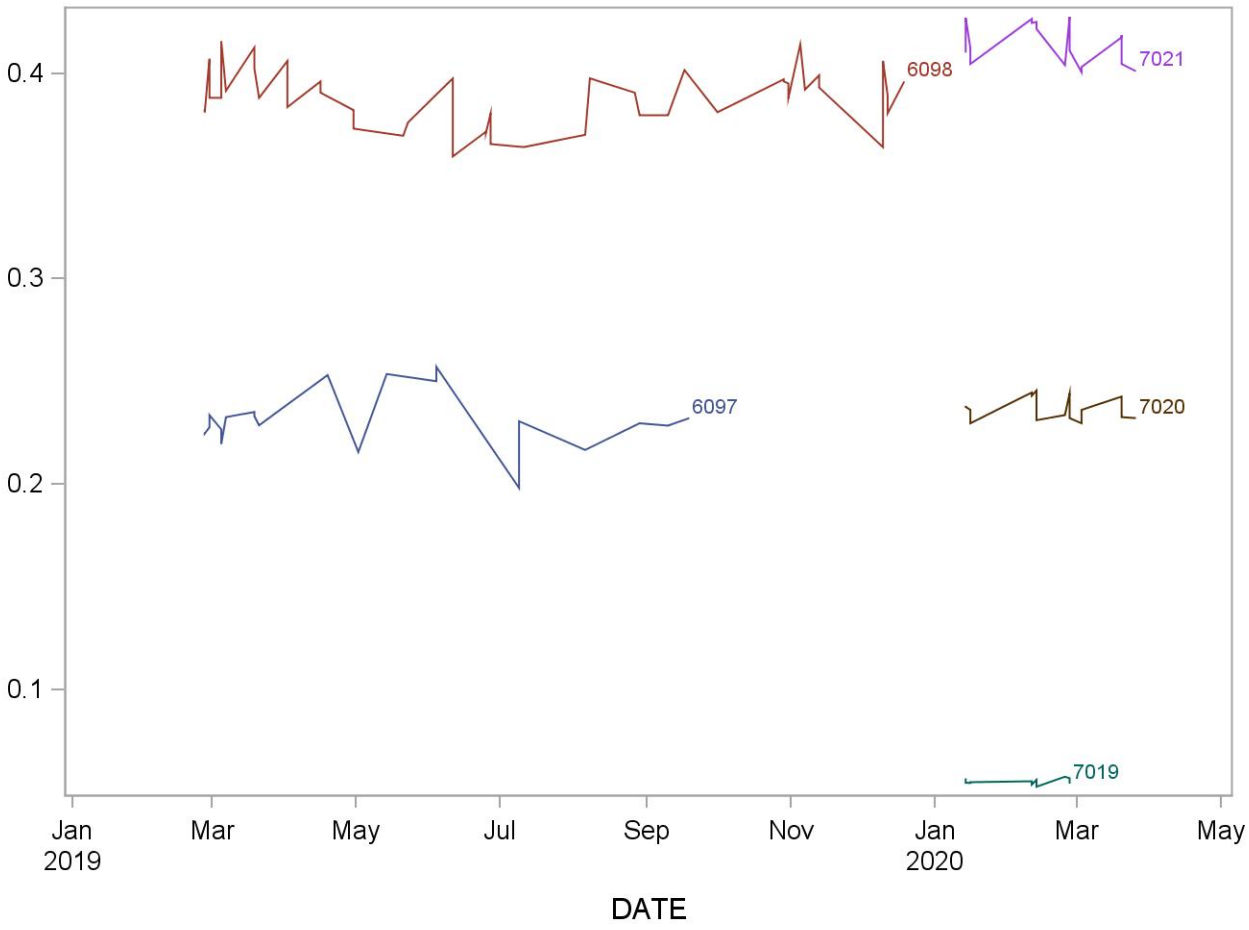
2019-2020 Summary Statistics and QC Chart
LBXV08 (Blood Octane (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	57	26FEB19	19DEC19	0.1486	0.0163	11.0
6098	45	26FEB19	19DEC19	0.6268	0.0636	10.1
7019	11	14JAN20	27FEB20	0.2790	0.0202	7.2
7020	17	14JAN20	26MAR20	0.7702	0.0569	7.4
7021	17	14JAN20	26MAR20	1.2529	0.1091	8.7



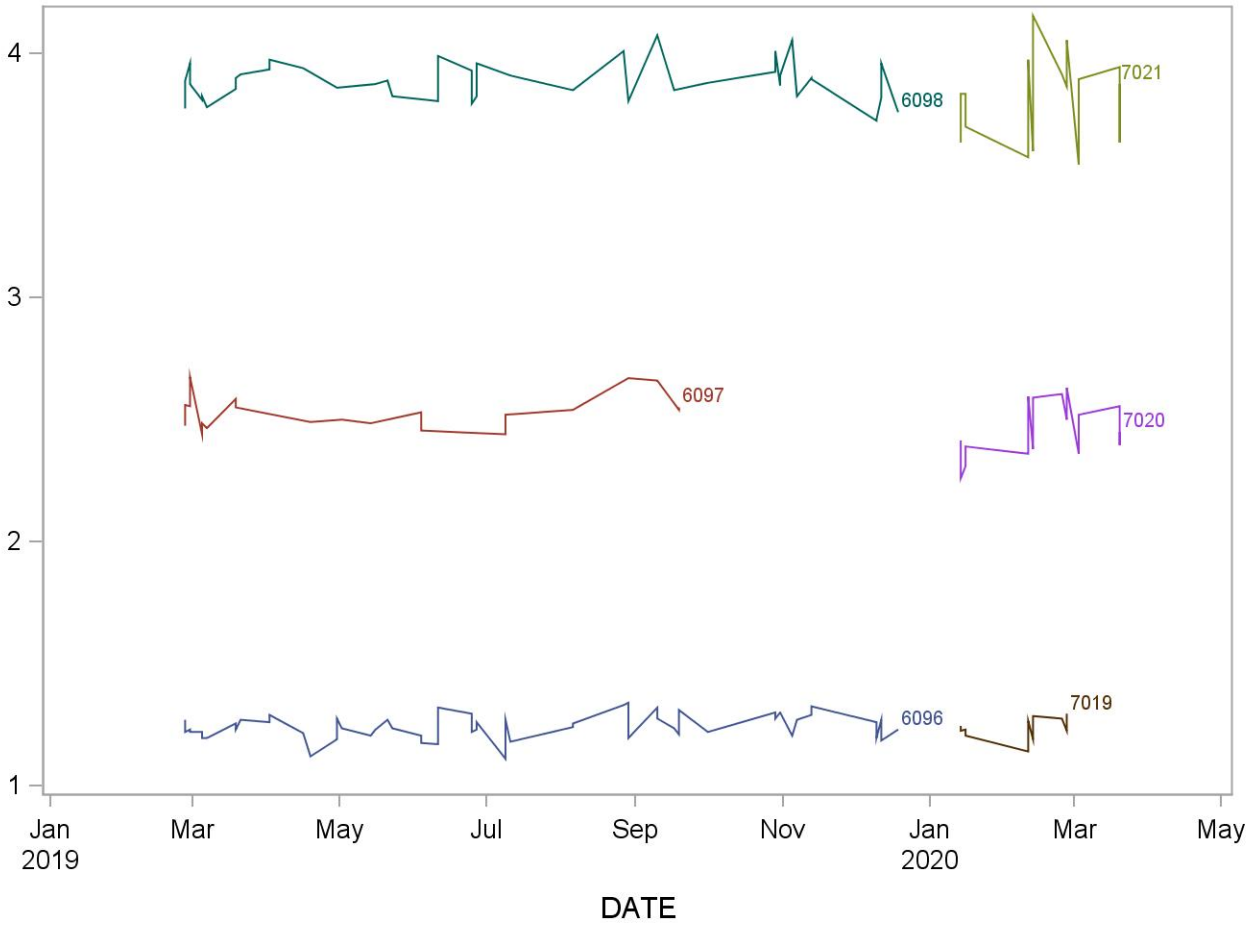
2019-2020 Summary Statistics and QC Chart
LBXV4C (Blood Tetrachloroethene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6097	21	26FEB19	19SEP19	0.2309	0.0139	6.0
6098	45	26FEB19	19DEC19	0.3878	0.0140	3.6
7019	11	14JAN20	27FEB20	0.0550	0.0015	2.7
7020	17	14JAN20	26MAR20	0.2368	0.0055	2.3
7021	17	14JAN20	26MAR20	0.4140	0.0100	2.4



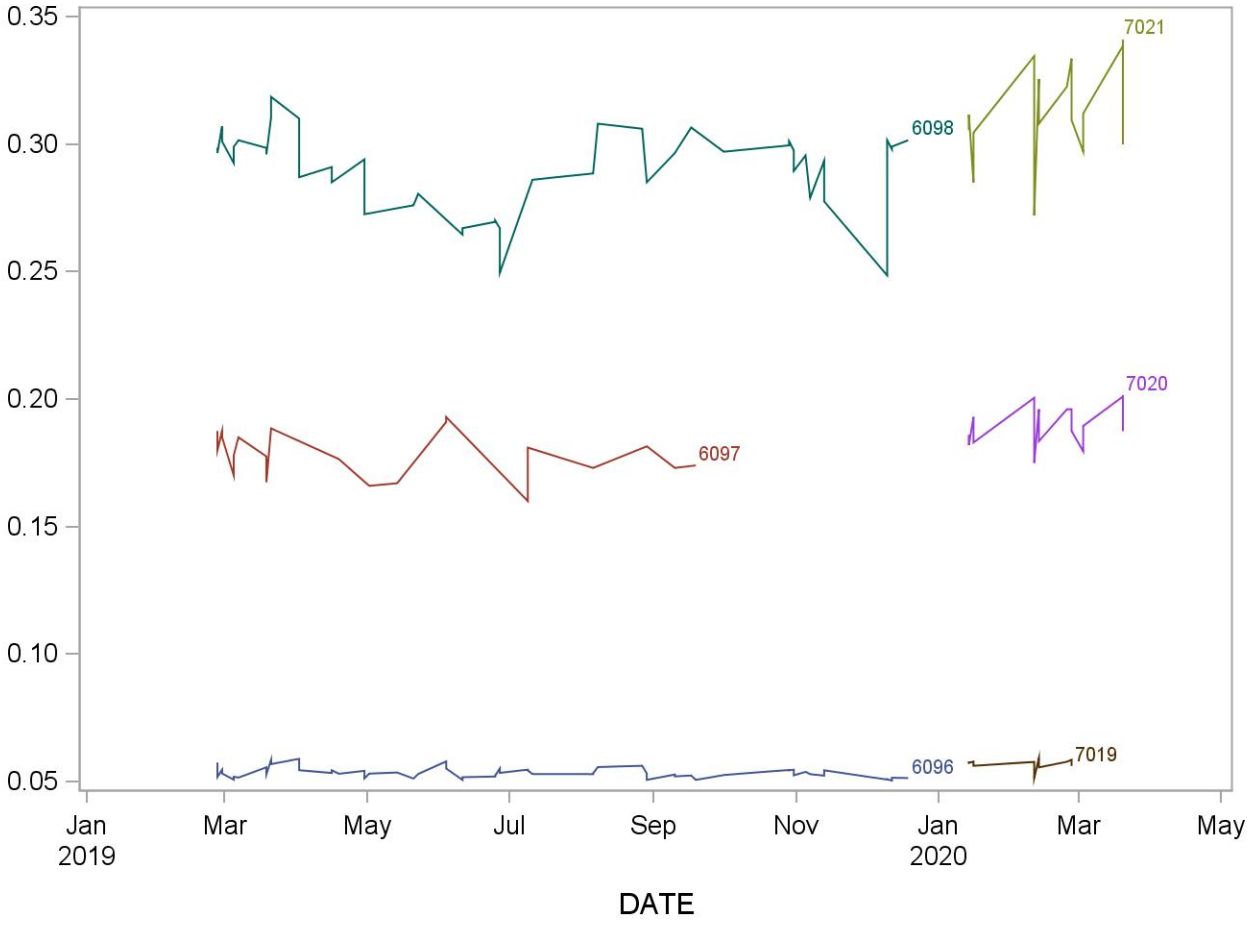
2019-2020 Summary Statistics and QC Chart
LBXVHT (Blood Tetrahydrofuran (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	1.2429	0.0500	4.0
6097	21	26FEB19	19SEP19	2.5319	0.0703	2.8
6098	44	26FEB19	19DEC19	3.8822	0.0810	2.1
7019	11	14JAN20	27FEB20	1.2345	0.0457	3.7
7020	16	14JAN20	20MAR20	2.4572	0.1153	4.7
7021	16	14JAN20	20MAR20	3.8150	0.1814	4.8



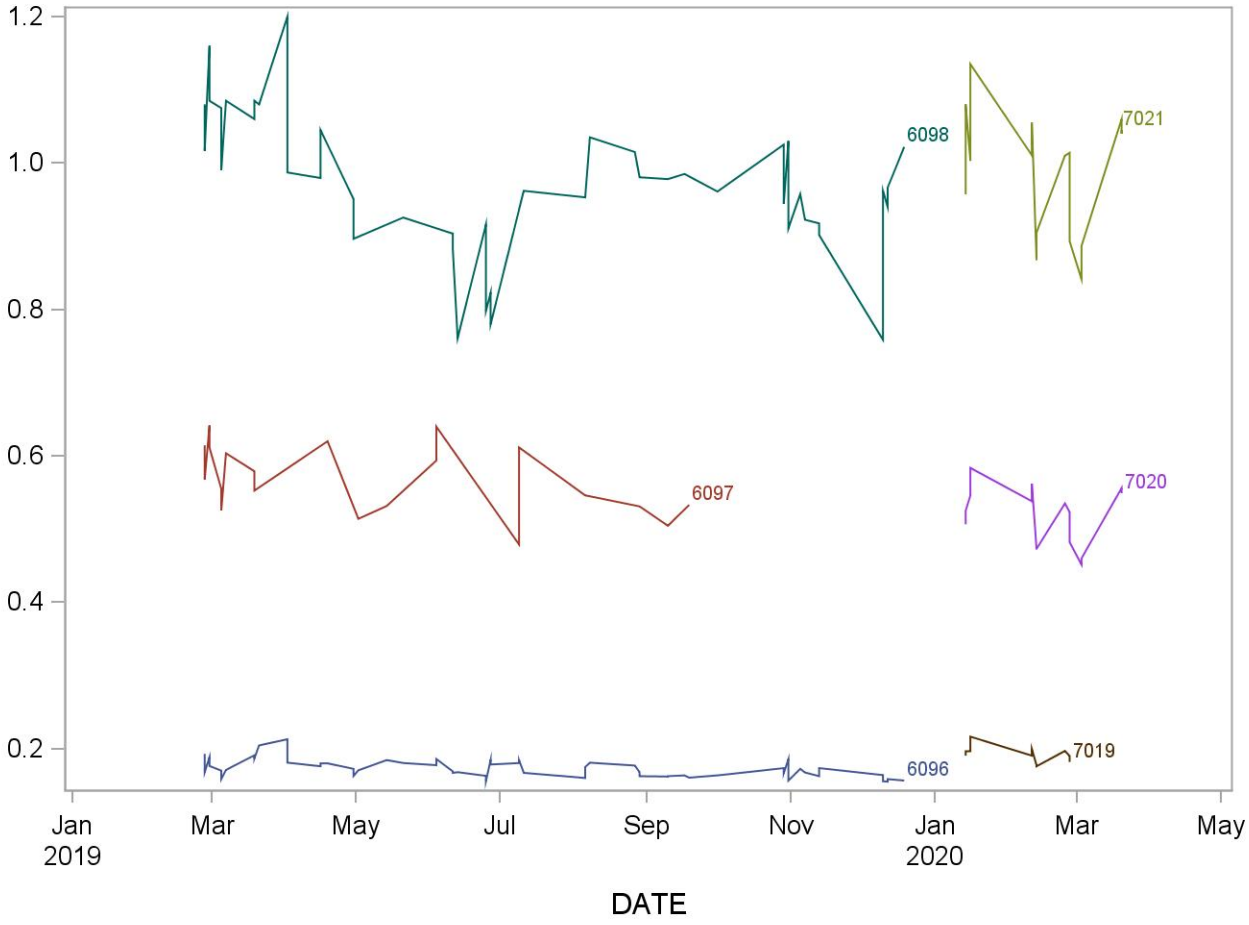
2019-2020 Summary Statistics and QC Chart
LBXVTC (Blood Trichloroethene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	57	26FEB19	19DEC19	0.0534	0.0020	3.8
6097	21	26FEB19	19SEP19	0.1782	0.0091	5.1
6098	46	26FEB19	19DEC19	0.2904	0.0156	5.4
7019	11	14JAN20	27FEB20	0.0569	0.0021	3.7
7020	16	14JAN20	20MAR20	0.1898	0.0082	4.3
7021	16	14JAN20	20MAR20	0.3125	0.0194	6.2



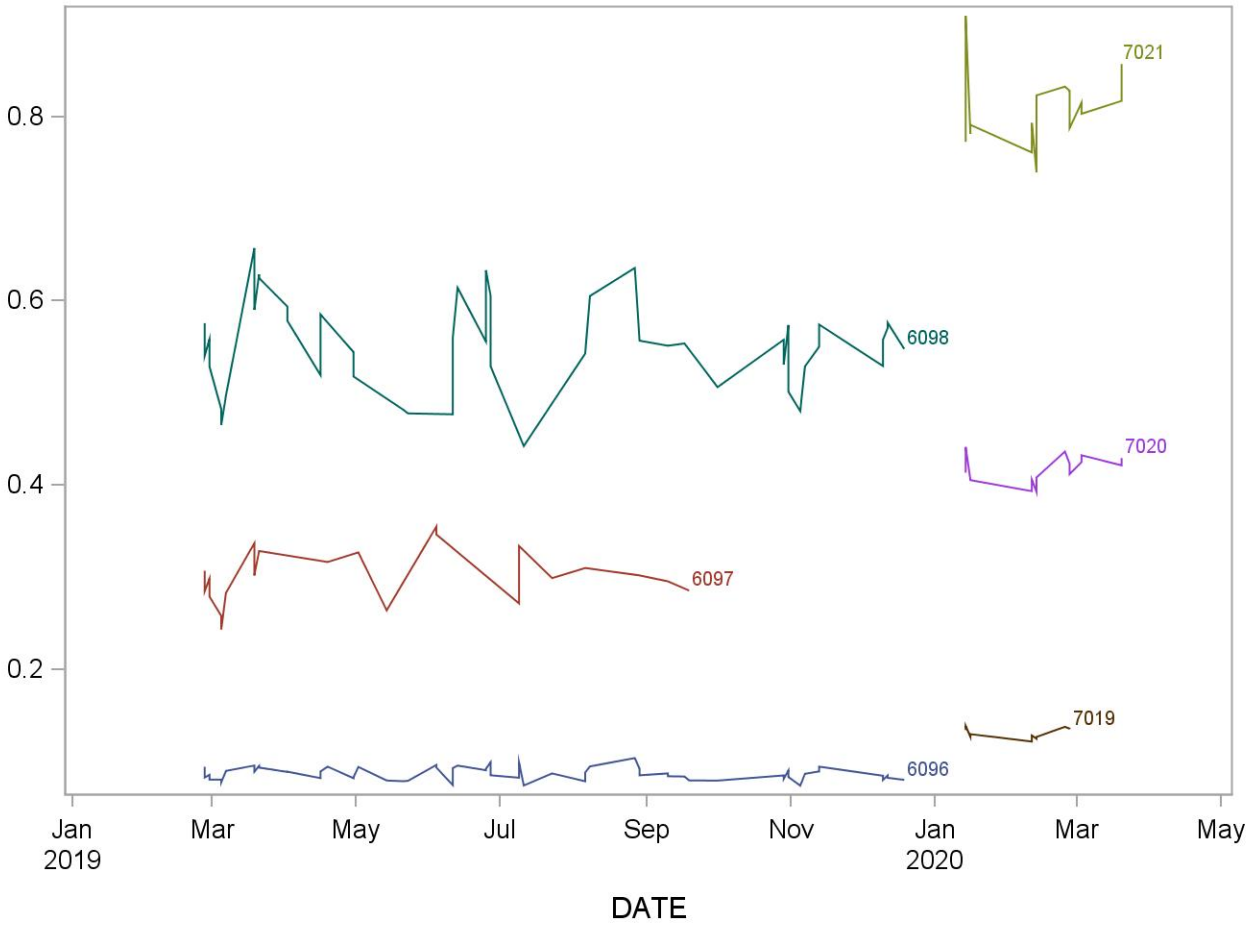
2019-2020 Summary Statistics and QC Chart
LBXVVB (Blood Vinyl Bromide (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.1728	0.0123	7.1
6097	20	26FEB19	19SEP19	0.5678	0.0474	8.4
6098	45	26FEB19	19DEC19	0.9709	0.0966	10.0
7019	11	14JAN20	27FEB20	0.1920	0.0114	5.9
7020	16	14JAN20	20MAR20	0.5198	0.0406	7.8
7021	16	14JAN20	20MAR20	0.9877	0.0859	8.7



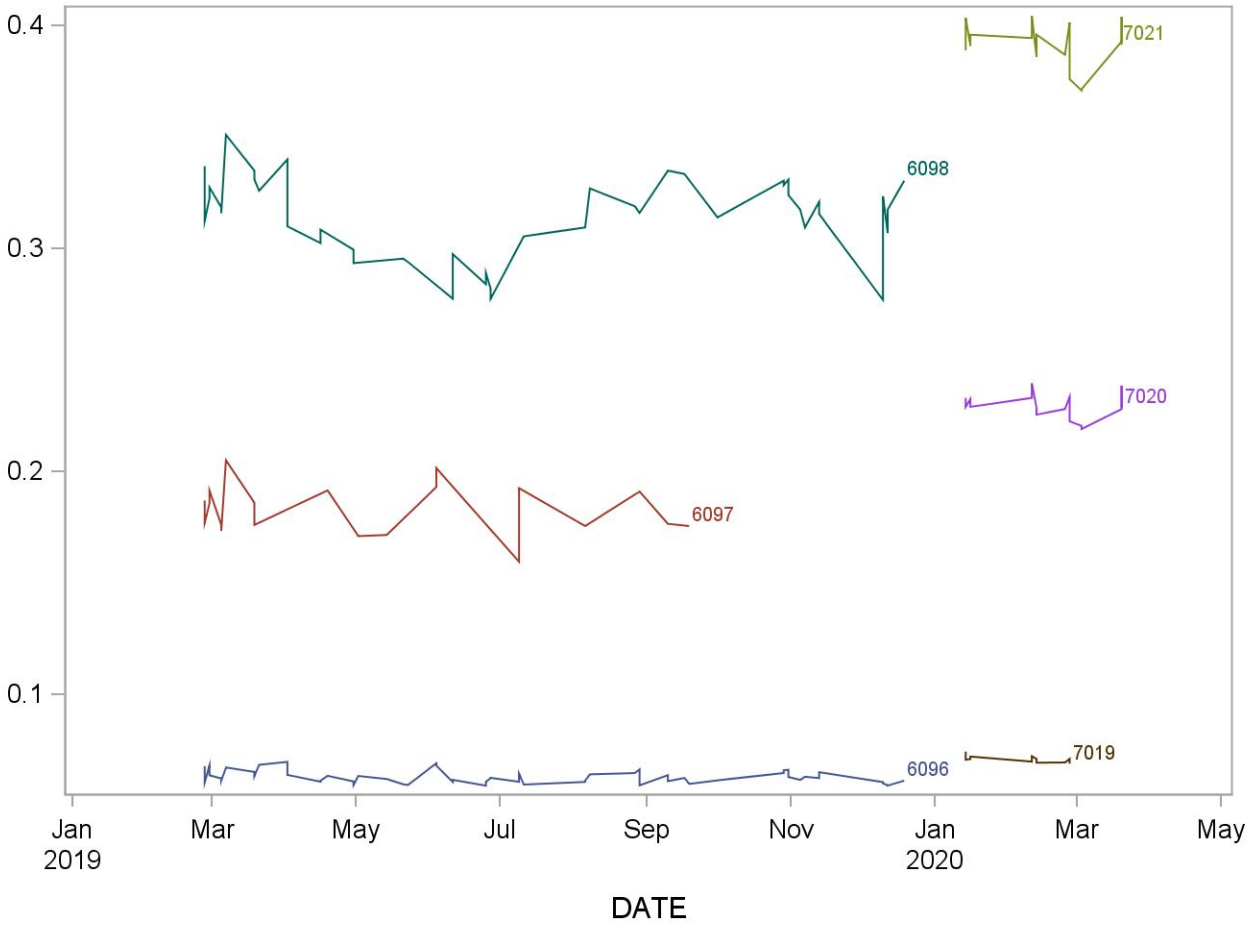
2019-2020 Summary Statistics and QC Chart
LBXVAPN (Blood a-pinene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	59	26FEB19	19DEC19	0.0860	0.0069	8.0
6097	22	26FEB19	19SEP19	0.3008	0.0292	9.7
6098	47	26FEB19	19DEC19	0.5507	0.0492	8.9
7019	11	14JAN20	27FEB20	0.1301	0.0057	4.4
7020	16	14JAN20	20MAR20	0.4165	0.0146	3.5
7021	16	14JAN20	20MAR20	0.8093	0.0406	5.0



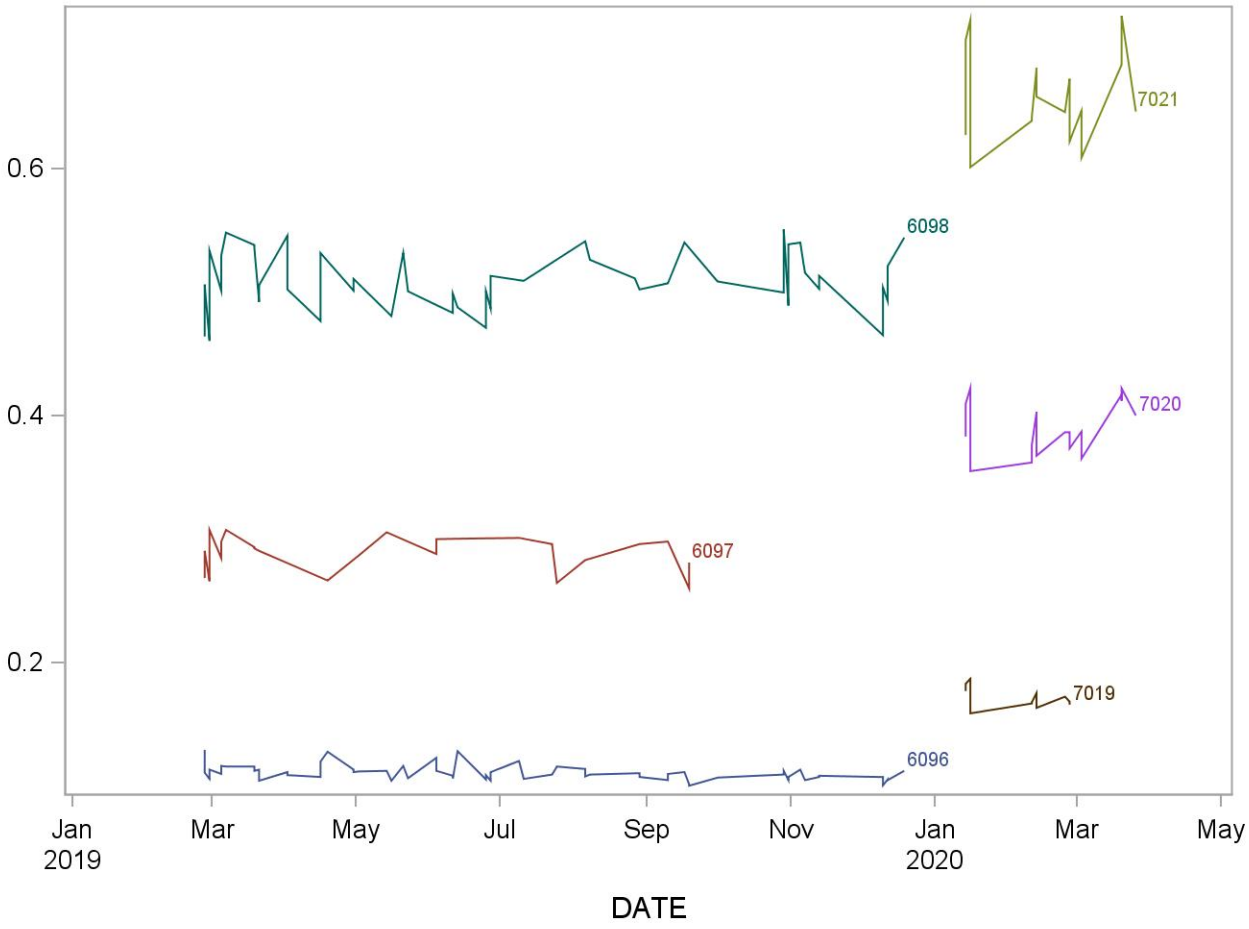
2019-2020 Summary Statistics and QC Chart
LBXVFT (Blood aaa-Trifluorotoluene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	56	26FEB19	19DEC19	0.0628	0.0028	4.5
6097	20	26FEB19	19SEP19	0.1828	0.0114	6.2
6098	45	26FEB19	19DEC19	0.3138	0.0182	5.8
7019	11	14JAN20	27FEB20	0.0709	0.0016	2.2
7020	16	14JAN20	20MAR20	0.2293	0.0057	2.5
7021	16	14JAN20	20MAR20	0.3910	0.0108	2.8



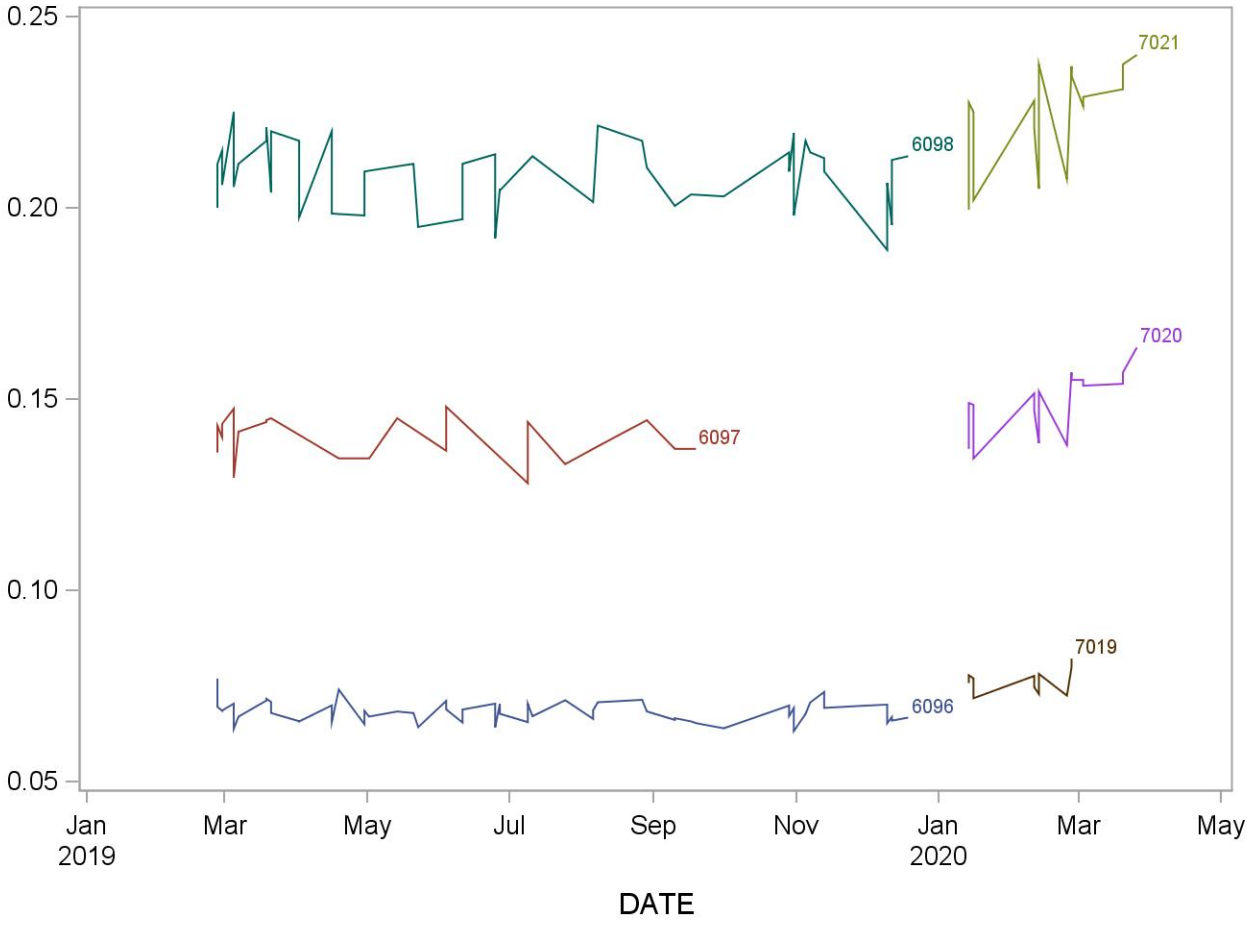
2019-2020 Summary Statistics and QC Chart
LBXVXY (Blood m-/p-Xylene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	61	26FEB19	19DEC19	0.11081	0.00616	5.6
6097	23	26FEB19	19SEP19	0.28804	0.01434	5.0
6098	48	26FEB19	19DEC19	0.50941	0.02378	4.7
7019	11	14JAN20	27FEB20	0.17155	0.00844	4.9
7020	17	14JAN20	26MAR20	0.38991	0.02182	5.6
7021	17	14JAN20	26MAR20	0.65929	0.03674	5.6



2019-2020 Summary Statistics and QC Chart
LBXVOX (Blood o-Xylene (ng/mL))

Lot	N	Start Date	End Date	Mean	Standard Deviation	Coefficient of Variation
6096	58	26FEB19	19DEC19	0.0682	0.0027	4.0
6097	22	26FEB19	19SEP19	0.1397	0.0057	4.1
6098	46	26FEB19	19DEC19	0.2085	0.0088	4.2
7019	11	14JAN20	27FEB20	0.0764	0.0032	4.2
7020	17	14JAN20	26MAR20	0.1498	0.0082	5.5
7021	17	14JAN20	26MAR20	0.2248	0.0132	5.9



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Appendix A: Method Performance Documentation

Method performance documentation for this method including accuracy, precision, specificity, and stability is provided in this section. The signatures of the Branch Chief and Director of the Division of the Laboratory Sciences on the first page of this procedure denote that the method performance is fit for the intended use of the method.

Table C1: Accuracy using spike recovery

Spiked recovery experiments were performed in bovine serum that was outgassed to minimize baseline VOC levels. The ISTD was added to the methanol spiking solution (upstream) to compensate for surface adsorption loss as VOCs are relatively nonpolar compounds and adhere to surfaces. A 40-µL positive displacement pipet was used to ensure accurate aliquoting, where different concentration levels were made using multiple aliquots of the 40-µL increment. Spiking solution was taken from same intermediate level ampule as used for the standard set. Results from these experiments can be found in run N17346 and N17348, as denoted in column headers. Dilution factor specifies relative amount of ISTD spiked in spike recovery samples vs. the calibrators.

For highly nonpolar analytes (n-hexane, n-heptane, methylcyclopentane, and cyclohexane), blood with low levels of these compounds was used for simultaneous direct spiking of native and ISTD. However due to limitations in obtaining suitable blood specimen quantity, analysis was performed in duplicate and sample A and B are from the same donor. In addition, ethyl acetate was quantified in the blood matrix because baseline levels in serum could not be sufficiently reduced and were low in the obtained blood specimen. Results from these experiments can be found in run N18093, as denoted in column headers.

Accuracy using Spike Recovery

Recovery = (final concentration – initial concentration)/added concentration
Recovery are to be 85-115% except at 3*LOD where can be 80-120%

Method name: Volatile Organic Compounds in Blood
Method #: 2100
Matrix: Whole Blood
Units: ng/mL
Analyte: **VCE**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Serum Sample 0	1	0	0.014		0.026		0.013		0	0.054		0.023		0.035	
	2		0.001		0.017					0.045		0.019			
	3		0.004		0.018					0.047		0.019			
Serum + Spike 1 1	1	0.913	0.813	0.961	0.758	0.943	0.815	89.2	0.913	0.840	0.938	0.767	0.966	0.809	88.6
	2		0.836	0.968	0.729	0.907				0.852	0.954	0.759	0.944		
	3		0.838	0.986	0.751	0.932				0.860	0.977	0.768	0.955		
Serum + Spike 2 2	1	1.487	1.359	0.952	1.254	0.931	1.370	92.2	1.487	1.378	0.940	0.967	0.919	1.305	87.8
	2		1.346	0.944	1.190	0.888				1.383	0.949	1.215	0.923		
	3		1.359	0.953	1.311	0.978				1.417	0.978	1.254	0.958		
Serum + Spike 3 3	1	2.974	2.855	0.969	2.425	0.917	2.781	93.5	2.974	2.590	0.902	2.430	0.922	2.705	90.9
	2		2.740	0.935	2.380	0.892				2.789	0.974	2.407	0.930		
	3		2.818	0.965	2.498	0.938				2.764	0.961	2.550	0.976		

Mean recovery (%)	SD (%)
90.4	2.2

Analyte: **VVB**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	-0.001		0.004		0.002		0	0.001		0.004		0.003	
	2		-0.001		0.004					0.001		0.005			
	3		-0.001		0.005					0.000		0.004			
Sample + Spike 1 1	1	0.299	0.261	0.961	0.243	0.943	0.262	87.8	0.299	0.248	0.938	0.240	0.966	0.256	85.7
	2		0.262	0.968	0.233	0.907				0.255	0.954	0.240	0.944		
	3		0.268	0.986	0.239	0.932				0.265	0.977	0.236	0.955		
Sample + Spike 2 2	1	0.492	0.432	0.952	0.391	0.931	0.433	88.0	0.492	0.425	0.940	0.382	0.919	0.431	87.6
	2		0.427	0.944	0.370	0.888				0.429	0.949	0.382	0.923		
	3		0.430	0.953	0.406	0.978				0.442	0.978	0.399	0.958		
Sample + Spike 3 3	1	0.983	0.843	0.969	0.762	0.917	0.857	87.1	0.983	0.807	0.902	0.764	0.922	0.848	86.3
	2		0.834	0.935	0.729	0.892				0.814	0.974	0.771	0.930		
	3		0.866	0.965	0.790	0.938				0.855	0.961	0.808	0.976		

Mean recovery (%)	SD (%)
87.1	0.9

Analyte: VFN

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.015		0.007		0.023		0	0.055		0.074		0.067	
	2		0.018		0.015					0.058		0.088			
	3		0.037		0.045					0.053		0.071			
Sample + Spike 1 1	1	0.415	0.375	0.961	0.366	0.943	0.382	92.0	0.415	0.390	0.938	0.417	0.966	0.353	85.1
	2		0.394	0.968	0.399	0.907				0.399	0.954	0.410	0.944		
	3		0.393	0.986	0.383	0.932				0.390	0.977	0.418	0.955		
Sample + Spike 2 2	1	0.638	0.625	0.952	0.615	0.931	0.633	99.2	0.638	0.612	0.940	0.609	0.919	0.587	92.0
	2		0.614	0.944	0.605	0.888				0.629	0.949	0.614	0.923		
	3		0.613	0.953	0.638	0.978				0.626	0.978	0.635	0.958		
Sample + Spike 3 3	1	1.277	1.155	0.969	1.192	0.917	1.204	94.3	1.277	1.113	0.902	0.990	0.922	1.131	88.5
	2		1.168	0.935	1.099	0.892				1.188	0.974	1.130	0.930		
	3		1.186	0.965	1.094	0.938				1.186	0.961	1.201	0.976		

Mean recovery (%)	SD (%)
91.9	4.8

Analyte: VDEE

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.000		0.001		0.000		0	0.002		0.001		0.002	
	2		0.000		0.000					0.002		0.002			
	3		0.001		0.000					0.002		0.002			
Sample + Spike 1 1	1	0.541	0.479	0.961	0.466	0.943	0.491	90.8	0.541	0.487	0.938	0.490	0.966	0.503	92.9
	2		0.488	0.968	0.434	0.907				0.489	0.954	0.481	0.944		
	3		0.482	0.986	0.451	0.932				0.482	0.977	0.463	0.955		
Sample + Spike 2 2	1	0.842	0.780	0.952	0.748	0.931	0.810	96.2	0.842	0.778	0.940	0.749	0.919	0.824	97.8
	2		0.764	0.944	0.720	0.888				0.814	0.949	0.754	0.923		
	3		0.761	0.953	0.805	0.978				0.809	0.978	0.775	0.958		
Sample + Spike 3 3	1	1.684	1.523	0.969	1.500	0.917	1.608	95.5	1.684	1.466	0.902	1.454	0.922	1.615	95.9
	2		1.505	0.935	1.480	0.892				1.654	0.974	1.466	0.930		
	3		1.554	0.965	1.468	0.938				1.573	0.961	1.551	0.976		

Mean recovery (%)	SD (%)
94.9	2.6

Analyte: VMC

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.079		0.186		0.120		0	0.100		0.200		0.146	
	2		0.071		0.170					0.101		0.178			
	3		0.079		0.135					0.108		0.191			
Sample + Spike 1 1	1	0.423	0.420	0.961	0.498	0.943	0.356	84.2	0.423	0.444	0.938	0.527	0.966	0.366	86.6
	2		0.416	0.968	0.494	0.907				0.448	0.954	0.529	0.944		
	3		0.435	0.986	0.479	0.932				0.464	0.977	0.567	0.955		
Sample + Spike 2 2	1	0.661	0.647	0.952	0.744	0.931	0.610	92.3	0.661	0.667	0.940	0.755	0.919	0.602	91.1
	2		0.641	0.944	0.710	0.888				0.675	0.949	0.735	0.923		
	3		0.652	0.953	0.769	0.978				0.693	0.978	0.763	0.958		
Sample + Spike 3 3	1	1.322	1.235	0.969	1.277	0.917	1.209	91.4	1.322	1.162	0.902	1.317	0.922	1.205	91.1
	2		1.181	0.935	1.253	0.892				1.257	0.974	1.332	0.930		
	3		1.216	0.965	1.339	0.938				1.244	0.961	1.391	0.976		

Mean recovery (%)	SD (%)
89.5	3.3

Analyte: VME

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.001		0.005		0.003		0	0.006		0.008		0.009	
	2		0.001		0.005					0.010		0.009			
	3		0.004		0.004					0.009		0.009			
Sample + Spike 1 1	1	0.107	0.109	0.961	0.071	0.943	0.097	90.4	0.107	0.092	0.938	0.103	0.966	0.096	89.8
	2		0.112	0.968	0.099	0.907				0.100	0.954	0.102	0.944		
	3		0.086	0.986	0.094	0.932				0.107	0.977	0.098	0.955		
Sample + Spike 2 2	1	0.180	0.127	0.952	0.124	0.931	0.151	84.0	0.180	0.174	0.940	0.148	0.919	0.167	92.8
	2		0.168	0.944	0.149	0.888				0.171	0.949	0.160	0.923		
	3		0.140	0.953	0.165	0.978				0.179	0.978	0.166	0.958		
Sample + Spike 3 3	1	0.359	0.329	0.969	0.300	0.917	0.334	93.1	0.359	0.313	0.902	0.301	0.922	0.330	91.9
	2		0.336	0.935	0.287	0.892				0.342	0.974	0.309	0.930		
	3		0.343	0.965	0.303	0.938				0.338	0.961	0.318	0.976		

Mean recovery (%)	SD (%)
90.3	3.4

Analyte: V06

	Replicate	Sample: A Spike concentration	Measured concentration N18093	N18093 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N18093	N18093 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.048		0.048		0	0.043		0.043	
	2		0.048					0.042			
Sample + Spike 1 1	1	1.003	0.895	0.951	0.899	89.6	1.003	0.925	0.983	0.899	89.7
	2		0.908	0.948				0.932	0.975		
Sample + Spike 2 2	1	3.001	3.084	0.965	3.150	105.0	3.001	3.035	0.978	3.024	100.8
	2		3.113	0.972				2.929	0.962		
Sample + Spike 3 3	1	10.347	9.859	0.968	10.113	97.7	10.347	9.203	0.952	9.694	93.7
	2		9.776	0.964				9.409	0.958		

Mean recovery (%)	SD (%)
96.1	6.2

Analyte: VCF

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.006		0.007		0.006		0	0.015		0.015		0.012	
	2		0.008		0.002					0.007		0.007			
	3		0.006		0.007					0.013		0.013			
Sample + Spike 1 1	1	0.090	0.089	0.961	0.069	0.943	0.084	93.4	0.090	0.092	0.938	0.093	0.966	0.085	94.0
	2		0.091	0.968	0.086	0.907				0.092	0.954	0.091	0.944		
	3		0.092	0.986	0.088	0.932				0.095	0.977	0.092	0.955		
Sample + Spike 2 2	1	0.142	0.144	0.952	0.142	0.931	0.144	101.6	0.142	0.142	0.940	0.139	0.919	0.148	103.9
	2		0.141	0.944	0.126	0.888				0.164	0.949	0.161	0.923		
	3		0.152	0.953	0.146	0.978				0.152	0.978	0.148	0.958		
Sample + Spike 3 3	1	0.283	0.272	0.969	0.256	0.917	0.277	97.8	0.283	0.256	0.902	0.260	0.922	0.275	97.2
	2		0.263	0.935	0.252	0.892				0.277	0.974	0.263	0.930		
	3		0.279	0.965	0.269	0.938				0.285	0.961	0.288	0.976		

Mean recovery (%)	SD (%)
98.0	4.1

Analyte: **VEA**

		Sample:	A				Sample:	B			
			Measured concentration					Measured concentration			
	Replicate	Spike concentration	N18093	N18093 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N18093	N18093 Dilution Factor	Mean of spike	Recovery (%)
Sample	1		0.095		0.096			0.093		0.094	
0	2	0	0.096				0	0.094			
Sample + Spike 1	1		1.643	0.951	1.598	87.9		1.702	0.983	1.648	90.7
1	2	1.817	1.582	0.948			1.817	1.715	0.975		
Sample + Spike 2	1		5.230	0.965	5.342	105.7		5.345	0.978	5.344	105.7
2	2	5.055	5.308	0.972			5.055	5.213	0.962		
Sample + Spike 3	1		17.519	0.968	18.239	109.7		16.919	0.952	17.871	107.4
3	2	16.633	17.908	0.964			16.633	17.407	0.958		

Mean recovery (%)	SD (%)
101.2	9.4

Analyte: **VMCP**

		Sample:	A				Sample:	B			
			Measured concentration					Measured concentration			
	Replicate	Spike concentration	N18093	N18093 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N18093	N18093 Dilution Factor	Mean of spike	Recovery (%)
Sample	1		0.013		0.013			0.012		0.013	
0	2	0	0.013				0	0.013			
Sample + Spike 1	1		0.382	0.951	0.397	93.4		0.405	0.983	0.396	93.3
1	2	0.425	0.398	0.948			0.425	0.397	0.975		
Sample + Spike 2	1		1.265	0.965	1.288	99.8		1.254	0.978	1.265	98.1
2	2	1.290	1.255	0.972			1.290	1.227	0.962		
Sample + Spike 3	1		4.195	0.968	4.384	101.9		3.979	0.952	4.179	97.2
3	2	4.300	4.300	0.964			4.300	4.029	0.958		

Mean recovery (%)	SD (%)
97.3	3.5

Analyte: **VIBN**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample	1		0.004		0.004		0.007			0.011		0.005		0.008	
0	2	0	0.007		0.006				0	0.012		0.006			
	3		0.010		0.012					0.008		0.006			
Sample + Spike 1	1		0.369	0.961	0.337	0.943	0.366	91.2		0.350	0.938	0.354	0.966	0.369	91.9
1	2	0.401	0.371	0.968	0.350	0.907			0.401	0.352	0.954	0.395	0.944		
	3		0.374	0.986	0.326	0.932				0.359	0.977	0.351	0.955		
Sample + Spike 2	1		0.550	0.952	0.555	0.931	0.592	94.2		0.586	0.940	0.563	0.919	0.628	100.0
2	2	0.628	0.578	0.944	0.541	0.888			0.628	0.591	0.949	0.615	0.923		
	3		0.557	0.953	0.603	0.978				0.647	0.978	0.606	0.958		
Sample + Spike 3	1		1.163	0.969	1.067	0.917	1.173	93.3		1.006	0.902	1.030	0.922	1.182	94.0
3	2	1.257	1.121	0.935	1.037	0.892			1.257	1.186	0.974	1.209	0.930		
	3		1.159	0.965	1.087	0.938				1.089	0.961	1.230	0.976		

Mean recovery (%)	SD (%)
94.1	3.1

Analyte: **VTHF**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample	1		0.003		0.004		0.005			0.002		0.008		0.007	
0	2	0	0.006		0.004				0	0.000		0.020			
	3		0.004		0.009					0.000		0.010			
Sample + Spike 1	1		0.783	0.961	0.726	0.943	0.766	89.5		0.745	0.938	0.757	0.966	0.799	93.4
1	2	0.855	0.739	0.968	0.683	0.907			0.855	0.754	0.954	0.858	0.944		
	3		0.776	0.986	0.687	0.932				0.764	0.977	0.741	0.955		
Sample + Spike 2	1		1.165	0.952	1.145	0.931	1.245	93.9		1.215	0.940	1.222	0.919	1.345	101.4
2	2	1.326	1.198	0.944	1.133	0.888			1.326	1.207	0.949	1.334	0.923		
	3		1.144	0.953	1.273	0.978				1.378	0.978	1.304	0.958		
Sample + Spike 3	1		2.543	0.969	2.260	0.917	2.516	94.9		2.158	0.902	2.162	0.922	2.559	96.5
3	2	2.651	2.381	0.935	2.222	0.892			2.651	2.636	0.974	2.587	0.930		
	3		2.479	0.965	2.280	0.938				2.340	0.961	2.673	0.976		

Mean recovery (%)	SD (%)
94.9	3.9

Analyte: **V2A**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample	1		0.001		0.001		0.001			0.005		0.004		0.004	
0	2	0	0.001		0.001				0	0.003		0.002			
	3		0.001		0.001					0.004		0.003			
Sample + Spike 1	1		0.154	0.961	0.164	0.943	0.170	99.4		0.164	0.938	0.171	0.966	0.171	100.0
1	2	0.171	0.154	0.968	0.161	0.907			0.171	0.165	0.954	0.166	0.944		
	3		0.175	0.986	0.166	0.932				0.168	0.977	0.167	0.955		
Sample + Spike 2	1		0.282	0.952	0.278	0.931	0.296	107.2		0.261	0.940	0.267	0.919	0.288	104.4
2	2	0.276	0.277	0.944	0.266	0.888			0.276	0.282	0.949	0.276	0.923		
	3		0.282	0.953	0.291	0.978				0.287	0.978	0.281	0.958		
Sample + Spike 3	1		0.470	0.969	0.512	0.917	0.527	95.2		0.494	0.902	0.515	0.922	0.548	99.1
3	2	0.553	0.471	0.935	0.500	0.892			0.553	0.532	0.974	0.515	0.930		
	3		0.484	0.965	0.522	0.938				0.527	0.961	0.541	0.976		

Mean recovery (%)	SD (%)
100.9	4.3

Analyte: VTE

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.001		0.003		0.002		0	0.001		0.003		0.002	
	2		0.001		0.003					0.001		0.003			
	3		0.001		0.003					0.001		0.003			
Sample + Spike 1 1	1	0.109	0.102	0.961	0.089	0.943	0.099	90.5	0.109	0.098	0.938	0.092	0.966	0.098	89.9
	2		0.103	0.968	0.087	0.907				0.100	0.954	0.090	0.944		
	3		0.105	0.986	0.089	0.932				0.102	0.977	0.092	0.955		
Sample + Spike 2 2	1	0.177	0.168	0.952	0.149	0.931	0.166	93.8	0.177	0.162	0.940	0.146	0.919	0.164	92.9
	2		0.167	0.944	0.142	0.888				0.166	0.949	0.146	0.923		
	3		0.168	0.953	0.156	0.978				0.171	0.978	0.153	0.958		
Sample + Spike 3 3	1	0.354	0.307	0.969	0.281	0.917	0.314	88.7	0.354	0.298	0.902	0.283	0.922	0.316	89.3
	2		0.309	0.935	0.271	0.892				0.323	0.974	0.282	0.930		
	3		0.322	0.965	0.287	0.938				0.322	0.961	0.294	0.976		

Mean recovery (%)	SD (%)
90.9	2.0

Analyte: VC06

	Replicate	Sample: A Spike concentration	Measured concentration N18093	N18093 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N18093	N18093 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.008		0.008		0	0.007		0.007	
	2		0.007					0.007			
Sample + Spike 1 1	1	0.380	0.344	0.951	0.357	94.0	0.380	0.360	0.983	0.358	94.1
	2		0.349	0.948				0.355	0.975		
Sample + Spike 2 2	1	1.183	1.239	0.965	1.271	107.4	1.183	1.239	0.978	1.253	105.9
	2		1.237	0.972				1.207	0.962		
Sample + Spike 3 3	1	3.953	4.197	0.968	4.311	109.0	3.953	3.938	0.952	4.132	104.5
	2		4.146	0.964				3.969	0.958		

Mean recovery (%)	SD (%)
102.5	6.7

Analyte: VCT

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.002		0.003		0.003		0	0.010		0.010		0.008	
	2		0.002		0.003					0.006		0.006			
	3		0.002		0.003					0.009		0.009			
Sample + Spike 1 1	1	0.088	0.079	0.961	0.071	0.943	0.076	86.7	0.088	0.084	0.938	0.079	0.966	0.076	86.8
	2		0.080	0.968	0.069	0.907				0.084	0.954	0.076	0.944		
	3		0.081	0.986	0.070	0.932				0.087	0.977	0.078	0.955		
Sample + Spike 2 2	1	0.138	0.129	0.952	0.116	0.931	0.128	93.0	0.138	0.131	0.940	0.118	0.919	0.131	95.0
	2		0.128	0.944	0.110	0.888				0.149	0.949	0.132	0.923		
	3		0.133	0.953	0.124	0.978				0.139	0.978	0.124	0.958		
Sample + Spike 3 3	1	0.276	0.252	0.969	0.216	0.917	0.246	89.0	0.276	0.237	0.902	0.222	0.922	0.247	89.6
	2		0.243	0.935	0.211	0.892				0.257	0.974	0.227	0.930		
	3		0.252	0.965	0.222	0.938				0.263	0.961	0.245	0.976		

Mean recovery (%)	SD (%)
90.0	3.4

Analyte: VBZ

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.012		0.014		0.035		0	0.047		0.036		0.040	
	2		0.023		0.035					0.043		0.034			
	3		0.049		0.076					0.044		0.035			
Sample + Spike 1 1	1	0.147	0.167	0.961	0.173	0.943	0.155	105.7	0.147	0.166	0.938	0.155	0.966	0.126	85.9
	2		0.191	0.968	0.205	0.907				0.169	0.954	0.149	0.944		
	3		0.174	0.986	0.182	0.932				0.171	0.977	0.153	0.955		
Sample + Spike 2 2	1	0.223	0.259	0.952	0.274	0.931	0.249	111.7	0.223	0.246	0.940	0.227	0.919	0.214	96.0
	2		0.266	0.944	0.277	0.888				0.263	0.949	0.233	0.923		
	3		0.262	0.953	0.275	0.978				0.254	0.978	0.230	0.958		
Sample + Spike 3 3	1	0.447	0.618	0.969	0.407	0.917	0.462	103.4	0.447	0.418	0.902	0.405	0.922	0.415	92.8
	2		0.452	0.935	0.411	0.892				0.455	0.974	0.411	0.930		
	3		0.489	0.965	0.436	0.938				0.461	0.961	0.441	0.976		

Mean recovery (%)	SD (%)
99.3	9.4

Analyte: V07N

	Replicate	Sample: A Spike concentration	Measured concentration N18093	N18093 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N18093	N18093 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.024		0.024		0	0.022		0.022	
	2		0.023					0.022			
Sample + Spike 1 1	1	0.792	0.717	0.951	0.728	92.0	0.792	0.737	0.983	0.727	91.8
	2		0.713	0.948				0.734	0.975		
Sample + Spike 2 2	1	2.288	2.252	0.965	2.304	100.7	2.288	2.240	0.978	2.259	98.7
	2		2.258	0.972				2.190	0.962		
Sample + Spike 3 3	1	8.282	7.290	0.968	7.616	92.0	8.282	7.004	0.952	7.375	89.0
	2		7.470	0.964				7.129	0.958		

Mean recovery (%)	SD (%)
94.0	4.6

Analyte: VTC

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.002		0.002		0.002		0	0.003		0.002		0.003	
	2		0.002		0.002					0.003		0.002			
	3		0.002		0.002					0.003		0.002			
Sample + Spike 1 1	1	0.176	0.176	0.961	0.169	0.943	0.178	101.2	0.176	0.164	0.938	0.176	0.966	0.175	99.4
	2		0.177	0.968	0.160	0.907				0.166	0.954	0.169	0.944		
	3		0.178	0.986	0.167	0.932				0.171	0.977	0.172	0.955		
Sample + Spike 2 2	1	0.259	0.280	0.952	0.276	0.931	0.294	113.7	0.259	0.273	0.940	0.273	0.919	0.292	112.6
	2		0.278	0.944	0.265	0.888				0.278	0.949	0.272	0.923		
	3		0.284	0.953	0.291	0.978				0.286	0.978	0.285	0.958		
Sample + Spike 3 3	1	0.518	0.467	0.969	0.514	0.917	0.541	104.4	0.518	0.500	0.902	0.519	0.922	0.556	107.2
	2		0.512	0.935	0.503	0.892				0.541	0.974	0.520	0.930		
	3		0.526	0.965	0.524	0.938				0.539	0.961	0.543	0.976		

Mean recovery (%)	SD (%)
106.4	5.9

Analyte: **VBM**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample	1		0.000		0.001		0.002			0.004		0.005		0.004	
0	2	0	0.000		0.002				0	0.004		0.005			
	3		0.002		0.004					0.003		0.005			
Sample + Spike 1	1		0.086	0.961	0.080	0.943	0.087	97.6		0.087	0.938	0.085	0.966	0.085	95.8
1	2	0.089	0.089	0.968	0.080	0.907			0.089	0.087	0.954	0.082	0.944		
	3		0.089	0.986	0.080	0.932				0.090	0.977	0.084	0.955		
Sample + Spike 2	1		0.142	0.952	0.131	0.931	0.143	105.9		0.142	0.940	0.132	0.919	0.142	105.2
2	2	0.135	0.140	0.944	0.125	0.888			0.135	0.144	0.949	0.131	0.923		
	3		0.141	0.953	0.137	0.978				0.146	0.978	0.136	0.958		
Sample + Spike 3	1		0.268	0.969	0.238	0.917	0.268	99.1		0.254	0.902	0.244	0.922	0.269	99.6
3	2	0.270	0.263	0.935	0.234	0.892			0.270	0.274	0.974	0.247	0.930		
	3		0.266	0.965	0.244	0.938				0.272	0.961	0.259	0.976		

Mean recovery (%)	SD (%)
100.5	4.1

Analyte: **2DF**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample	1		0.004		0.004		0.005			0.005		0.006		0.006	
0	2	0	0.005		0.005				0	0.005		0.006			
	3		0.005		0.005					0.005		0.006			
Sample + Spike 1	1		0.120	0.961	0.121	0.943	0.121	94.8		0.118	0.938	0.123	0.966	0.121	94.7
1	2	0.128	0.121	0.968	0.116	0.907			0.128	0.121	0.954	0.121	0.944		
	3		0.123	0.986	0.118	0.932				0.122	0.977	0.123	0.955		
Sample + Spike 2	1		0.198	0.952	0.195	0.931	0.204	103.1		0.194	0.940	0.190	0.919	0.202	101.8
2	2	0.198	0.198	0.944	0.187	0.888			0.198	0.197	0.949	0.194	0.923		
	3		0.198	0.953	0.205	0.978				0.202	0.978	0.198	0.958		
Sample + Spike 3	1		0.386	0.969	0.365	0.917	0.391	98.5		0.354	0.902	0.361	0.922	0.386	97.3
3	2	0.397	0.372	0.935	0.351	0.892			0.397	0.386	0.974	0.365	0.930		
	3		0.379	0.965	0.371	0.938				0.376	0.961	0.380	0.976		

Mean recovery (%)	SD (%)
98.4	3.5

Analyte: **VTFT**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample	1		0.002		0.002		0.002			0.002		0.002		0.002	
0	2	0	0.002		0.002				0	0.002		0.002			
	3		0.002		0.002					0.002		0.002			
Sample + Spike 1	1		0.187	0.961	0.182	0.943	0.191	90.8		0.180	0.938	0.186	0.966	0.191	90.8
1	2	0.210	0.188	0.968	0.174	0.907			0.210	0.184	0.954	0.183	0.944		
	3		0.190	0.986	0.178	0.932				0.188	0.977	0.184	0.955		
Sample + Spike 2	1		0.305	0.952	0.298	0.931	0.319	93.1		0.303	0.940	0.298	0.919	0.320	93.4
2	2	0.343	0.304	0.944	0.287	0.888			0.343	0.307	0.949	0.297	0.923		
	3		0.308	0.953	0.313	0.978				0.315	0.978	0.308	0.958		
Sample + Spike 3	1		0.589	0.969	0.561	0.917	0.612	89.3		0.564	0.902	0.568	0.922	0.618	90.0
3	2	0.686	0.586	0.935	0.548	0.892			0.686	0.605	0.974	0.573	0.930		
	3		0.590	0.965	0.577	0.938				0.599	0.961	0.602	0.976		

Mean recovery (%)	SD (%)
91.2	1.7

Analyte: **VMIK**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.006		0.006		0.007		0	0.010		0.003		0.007	
	2		0.009		0.007					0.011		0.003			
	3		0.011		0.003					0.008		0.006			
Sample + Spike 1 1	1	0.515	0.480	0.961	0.453	0.943	0.479	93.0	0.515	0.448	0.938	0.470	0.966	0.477	92.7
	2		0.480	0.968	0.438	0.907				0.462	0.954	0.458	0.944		
	3		0.473	0.986	0.447	0.932				0.472	0.977	0.469	0.955		
Sample + Spike 2 2	1	0.802	0.777	0.952	0.747	0.931	0.801	99.9	0.802	0.760	0.940	0.761	0.919	0.810	100.9
	2		0.756	0.944	0.723	0.888				0.775	0.949	0.763	0.923		
	3		0.779	0.953	0.785	0.978				0.789	0.978	0.780	0.958		
Sample + Spike 3 3	1	1.604	1.517	0.969	1.385	0.917	1.526	95.1	1.604	1.356	0.902	1.401	0.922	1.516	94.5
	2		1.460	0.935	1.341	0.892				1.461	0.974	1.440	0.930		
	3		1.475	0.965	1.434	0.938				1.468	0.961	1.506	0.976		

Mean recovery (%)	SD (%)
96.0	3.5

Analyte: **VTO**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.021		0.022		0.021		0	0.049		0.036		0.037	
	2		0.021		0.020					0.036		0.024			
	3		0.024		0.019					0.045		0.032			
Sample + Spike 1 1	1	0.225	0.227	0.961	0.211	0.943	0.208	92.5	0.225	0.234	0.938	0.230	0.966	0.204	90.6
	2		0.229	0.968	0.210	0.907				0.233	0.954	0.221	0.944		
	3		0.225	0.986	0.211	0.932				0.243	0.977	0.230	0.955		
Sample + Spike 2 2	1	0.348	0.350	0.952	0.338	0.931	0.347	99.8	0.348	0.358	0.940	0.345	0.919	0.352	101.0
	2		0.351	0.944	0.325	0.888				0.397	0.949	0.380	0.923		
	3		0.361	0.953	0.364	0.978				0.372	0.978	0.362	0.958		
Sample + Spike 3 3	1	0.695	1.000	0.969	0.616	0.917	0.724	104.2	0.695	0.620	0.902	0.634	0.922	0.661	95.0
	2		0.672	0.935	0.597	0.892				0.677	0.974	0.647	0.930		
	3		0.687	0.965	0.635	0.938				0.688	0.961	0.700	0.976		

Mean recovery (%)	SD (%)
97.2	5.3

Analyte: **VCM**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.000		0.000		0.000		0	0.000		0.000		0.000	
	2		0.000		0.000					0.000		0.001			
	3		0.000		0.000					0.000		0.001			
Sample + Spike 1 1	1	0.043	0.040	0.961	0.039	0.943	0.042	98.0	0.043	0.040	0.938	0.039	0.966	0.042	96.9
	2		0.041	0.968	0.039	0.907				0.041	0.954	0.039	0.944		
	3		0.042	0.986	0.039	0.932				0.042	0.977	0.040	0.955		
Sample + Spike 2 2	1	0.064	0.065	0.952	0.060	0.931	0.067	104.3	0.064	0.063	0.940	0.061	0.919	0.066	103.6
	2		0.064	0.944	0.059	0.888				0.064	0.949	0.060	0.923		
	3		0.065	0.953	0.064	0.978				0.067	0.978	0.063	0.958		
Sample + Spike 3 3	1	0.129	0.124	0.969	0.114	0.917	0.126	97.4	0.129	0.116	0.902	0.114	0.922	0.126	97.3
	2		0.120	0.935	0.110	0.892				0.125	0.974	0.114	0.930		
	3		0.122	0.965	0.116	0.938				0.123	0.961	0.121	0.976		

Mean recovery (%)	SD (%)
99.6	3.4

Analyte: **V08N**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.081		0.080		0.123		0	0.115		0.113		0.124	
	2		0.104		0.104					0.138		0.135			
	3		0.174		0.194					0.128		0.114			
Sample + Spike 1 1	1	0.654	0.642	0.961	0.735	0.943	0.633	96.8	0.654	0.674	0.938	0.702	0.966	0.596	91.2
	2		0.681	0.968	0.739	0.907				0.684	0.954	0.686	0.944		
	3		0.786	0.986	0.756	0.932				0.715	0.977	0.702	0.955		
Sample + Spike 2 2	1	1.013	1.201	0.952	1.172	0.931	1.135	112.0	1.013	1.089	0.940	1.103	0.919	1.032	101.8
	2		1.200	0.944	1.150	0.888				1.101	0.949	1.094	0.923		
	3		1.190	0.953	1.228	0.978				1.103	0.978	1.097	0.958		
Sample + Spike 3 3	1	2.026	1.822	0.969	1.998	0.917	1.962	96.9	2.026	1.900	0.902	1.942	0.922	1.993	98.4
	2		1.797	0.935	1.946	0.892				2.067	0.974	1.998	0.930		
	3		2.166	0.965	2.022	0.938				2.034	0.961	2.095	0.976		

Mean recovery (%)	SD (%)
99.5	7.0

Analyte: **VDE**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.001		0.001		0.001		0	0.000		0.003		0.002	
	2		0.001		0.000					0.002		0.003			
	3		0.000		0.002					0.002		0.003			
Sample + Spike 1 1	1	0.111	0.101	0.961	0.102	0.943	0.106	95.5	0.111	0.100	0.938	0.104	0.966	0.105	94.6
	2		0.103	0.968	0.097	0.907				0.103	0.954	0.101	0.944		
	3		0.106	0.986	0.100	0.932				0.104	0.977	0.103	0.955		
Sample + Spike 2 2	1	0.174	0.170	0.952	0.165	0.931	0.177	101.5	0.174	0.167	0.940	0.163	0.919	0.175	100.8
	2		0.168	0.944	0.157	0.888				0.169	0.949	0.164	0.923		
	3		0.169	0.953	0.173	0.978				0.174	0.978	0.170	0.958		
Sample + Spike 3 3	1	0.347	0.321	0.969	0.305	0.917	0.332	95.8	0.347	0.303	0.902	0.307	0.922	0.333	95.8
	2		0.311	0.935	0.299	0.892				0.326	0.974	0.312	0.930		
	3		0.323	0.965	0.313	0.938				0.321	0.961	0.328	0.976		

Mean recovery (%)	SD (%)
97.3	3.0

Analyte: **V4C**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.029		0.028		0.031		0	0.097		0.096		0.071	
	2		0.033		0.033					0.040		0.040			
	3		0.033		0.030					0.078		0.074			
Sample + Spike 1 1	1	0.307	0.304	0.961	0.293	0.943	0.285	92.8	0.307	0.341	0.938	0.343	0.966	0.278	90.5
	2		0.317	0.968	0.296	0.907				0.331	0.954	0.324	0.944		
	3		0.309	0.986	0.290	0.932				0.346	0.977	0.334	0.955		
Sample + Spike 2 2	1	0.482	0.487	0.952	0.473	0.931	0.487	100.9	0.482	0.485	0.940	0.468	0.919	0.497	103.1
	2		0.478	0.944	0.448	0.888				0.638	0.949	0.604	0.923		
	3		0.522	0.953	0.527	0.978				0.533	0.978	0.513	0.958		
Sample + Spike 3 3	1	0.965	0.884	0.969	0.858	0.917	0.905	93.8	0.965	0.863	0.902	0.864	0.922	0.904	93.7
	2		0.882	0.935	0.825	0.892				0.943	0.974	0.885	0.930		
	3		0.929	0.965	0.893	0.938				0.999	0.961	0.999	0.976		

Mean recovery (%)	SD (%)
95.8	5.0

Analyte: **V4CE**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.003		0.002		0.003		0	0.003		0.002		0.003	
	2		0.003		0.002					0.004		0.002			
	3		0.003		0.002					0.003		0.002			
Sample + Spike 1 1	1	0.207	0.185	0.961	0.179	0.943	0.188	90.7	0.207	0.175	0.938	0.183	0.966	0.186	89.9
	2		0.184	0.968	0.173	0.907				0.180	0.954	0.180	0.944		
	3		0.187	0.986	0.177	0.932				0.184	0.977	0.181	0.955		
Sample + Spike 2 2	1	0.335	0.297	0.952	0.295	0.931	0.312	93.2	0.335	0.295	0.940	0.288	0.919	0.311	92.7
	2		0.296	0.944	0.282	0.888				0.296	0.949	0.291	0.923		
	3		0.299	0.953	0.309	0.978				0.305	0.978	0.301	0.958		
Sample + Spike 3 3	1	0.670	0.575	0.969	0.542	0.917	0.590	88.0	0.670	0.532	0.902	0.548	0.922	0.591	88.2
	2		0.555	0.935	0.528	0.892				0.576	0.974	0.557	0.930		
	3		0.571	0.965	0.557	0.938				0.568	0.961	0.582	0.976		

Mean recovery (%)	SD (%)
90.5	2.2

Analyte: **VCB**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.000		0.000		0.000		0	0.001		0.000		0.000	
	2		0.000		0.000					0.000		0.000			
	3		0.000		0.000					0.000		0.000			
Sample + Spike 1 1	1	0.064	0.057	0.961	0.055	0.943	0.059	91.6	0.064	0.054	0.938	0.056	0.966	0.058	90.5
	2		0.057	0.968	0.054	0.907				0.056	0.954	0.054	0.944		
	3		0.056	0.986	0.055	0.932				0.057	0.977	0.056	0.955		
Sample + Spike 2 2	1	0.097	0.091	0.952	0.089	0.931	0.096	98.6	0.097	0.090	0.940	0.088	0.919	0.095	98.2
	2		0.089	0.944	0.085	0.888				0.090	0.949	0.089	0.923		
	3		0.092	0.953	0.094	0.978				0.093	0.978	0.091	0.958		
Sample + Spike 3 3	1	0.193	0.185	0.969	0.166	0.917	0.184	95.3	0.193	0.163	0.902	0.168	0.922	0.181	93.9
	2		0.172	0.935	0.164	0.892				0.174	0.974	0.170	0.930		
	3		0.175	0.965	0.171	0.938				0.175	0.961	0.178	0.976		

Mean recovery (%)	SD (%)
94.7	3.3

Analyte: **VEB**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.019		0.018		0.020		0	0.018		0.017		0.015	
	2		0.019		0.020					0.011		0.011			
	3		0.023		0.021					0.016		0.016			
Sample + Spike 1 1	1	0.162	0.168	0.961	0.164	0.943	0.153	94.5	0.162	0.150	0.938	0.160	0.966	0.147	90.9
	2		0.170	0.968	0.160	0.907				0.154	0.954	0.154	0.944		
	3		0.167	0.986	0.163	0.932				0.158	0.977	0.157	0.955		
Sample + Spike 2 2	1	0.248	0.261	0.952	0.257	0.931	0.256	103.3	0.248	0.241	0.940	0.237	0.919	0.251	101.3
	2		0.259	0.944	0.246	0.888				0.265	0.949	0.261	0.923		
	3		0.268	0.953	0.276	0.978				0.256	0.978	0.253	0.958		
Sample + Spike 3 3	1	0.495	0.489	0.969	0.446	0.917	0.473	95.6	0.495	0.426	0.902	0.448	0.922	0.468	94.4
	2		0.455	0.935	0.442	0.892				0.467	0.974	0.455	0.930		
	3		0.476	0.965	0.470	0.938				0.462	0.961	0.480	0.976		

Mean recovery (%)	SD (%)
96.7	4.7

Analyte: VXY

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.109		0.108		0.105		0	0.058		0.060		0.046	
	2		0.102		0.105					0.030		0.032			
	3		0.102		0.103					0.047		0.050			
Sample + Spike 1 1	1	0.228	0.327	0.961	0.328	0.943	0.233	102.0	0.228	0.252	0.938	0.272	0.966	0.228	100.0
	2		0.326	0.968	0.317	0.907				0.257	0.954	0.263	0.944		
	3		0.323	0.986	0.332	0.932				0.264	0.977	0.276	0.955		
Sample + Spike 2 2	1	0.350	0.459	0.952	0.457	0.931	0.395	112.8	0.350	0.400	0.940	0.385	0.919	0.399	114.1
	2		0.473	0.944	0.444	0.888				0.458	0.949	0.460	0.923		
	3		0.507	0.953	0.520	0.978				0.410	0.978	0.427	0.958		
Sample + Spike 3 3	1	0.700	0.610	0.969	0.793	0.917	0.702	100.3	0.700	0.676	0.902	0.712	0.922	0.731	104.5
	2		0.789	0.935	0.757	0.892				0.722	0.974	0.742	0.930		
	3		0.823	0.965	0.793	0.938				0.756	0.961	0.815	0.976		

Mean recovery (%)	SD (%)
105.6	6.3

Analyte: VBF

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.001		0.000		0.000		0	0.002		0.000		0.001	
	2		0.000		0.000					0.001		0.001			
	3		0.001		0.000					0.002		0.000			
Sample + Spike 1 1	1	0.091	0.085	0.961	0.084	0.943	0.089	97.6	0.091	0.086	0.938	0.086	0.966	0.089	97.6
	2		0.087	0.968	0.081	0.907				0.087	0.954	0.084	0.944		
	3		0.088	0.986	0.083	0.932				0.088	0.977	0.084	0.955		
Sample + Spike 2 2	1	0.137	0.133	0.952	0.130	0.931	0.140	101.9	0.137	0.132	0.940	0.127	0.919	0.139	101.1
	2		0.132	0.944	0.125	0.888				0.133	0.949	0.128	0.923		
	3		0.133	0.953	0.137	0.978				0.136	0.978	0.135	0.958		
Sample + Spike 3 3	1	0.274	0.252	0.969	0.243	0.917	0.263	95.9	0.274	0.238	0.902	0.242	0.922	0.262	95.8
	2		0.245	0.935	0.234	0.892				0.256	0.974	0.247	0.930		
	3		0.257	0.965	0.247	0.938				0.251	0.961	0.259	0.976		

Mean recovery (%)	SD (%)
98.3	2.6

Analyte: VST

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.109		0.103		0.105		0	0.063		0.060		0.048	
	2		0.105		0.101					0.035		0.033			
	3		0.116		0.093					0.053		0.046			
Sample + Spike 1 1	1	0.143	0.239	0.961	0.229	0.943	0.138	96.8	0.143	0.174	0.938	0.170	0.966	0.129	90.1
	2		0.250	0.968	0.225	0.907				0.173	0.954	0.165	0.944		
	3		0.244	0.986	0.229	0.932				0.178	0.977	0.169	0.955		
Sample + Spike 2 2	1	0.223	0.321	0.952	0.307	0.931	0.228	102.2	0.223	0.244	0.940	0.235	0.919	0.227	101.9
	2		0.328	0.944	0.299	0.888				0.300	0.949	0.283	0.923		
	3		0.332	0.953	0.327	0.978				0.260	0.978	0.255	0.958		
Sample + Spike 3 3	1	0.446	0.591	0.969	0.479	0.917	0.446	100.0	0.446	0.416	0.902	0.417	0.922	0.418	93.7
	2		0.513	0.935	0.475	0.892				0.454	0.974	0.427	0.930		
	3		0.560	0.965	0.518	0.938				0.475	0.961	0.469	0.976		

Mean recovery (%)	SD (%)
97.4	4.8

Analyte: **VOX**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.012		0.012		0.013		0	0.021		0.022		0.017	
	2		0.012		0.013					0.011		0.012			
	3		0.014		0.013					0.017		0.016			
Sample + Spike 1 1	1	0.112	0.105	0.961	0.111	0.943	0.104	92.5	0.112	0.110	0.938	0.115	0.966	0.100	89.7
	2		0.115	0.968	0.110	0.907				0.111	0.954	0.110	0.944		
	3		0.115	0.986	0.110	0.932				0.116	0.977	0.113	0.955		
Sample + Spike 2 2	1	0.168	0.175	0.952	0.178	0.931	0.176	104.6	0.168	0.164	0.940	0.165	0.919	0.172	102.3
	2		0.174	0.944	0.169	0.888				0.194	0.949	0.196	0.923		
	3		0.182	0.953	0.190	0.978				0.173	0.978	0.180	0.958		
Sample + Spike 3 3	1	0.335	0.319	0.969	0.316	0.917	0.322	96.0	0.335	0.287	0.902	0.310	0.922	0.320	95.4
	2		0.297	0.935	0.307	0.892				0.323	0.974	0.318	0.930		
	3		0.321	0.965	0.322	0.938				0.325	0.961	0.348	0.976		

Mean recovery (%)	SD (%)
96.7	5.7

Analyte: **VTP**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.003		0.002		0.002		0	0.003		0.002		0.003	
	2		0.003		0.002					0.003		0.002			
	3		0.002		0.002					0.003		0.002			
Sample + Spike 1 1	1	0.243	0.215	0.961	0.213	0.943	0.223	91.9	0.243	0.211	0.938	0.219	0.966	0.224	92.0
	2		0.219	0.968	0.207	0.907				0.214	0.954	0.216	0.944		
	3		0.222	0.986	0.210	0.932				0.221	0.977	0.216	0.955		
Sample + Spike 2 2	1	0.390	0.359	0.952	0.350	0.931	0.374	95.8	0.390	0.355	0.940	0.345	0.919	0.373	95.7
	2		0.355	0.944	0.333	0.888				0.355	0.949	0.348	0.923		
	3		0.358	0.953	0.369	0.978				0.364	0.978	0.364	0.958		
Sample + Spike 3 3	1	0.780	0.674	0.969	0.654	0.917	0.705	90.4	0.780	0.638	0.902	0.658	0.922	0.710	91.1
	2		0.657	0.935	0.640	0.892				0.696	0.974	0.665	0.930		
	3		0.681	0.965	0.668	0.938				0.683	0.961	0.700	0.976		

Mean recovery (%)	SD (%)
92.8	2.4

Analyte: **VIPB**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.002		0.022		0.018		0	0.004		0.009		0.004	
	2		0.001		0.036					0.000		0.006			
	3		0.004		0.042					0.000		0.005			
Sample + Spike 1 1	1	0.484	0.422	0.961	0.438	0.943	0.428	88.5	0.484	0.394	0.938	0.402	0.966	0.420	86.7
	2		0.416	0.968	0.402	0.907				0.417	0.954	0.392	0.944		
	3		0.445	0.986	0.424	0.932				0.421	0.977	0.404	0.955		
Sample + Spike 2 2	1	0.775	0.719	0.952	0.712	0.931	0.748	96.5	0.775	0.705	0.940	0.654	0.919	0.729	94.0
	2		0.730	0.944	0.700	0.888				0.714	0.949	0.659	0.923		
	3		0.728	0.953	0.738	0.978				0.731	0.978	0.691	0.958		
Sample + Spike 3 3	1	1.550	1.551	0.969	1.243	0.917	1.417	91.4	1.550	1.254	0.902	1.222	0.922	1.357	87.6
	2		1.376	0.935	1.224	0.892				1.357	0.974	1.239	0.930		
	3		1.382	0.965	1.299	0.938				1.342	0.961	1.300	0.976		

Mean recovery (%)	SD (%)
90.8	3.9

Analyte: **VBZN**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample	1		0.037		0.021		0.028			0.087		0.044		0.059	
0	2	0	0.038		0.018				0	0.076		0.041			
	3		0.031		0.023					0.070		0.033			
Sample + Spike 1	1		1.776	0.961	1.750	0.943	1.842	87.1		1.775	0.938	1.754	0.966	1.813	85.7
1	2	2.115	1.833	0.968	1.714	0.907			2.115	1.812	0.954	1.738	0.944		
	3		1.806	0.986	1.778	0.932				1.854	0.977	1.815	0.955		
Sample + Spike 2	1		2.912	0.952	2.898	0.931	3.109	92.8		2.895	0.940	2.798	0.919	3.041	90.8
2	2	3.349	2.990	0.944	2.791	0.888			3.349	2.973	0.949	2.821	0.923		
	3		3.055	0.953	3.075	0.978				3.010	0.978	3.089	0.958		
Sample + Spike 3	1		5.888	0.969	5.503	0.917	6.033	90.1		5.420	0.902	5.353	0.922	5.832	87.1
3	2	6.697	5.687	0.935	5.359	0.892			6.697	5.701	0.974	5.449	0.930		
	3		5.894	0.965	5.724	0.938				5.762	0.961	5.702	0.976		

Mean recovery (%)	SD (%)
88.9	2.7

Analyte: **V3B**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample	1		0.003		0.003		0.003			0.005		0.004		0.003	
0	2	0	0.002		0.002				0	0.003		0.002			
	3		0.003		0.002					0.002		0.002			
Sample + Spike 1	1		0.144	0.961	0.138	0.943	0.147	94.8		0.138	0.938	0.140	0.966	0.146	94.2
1	2	0.155	0.146	0.968	0.136	0.907			0.155	0.145	0.954	0.141	0.944		
	3		0.149	0.986	0.139	0.932				0.148	0.977	0.143	0.955		
Sample + Spike 2	1		0.234	0.952	0.226	0.931	0.245	104.4		0.233	0.940	0.222	0.919	0.243	103.3
2	2	0.235	0.236	0.944	0.219	0.888			0.235	0.235	0.949	0.225	0.923		
	3		0.242	0.953	0.243	0.978				0.244	0.978	0.235	0.958		
Sample + Spike 3	1		0.466	0.969	0.417	0.917	0.465	99.0		0.420	0.902	0.421	0.922	0.460	97.8
3	2	0.470	0.451	0.935	0.412	0.892			0.470	0.456	0.974	0.426	0.930		
	3		0.454	0.965	0.430	0.938				0.454	0.961	0.445	0.976		

Mean recovery (%)	SD (%)
98.9	4.2

Analyte: **VDB**

		Sample:	A						Sample:	B					
			Measured concentration							Measured concentration					
	Replicate	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Spike concentration	N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample	1		0.008		0.007		0.007			0.012		0.012		0.009	
0	2	0	0.007		0.008				0	0.009		0.009			
	3		0.007		0.006					0.006		0.007			
Sample + Spike 1	1		0.242	0.961	0.229	0.943	0.245	93.9		0.230	0.938	0.236	0.966	0.240	92.0
1	2	0.261	0.244	0.968	0.230	0.907			0.261	0.240	0.954	0.238	0.944		
	3		0.256	0.986	0.238	0.932				0.248	0.977	0.240	0.955		
Sample + Spike 2	1		0.392	0.952	0.379	0.931	0.406	103.0		0.384	0.940	0.372	0.919	0.400	101.6
2	2	0.394	0.394	0.944	0.365	0.888			0.394	0.391	0.949	0.376	0.923		
	3		0.398	0.953	0.406	0.978				0.409	0.978	0.393	0.958		
Sample + Spike 3	1		0.780	0.969	0.701	0.917	0.777	98.6		0.690	0.902	0.702	0.922	0.763	96.8
3	2	0.788	0.753	0.935	0.689	0.892			0.788	0.752	0.974	0.721	0.930		
	3		0.760	0.965	0.724	0.938				0.755	0.961	0.756	0.976		

Mean recovery (%)	SD (%)
97.6	4.3

Analyte: **V1D**

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.002		0.003		0.002		0	0.006		0.005		0.004	
	2		0.002		0.002					0.004		0.004			
	3		0.002		0.002					0.003		0.002			
Sample + Spike 1	1	0.139	0.125	0.961	0.121	0.943	0.128	92.4	0.139	0.121	0.938	0.124	0.966	0.126	90.7
1	2		0.128	0.968	0.116	0.907				0.124	0.954	0.122	0.944		
	3		0.132	0.986	0.123	0.932				0.130	0.977	0.126	0.955		
Sample + Spike 2	1	0.198	0.198	0.952	0.191	0.931	0.205	103.5	0.198	0.197	0.940	0.186	0.919	0.203	102.3
2	2		0.195	0.944	0.183	0.888				0.198	0.949	0.189	0.923		
	3		0.201	0.953	0.202	0.978				0.205	0.978	0.197	0.958		
Sample + Spike 3	1	0.396	0.392	0.969	0.346	0.917	0.390	98.6	0.396	0.346	0.902	0.351	0.922	0.382	96.6
3	2		0.383	0.935	0.344	0.892				0.379	0.974	0.361	0.930		
	3		0.380	0.965	0.362	0.938				0.379	0.961	0.375	0.976		

Mean recovery (%)	SD (%)
97.3	5.2

Analyte: **VNB**

	Replicate	Sample: A Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)	Sample: B Spike concentration	Measured concentration N17346	N17346 Dilution Factor	N17348	N17348 Dilution Factor	Mean of spike	Recovery (%)
Sample 0	1	0	0.028		0.009		0.026		0	0.083		0.086		0.052	
	2		0.034		0.016					0.059		0.013			
	3		0.049		0.020					0.057		0.013			
Sample + Spike 1	1	2.046	1.797	0.961	1.768	0.943	1.929	94.3	2.046	1.805	0.938	1.878	0.966	1.894	92.6
1	2		1.870	0.968	1.840	0.907				1.832	0.954	1.830	0.944		
	3		2.006	0.986	1.864	0.932				1.953	0.977	1.875	0.955		
Sample + Spike 2	1	3.211	3.065	0.952	2.980	0.931	3.218	100.2	3.211	2.909	0.940	2.977	0.919	3.174	98.9
2	2		3.074	0.944	2.874	0.888				3.124	0.949	2.998	0.923		
	3		3.171	0.953	3.164	0.978				3.150	0.978	3.143	0.958		
Sample + Spike 3	1	6.422	5.974	0.969	5.444	0.917	6.116	95.2	6.422	5.469	0.902	5.611	0.922	6.082	94.7
3	2		5.985	0.935	5.443	0.892				5.954	0.974	5.697	0.930		
	3		5.965	0.965	5.702	0.938				5.991	0.961	6.051	0.976		

Mean recovery (%)	SD (%)
96.0	2.9

Table C2: Precision

Quality material is bovine serum.

Precision

Total relative standard deviation are to be ≤ 15% (CV ≤ 15%)

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**VCE**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.222	0.204	0.213	7.74E-05	7.74E-05	0.091
N17143	0.222	0.244	0.233	1.17E-04	1.17E-04	0.108
N17145	0.233	0.229	0.231	4.00E-06	4.00E-06	0.106
B17157	0.222	0.273	0.248	6.63E-04	6.63E-04	0.123
N17157	0.255	0.242	0.248	4.29E-05	4.29E-05	0.123
B17159	0.222	0.245	0.234	1.38E-04	1.38E-04	0.109
B17178	0.222	0.260	0.241	3.63E-04	3.63E-04	0.116
N17178	0.251	0.262	0.256	3.19E-05	3.19E-05	0.131
N17199	0.236	0.227	0.231	2.16E-05	2.16E-05	0.107
Z17201	0.240	0.256	0.248	6.64E-05	6.64E-05	0.123

Grand sum	4.765	**Grand mean**	0.238

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	3.05E-03	3.05E-04	1.75E-02	7.33
Between Run	2.82E-03	3.14E-04	2.06E-03	0.87
Total	5.87E-03		1.76E-02	**7.38**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	1.003	0.942	0.973	9.27E-04	9.27E-04	1.893
N17143	1.135	1.000	1.067	4.55E-03	4.55E-03	2.278
N17145	1.043	1.047	1.045	3.80E-06	3.80E-06	2.185
B17157	1.187	1.180	1.183	1.33E-05	1.33E-05	2.801
N17157	1.136	1.064	1.100	1.29E-03	1.29E-03	2.420
B17159	1.198	1.074	1.136	3.83E-03	3.83E-03	2.580
B17178	0.989	0.980	0.985	2.35E-05	2.35E-05	1.939
N17178	1.067	1.030	1.048	3.37E-04	3.37E-04	2.198
N17199	1.036	1.031	1.033	7.84E-06	7.84E-06	2.136
Z17201	1.108	1.013	1.060	2.28E-03	2.28E-03	2.249

Grand sum	21.262	**Grand mean**	1.063

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	2.65E-02	2.65E-03	5.15E-02	4.85
Between Run	7.38E-02	8.20E-03	5.26E-02	4.95
Total	1.00E-01		7.37E-02	**6.93**

Analyte: **VVB**

Quality material QL054

Run	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
1	0.127	0.128	0.128	3.60E-07	3.60E-07	0.033
2	0.141	0.139	0.140	8.10E-07	8.10E-07	0.039
3	0.137	0.136	0.136	3.60E-07	3.60E-07	0.037
4	0.155	0.155	0.155	2.50E-09	2.50E-09	0.048
5	0.136	0.139	0.138	2.25E-06	2.25E-06	0.038
6	0.143	0.145	0.144	1.00E-06	1.00E-06	0.042
7	0.139	0.150	0.145	2.81E-05	2.81E-05	0.042
8	0.137	0.144	0.141	1.30E-05	1.30E-05	0.039
9	0.135	0.126	0.130	2.03E-05	2.03E-05	0.034
10	0.133	0.139	0.136	7.84E-06	7.84E-06	0.037

Grand sum 2.785 **Grand mean** 0.139

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	1.48E-04	1.48E-05	3.85E-03	2.76
Between Run	1.09E-03	1.21E-04	7.30E-03	5.24
Total	1.24E-03		8.25E-03	**5.93**

Quality material QH054

Run	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
1	0.609	0.587	0.598	1.27E-04	1.27E-04	0.716
2	0.678	0.603	0.640	1.40E-03	1.40E-03	0.820
3	0.611	0.643	0.627	2.51E-04	2.51E-04	0.786
4	0.683	0.694	0.688	2.92E-05	2.92E-05	0.948
5	0.645	0.612	0.629	2.71E-04	2.71E-04	0.790
6	0.751	0.653	0.702	2.41E-03	2.41E-03	0.986
7	0.597	0.614	0.605	6.72E-05	6.72E-05	0.733
8	0.621	0.622	0.621	6.40E-07	6.40E-07	0.772
9	0.620	0.619	0.620	9.00E-08	9.00E-08	0.768
10	0.677	0.584	0.630	2.18E-03	2.18E-03	0.794

Grand sum 12.723 **Grand mean** 0.636

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.35E-02	1.35E-03	3.67E-02	5.77
Between Run	2.03E-02	2.26E-03	2.14E-02	3.36
Total	3.38E-02		4.25E-02	**6.67**

Analyte: **VFN**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.059	0.055	0.057	2.72E-06	2.72E-06	0.006
N17143	0.067	0.065	0.066	2.10E-06	2.10E-06	0.009
N17145	0.061	0.056	0.058	7.56E-06	7.56E-06	0.007
B17157	0.067	0.068	0.068	6.25E-08	6.25E-08	0.009
N17157	0.064	0.058	0.061	9.30E-06	9.30E-06	0.007
B17159	0.068	0.071	0.069	3.80E-06	3.80E-06	0.010
B17178	0.059	0.059	0.059	2.25E-08	2.25E-08	0.007
N17178	0.058	0.055	0.057	2.72E-06	2.72E-06	0.006
N17199	0.056	0.058	0.057	8.10E-07	8.10E-07	0.006
Z17201	0.058	0.063	0.061	5.29E-06	5.29E-06	0.007

Grand sum 1.224 **Grand mean** 0.061

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	6.88E-05	6.88E-06	2.62E-03	4.29
Between Run	4.08E-04	4.54E-05	4.39E-03	7.17
Total	4.77E-04		5.11E-03	**8.35**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.166	0.158	0.162	1.56E-05	1.56E-05	0.052
N17143	0.180	0.163	0.172	7.06E-05	7.06E-05	0.059
N17145	0.166	0.163	0.164	2.72E-06	2.72E-06	0.054
B17157	0.184	0.183	0.183	2.50E-07	2.50E-07	0.067
N17157	0.173	0.162	0.168	3.31E-05	3.31E-05	0.056
B17159	0.190	0.166	0.178	1.46E-04	1.46E-04	0.063
B17178	0.165	0.154	0.159	2.76E-05	2.76E-05	0.051
N17178	0.170	0.162	0.166	1.64E-05	1.64E-05	0.055
N17199	0.175	0.182	0.179	1.26E-05	1.26E-05	0.064
Z17201	0.181	0.159	0.170	1.23E-04	1.23E-04	0.058

Grand sum 3.402 **Grand mean** 0.170

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	8.97E-04	8.97E-05	9.47E-03	5.57
Between Run	1.09E-03	1.21E-04	3.97E-03	2.33
Total	1.99E-03		1.03E-02	**6.04**

Analyte: **VDEE**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.178	0.163	0.171	5.85E-05	5.85E-05	0.058
N17143	0.203	0.183	0.193	1.03E-04	1.03E-04	0.075
N17145	0.194	0.185	0.189	1.76E-05	1.76E-05	0.072
B17157	0.175	0.178	0.176	1.32E-06	1.32E-06	0.062
N17157	0.175	0.189	0.182	4.90E-05	4.90E-05	0.066
B17159	0.172	0.176	0.174	4.00E-06	4.00E-06	0.060
B17178	0.204	0.191	0.198	3.97E-05	3.97E-05	0.078
N17178	0.188	0.184	0.186	4.00E-06	4.00E-06	0.069
N17199	0.156	0.178	0.167	1.21E-04	1.21E-04	0.056
Z17201	0.194	0.223	0.209	2.00E-04	2.00E-04	0.087

Grand sum 3.688 **Grand mean** 0.184

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	1.20E-03	1.20E-04	1.09E-02	5.93
Between Run	3.10E-03	3.44E-04	1.06E-02	5.74
Total	4.29E-03		1.52E-02	**8.26**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.473	0.445	0.459	1.89E-04	1.89E-04	0.421
N17143	0.525	0.522	0.523	2.10E-06	2.10E-06	0.547
N17145	0.483	0.498	0.490	6.01E-05	6.01E-05	0.481
B17157	0.480	0.480	0.480	9.00E-08	9.00E-08	0.461
N17157	0.505	0.506	0.505	4.90E-07	4.90E-07	0.511
B17159	0.506	0.456	0.481	6.28E-04	6.28E-04	0.462
B17178	0.480	0.444	0.462	3.24E-04	3.24E-04	0.428
N17178	0.511	0.501	0.506	2.30E-05	2.30E-05	0.512
N17199	0.521	0.461	0.491	9.12E-04	9.12E-04	0.482
Z17201	0.500	0.506	0.503	7.02E-06	7.02E-06	0.506

Grand sum 9.801 **Grand mean** 0.490

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	4.29E-03	4.29E-04	2.07E-02	4.23
Between Run	7.35E-03	8.17E-04	1.39E-02	2.84
Total	1.16E-02		2.50E-02	**5.09**

Analyte: **VMC**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.357	0.343	0.350	4.69E-05	4.69E-05	0.245
N17143	0.354	0.344	0.349	2.55E-05	2.55E-05	0.243
N17145	0.336	0.330	0.333	9.00E-06	9.00E-06	0.222
B17157	0.344	0.343	0.344	2.02E-07	2.03E-07	0.236
N17157	0.351	0.362	0.356	3.19E-05	3.19E-05	0.254
B17159	0.336	0.354	0.345	8.28E-05	8.28E-05	0.238
B17178	0.339	0.342	0.341	1.82E-06	1.82E-06	0.232
N17178	0.348	0.359	0.354	2.70E-05	2.70E-05	0.250
N17199	0.364	0.366	0.365	5.62E-07	5.63E-07	0.267
Z17201	0.385	0.394	0.390	2.03E-05	2.03E-05	0.304

Grand sum 7.051 **Grand mean** 0.353

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	4.92E-04	4.92E-05	7.01E-03	1.99
Between Run	4.45E-03	4.94E-04	1.49E-02	4.23
Total	4.94E-03		1.65E-02	**4.67**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	1.422	1.340	1.381	1.69E-03	1.69E-03	3.812
N17143	1.487	1.408	1.448	1.56E-03	1.56E-03	4.191
N17145	1.351	1.366	1.358	5.62E-05	5.63E-05	3.690
B17157	1.467	1.465	1.466	1.56E-06	1.56E-06	4.298
N17157	1.480	1.456	1.468	1.42E-04	1.42E-04	4.312
B17159	1.603	1.380	1.491	1.24E-02	1.24E-02	4.447
B17178	1.409	1.386	1.397	1.35E-04	1.35E-04	3.905
N17178	1.480	1.444	1.462	3.20E-04	3.20E-04	4.276
N17199	1.443	1.473	1.458	2.24E-04	2.24E-04	4.252
Z17201	1.516	1.458	1.487	8.53E-04	8.53E-04	4.423

Grand sum 28.834 **Grand mean** 1.442

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	3.47E-02	3.47E-03	5.89E-02	4.09
Between Run	3.83E-02	4.26E-03	1.98E-02	1.37
Total	7.31E-02		6.22E-02	**4.31**

Analyte: **VME**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.065	0.063	0.064	1.82E-06	1.82E-06	0.008
N17143	0.068	0.069	0.068	4.22E-07	4.22E-07	0.009
N17145	0.063	0.061	0.062	8.10E-07	8.10E-07	0.008
B17157	0.066	0.066	0.066	0.00E+00	0.00E+00	0.009
N17157	0.063	0.064	0.064	1.60E-07	1.60E-07	0.008
B17159	0.066	0.068	0.067	2.10E-06	2.10E-06	0.009
B17178	0.065	0.060	0.063	4.84E-06	4.84E-06	0.008
N17178	0.062	0.060	0.061	8.10E-07	8.10E-07	0.007
N17199	0.060	0.057	0.059	2.25E-06	2.25E-06	0.007
Z17201	0.058	0.057	0.057	2.02E-07	2.03E-07	0.007

Grand sum 1.260 **Grand mean** 0.063

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	2.68E-05	2.68E-06	1.64E-03	2.60
Between Run	2.37E-04	2.63E-05	3.44E-03	5.46
Total	2.64E-04		3.81E-03	**6.05**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.262	0.251	0.257	2.81E-05	2.81E-05	0.132
N17143	0.284	0.282	0.283	9.03E-07	9.03E-07	0.160
N17145	0.245	0.248	0.247	2.72E-06	2.72E-06	0.122
B17157	0.266	0.271	0.269	4.62E-06	4.62E-06	0.144
N17157	0.266	0.287	0.277	1.03E-04	1.03E-04	0.153
B17159	0.291	0.255	0.273	3.26E-04	3.26E-04	0.149
B17178	0.256	0.236	0.246	1.02E-04	1.02E-04	0.121
N17178	0.257	0.246	0.251	3.42E-05	3.42E-05	0.126
N17199	0.243	0.243	0.243	2.25E-08	2.25E-08	0.118
Z17201	0.222	0.230	0.226	1.60E-05	1.60E-05	0.103

Grand sum 5.143 **Grand mean** 0.257

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.23E-03	1.23E-04	1.11E-02	4.32
Between Run	5.65E-03	6.28E-04	1.59E-02	6.18
Total	6.89E-03		1.94E-02	**7.54**

Analyte: **V06**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.513	0.527	0.520	4.90E-05	4.90E-05	0.541
N17143	0.454	0.497	0.475	4.64E-04	4.64E-04	0.452
N17145	0.415	0.427	0.421	3.91E-05	3.91E-05	0.354
B17157	0.506	0.542	0.524	3.37E-04	3.37E-04	0.549
N17157	0.388	0.442	0.415	7.29E-04	7.29E-04	0.344
B17159	0.576	0.603	0.589	1.84E-04	1.84E-04	0.695
B17178	0.418	0.642	0.530	1.25E-02	1.25E-02	0.562
N17178	0.425	0.574	0.500	5.54E-03	5.54E-03	0.500
N17199	0.434	0.474	0.454	3.92E-04	3.92E-04	0.412
Z17201	0.451	0.470	0.461	9.03E-05	9.02E-05	0.424

Grand sum 9.777 **Grand mean** 0.489

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	4.07E-02	4.07E-03	6.38E-02	13.06
Between Run	5.29E-02	5.87E-03	3.00E-02	6.14
Total	9.36E-02		7.05E-02	**14.43**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	1.381	1.312	1.347	1.19E-03	1.19E-03	3.626
N17143	1.211	1.331	1.271	3.58E-03	3.58E-03	3.230
N17145	1.047	1.152	1.099	2.73E-03	2.73E-03	2.418
B17157	1.234	1.283	1.258	5.98E-04	5.98E-04	3.167
N17157	1.076	1.118	1.097	4.24E-04	4.24E-04	2.406
B17159	1.651	1.463	1.557	8.85E-03	8.85E-03	4.849
B17178	1.210	1.501	1.356	2.12E-02	2.12E-02	3.675
N17178	0.987	1.278	1.133	2.12E-02	2.12E-02	2.565
N17199	1.012	1.173	1.093	6.49E-03	6.49E-03	2.388
Z17201	1.347	1.246	1.297	2.55E-03	2.55E-03	3.362

Grand sum 25.013 **Grand mean** 1.251

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.38E-01	1.38E-02	1.17E-01	9.38
Between Run	4.04E-01	4.49E-02	1.25E-01	9.98
Total	5.42E-01		1.71E-01	**13.69**

Analyte: **VCF**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.057	0.055	0.056	5.63E-07	5.63E-07	0.006
N17143	0.059	0.057	0.058	7.23E-07	7.22E-07	0.007
N17145	0.059	0.057	0.058	5.63E-07	5.63E-07	0.007
B17157	0.058	0.060	0.059	4.23E-07	4.22E-07	0.007
N17157	0.058	0.058	0.058	1.00E-08	1.00E-08	0.007
B17159	0.057	0.058	0.058	2.03E-07	2.02E-07	0.007
B17178	0.055	0.056	0.056	4.90E-07	4.90E-07	0.006
N17178	0.057	0.056	0.056	2.25E-08	2.25E-08	0.006
N17199	0.056	0.053	0.055	1.56E-06	1.56E-06	0.006
Z17201	0.059	0.060	0.059	2.50E-07	2.50E-07	0.007

Grand sum 1.145 **Grand mean** 0.057

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	9.62E-06	9.62E-07	9.81E-04	1.71
Between Run	4.29E-05	4.76E-06	1.38E-03	2.41
Total	5.25E-05		1.69E-03	**2.96**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.286	0.268	0.277	7.31E-05	7.31E-05	0.153
N17143	0.295	0.279	0.287	5.78E-05	5.78E-05	0.165
N17145	0.243	0.273	0.258	2.31E-04	2.31E-04	0.133
B17157	0.298	0.294	0.296	4.20E-06	4.20E-06	0.175
N17157	0.280	0.278	0.279	1.32E-06	1.32E-06	0.156
B17159	0.304	0.272	0.288	2.61E-04	2.61E-04	0.166
B17178	0.270	0.271	0.271	6.40E-07	6.40E-07	0.146
N17178	0.283	0.279	0.281	5.52E-06	5.52E-06	0.158
N17199	0.270	0.276	0.273	1.09E-05	1.09E-05	0.149
Z17201	0.283	0.272	0.277	3.36E-05	3.36E-05	0.154

Grand sum 5.573 **Grand mean** 0.279

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.36E-03	1.36E-04	1.17E-02	4.18
Between Run	1.99E-03	2.21E-04	6.53E-03	2.34
Total	3.35E-03		1.34E-02	**4.79**

Analyte: **VEA**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	5.636	5.541	5.589	2.26E-03	2.26E-03	62.463
N17143	6.221	7.921	7.071	7.22E-01	7.22E-01	99.998
N17145	7.309	8.990	8.150	7.06E-01	7.06E-01	132.835
B17157	7.663	7.801	7.732	4.74E-03	4.74E-03	119.569
N17157	6.164	6.953	6.558	1.56E-01	1.56E-01	86.021
B17159	6.367	6.427	6.397	9.12E-04	9.12E-04	81.843
B17178	6.769	7.446	7.107	1.15E-01	1.15E-01	101.032
N17178	6.682	8.125	7.404	5.20E-01	5.20E-01	109.628
N17199	6.755	7.439	7.097	1.17E-01	1.17E-01	100.740
Z17201	5.492	5.427	5.460	1.06E-03	1.06E-03	59.612

Grand sum 137.129 **Grand mean** 6.856

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	4.69E+00	4.69E-01	6.85E-01	9.99
Between Run	1.35E+01	1.50E+00	7.19E-01	10.49
Total	1.82E+01		9.93E-01	**14.48**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	7.505	7.007	7.256	6.20E-02	6.20E-02	105.299
N17143	7.571	8.586	8.078	2.58E-01	2.58E-01	130.516
N17145	8.263	9.699	8.981	5.16E-01	5.16E-01	161.317
B17157	8.085	8.544	8.315	5.26E-02	5.26E-02	138.263
N17157	7.375	8.400	7.888	2.63E-01	2.63E-01	124.435
B17159	8.146	7.390	7.768	1.43E-01	1.43E-01	120.682
B17178	7.645	7.936	7.791	2.12E-02	2.12E-02	121.392
N17178	6.771	8.078	7.424	4.27E-01	4.27E-01	110.239
N17199	5.991	6.483	6.237	6.06E-02	6.06E-02	77.808
Z17201	6.730	6.774	6.752	4.84E-04	4.84E-04	91.179

Grand sum 152.980 **Grand mean** 7.649

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	3.61E+00	3.61E-01	6.01E-01	7.85
Between Run	1.10E+01	1.22E+00	6.56E-01	8.58
Total	1.46E+01		8.89E-01	**11.63**

Analyte: **VMCP**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.214	0.199	0.206	5.33E-05	5.33E-05	0.085
N17143	0.194	0.212	0.203	8.10E-05	8.10E-05	0.082
N17145	0.184	0.183	0.183	2.03E-07	2.03E-07	0.067
B17157	0.217	0.225	0.221	1.30E-05	1.30E-05	0.098
N17157	0.173	0.189	0.181	6.16E-05	6.16E-05	0.065
B17159	0.246	0.251	0.249	5.76E-06	5.76E-06	0.124
B17178	0.194	0.254	0.224	8.79E-04	8.79E-04	0.100
N17178	0.192	0.231	0.211	3.92E-04	3.92E-04	0.089
N17199	0.196	0.207	0.201	2.76E-05	2.76E-05	0.081
Z17201	0.179	0.190	0.185	3.03E-05	3.03E-05	0.068

Grand sum 4.128 **Grand mean** 0.206

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	3.09E-03	3.09E-04	1.76E-02	8.51
Between Run	8.10E-03	9.00E-04	1.72E-02	8.33
Total	1.12E-02		2.46E-02	**11.91**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.696	0.657	0.677	3.82E-04	3.82E-04	0.915
N17143	0.612	0.699	0.655	1.91E-03	1.91E-03	0.859
N17145	0.593	0.596	0.595	3.06E-06	3.06E-06	0.707
B17157	0.680	0.698	0.689	7.66E-05	7.66E-05	0.949
N17157	0.580	0.618	0.599	3.61E-04	3.61E-04	0.717
B17159	0.884	0.774	0.829	3.02E-03	3.02E-03	1.373
B17178	0.618	0.652	0.635	2.98E-04	2.98E-04	0.807
N17178	0.592	0.539	0.566	7.08E-04	7.08E-04	0.640
N17199	0.661	0.688	0.674	1.85E-04	1.85E-04	0.909
Z17201	0.627	0.613	0.620	5.04E-05	5.04E-05	0.768

Grand sum 13.075 **Grand mean** 0.654

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.40E-02	1.40E-03	3.74E-02	5.72
Between Run	9.70E-02	1.08E-02	6.85E-02	10.48
Total	1.11E-01		7.80E-02	**11.94**

Analyte: **VIBN**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.343	0.327	0.335	5.70E-05	5.70E-05	0.224
N17143	0.373	0.362	0.367	3.25E-05	3.25E-05	0.270
N17145	0.356	0.347	0.351	2.21E-05	2.21E-05	0.247
B17157	0.321	0.330	0.325	1.98E-05	1.98E-05	0.212
N17157	0.346	0.341	0.344	8.12E-06	8.12E-06	0.236
B17159	0.328	0.343	0.335	6.01E-05	6.01E-05	0.225
B17178	0.327	0.332	0.329	6.00E-06	6.00E-06	0.217
N17178	0.320	0.311	0.315	1.76E-05	1.76E-05	0.199
N17199	0.323	0.307	0.315	6.16E-05	6.16E-05	0.198
Z17201	0.322	0.311	0.316	2.70E-05	2.70E-05	0.200

Grand sum 6.667 **Grand mean** 0.333

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	6.24E-04	6.24E-05	7.90E-03	2.37
Between Run	5.24E-03	5.82E-04	1.61E-02	4.83
Total	5.86E-03		1.79E-02	**5.38**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	1.054	0.980	1.017	1.38E-03	1.38E-03	2.069
N17143	1.082	1.073	1.078	1.85E-05	1.85E-05	2.323
N17145	0.904	1.028	0.966	3.88E-03	3.88E-03	1.867
B17157	0.999	1.033	1.016	2.77E-04	2.77E-04	2.064
N17157	1.096	1.025	1.060	1.27E-03	1.27E-03	2.249
B17159	1.161	0.951	1.056	1.10E-02	1.10E-02	2.232
B17178	1.005	0.985	0.995	1.07E-04	1.07E-04	1.979
N17178	0.987	0.981	0.984	6.76E-06	6.76E-06	1.937
N17199	0.995	0.993	0.994	1.21E-06	1.21E-06	1.976
Z17201	1.042	0.998	1.020	4.97E-04	4.97E-04	2.080

Grand sum 20.373 **Grand mean** 1.019

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	3.69E-02	3.69E-03	6.07E-02	5.96
Between Run	2.36E-02	2.62E-03	0.00E+00	0.00
Total	6.05E-02		6.07E-02	**5.96**

Analyte: **VTHF**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	1.223	1.148	1.185	1.39E-03	1.39E-03	2.810
N17143	1.276	1.154	1.215	3.71E-03	3.71E-03	2.951
N17145	1.226	1.171	1.198	7.32E-04	7.32E-04	2.873
B17157	1.205	1.213	1.209	1.94E-05	1.94E-05	2.923
N17157	1.222	1.210	1.216	4.03E-05	4.03E-05	2.957
B17159	1.144	1.210	1.177	1.08E-03	1.08E-03	2.770
B17178	1.149	1.071	1.110	1.52E-03	1.52E-03	2.466
N17178	1.202	1.176	1.189	1.69E-04	1.69E-04	2.827
N17199	1.121	1.101	1.111	9.80E-05	9.80E-05	2.470
Z17201	1.037	1.048	1.042	3.19E-05	3.19E-05	2.172

Grand sum 23.306 **Grand mean** 1.165

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	1.76E-02	1.76E-03	4.19E-02	3.60
Between Run	6.04E-02	6.71E-03	4.98E-02	4.27
Total	7.80E-02		6.51E-02	**5.58**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	4.012	3.641	3.827	3.44E-02	3.44E-02	29.290
N17143	3.739	3.741	3.740	1.21E-06	1.21E-06	27.975
N17145	3.226	3.752	3.489	6.92E-02	6.92E-02	24.345
B17157	4.020	4.018	4.019	1.32E-06	1.32E-06	32.309
N17157	3.850	3.984	3.917	4.51E-03	4.51E-03	30.688
B17159	4.177	3.535	3.856	1.03E-01	1.03E-01	29.734
B17178	3.715	3.533	3.624	8.29E-03	8.29E-03	26.263
N17178	3.973	3.800	3.886	7.48E-03	7.48E-03	30.207
N17199	3.858	3.707	3.783	5.74E-03	5.74E-03	28.617
Z17201	3.689	3.737	3.713	5.76E-04	5.76E-04	27.574

Grand sum 75.708 **Grand mean** 3.785

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	4.66E-01	4.66E-02	2.16E-01	5.70
Between Run	4.20E-01	4.67E-02	6.69E-03	0.18
Total	8.87E-01		2.16E-01	**5.71**

Analyte: **V2A**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.047	0.047	0.047	6.25E-08	6.25E-08	0.004
N17143	0.050	0.049	0.049	2.50E-07	2.50E-07	0.005
N17145	0.048	0.047	0.047	1.00E-08	1.00E-08	0.004
B17157	0.047	0.048	0.047	2.02E-07	2.02E-07	0.005
N17157	0.048	0.048	0.048	4.00E-08	4.00E-08	0.005
B17159	0.047	0.051	0.049	3.24E-06	3.24E-06	0.005
B17178	0.046	0.046	0.046	2.50E-09	2.50E-09	0.004
N17178	0.049	0.048	0.048	9.00E-08	9.00E-08	0.005
N17199	0.044	0.044	0.044	2.50E-09	2.50E-09	0.004
Z17201	0.045	0.046	0.046	3.60E-07	3.60E-07	0.004

Grand sum 0.943 **Grand mean** 0.047

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	8.52E-06	8.52E-07	9.23E-04	1.96
Between Run	4.89E-05	5.43E-06	1.51E-03	3.21
Total	5.74E-05		1.77E-03	**3.76**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.281	0.269	0.275	3.91E-05	3.91E-05	0.151
N17143	0.295	0.289	0.292	1.16E-05	1.16E-05	0.170
N17145	0.271	0.275	0.273	5.76E-06	5.76E-06	0.149
B17157	0.284	0.288	0.286	3.24E-06	3.24E-06	0.164
N17157	0.286	0.282	0.284	4.20E-06	4.20E-06	0.161
B17159	0.309	0.267	0.288	4.28E-04	4.28E-04	0.166
B17178	0.272	0.278	0.275	7.56E-06	7.56E-06	0.151
N17178	0.282	0.286	0.284	3.80E-06	3.80E-06	0.162
N17199	0.261	0.264	0.263	2.56E-06	2.56E-06	0.138
Z17201	0.278	0.271	0.274	1.37E-05	1.37E-05	0.151

Grand sum 5.588 **Grand mean** 0.279

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.04E-03	1.04E-04	1.02E-02	3.65
Between Run	1.42E-03	1.58E-04	5.20E-03	1.86
Total	2.46E-03		1.14E-02	**4.10**

Analyte: **VTE**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.025	0.024	0.024	8.10E-07	8.10E-07	0.001
N17143	0.026	0.026	0.026	4.00E-08	4.00E-08	0.001
N17145	0.026	0.026	0.026	0.00E+00	0.00E+00	0.001
B17157	0.027	0.027	0.027	9.00E-08	9.00E-08	0.001
N17157	0.025	0.026	0.026	9.00E-08	9.00E-08	0.001
B17159	0.026	0.026	0.026	1.00E-08	1.00E-08	0.001
B17178	0.025	0.026	0.026	8.10E-07	8.10E-07	0.001
N17178	0.024	0.026	0.025	5.62E-07	5.63E-07	0.001
N17199	0.024	0.023	0.024	2.02E-07	2.02E-07	0.001
Z17201	0.024	0.025	0.025	2.50E-07	2.50E-07	0.001

Grand sum 0.508 **Grand mean** 0.025

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	5.73E-06	5.73E-07	7.57E-04	2.98
Between Run	1.60E-05	1.78E-06	7.76E-04	3.06
Total	2.17E-05		1.08E-03	**4.27**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.139	0.132	0.135	9.30E-06	9.30E-06	0.037
N17143	0.149	0.140	0.145	2.03E-05	2.03E-05	0.042
N17145	0.139	0.142	0.140	1.56E-06	1.56E-06	0.039
B17157	0.144	0.147	0.145	2.40E-06	2.40E-06	0.042
N17157	0.145	0.141	0.143	3.24E-06	3.24E-06	0.041
B17159	0.155	0.135	0.145	9.80E-05	9.80E-05	0.042
B17178	0.142	0.145	0.144	2.10E-06	2.10E-06	0.041
N17178	0.141	0.138	0.139	1.96E-06	1.96E-06	0.039
N17199	0.138	0.138	0.138	4.00E-08	4.00E-08	0.038
Z17201	0.143	0.133	0.138	2.60E-05	2.60E-05	0.038

Grand sum 2.827 **Grand mean** 0.141

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	3.30E-04	3.30E-05	5.74E-03	4.06
Between Run	2.27E-04	2.52E-05	0.00E+00	0.00
Total	5.57E-04		5.74E-03	**4.06**

Analyte: **VC06**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.077	0.078	0.078	3.02E-07	3.02E-07	0.012
N17143	0.073	0.076	0.075	3.06E-06	3.06E-06	0.011
N17145	0.073	0.077	0.075	3.61E-06	3.61E-06	0.011
B17157	0.080	0.092	0.086	3.42E-05	3.42E-05	0.015
N17157	0.069	0.073	0.071	3.80E-06	3.80E-06	0.010
B17159	0.096	0.102	0.099	9.61E-06	9.61E-06	0.019
B17178	0.072	0.103	0.088	2.50E-04	2.50E-04	0.015
N17178	0.077	0.104	0.091	1.82E-04	1.82E-04	0.017
N17199	0.077	0.080	0.079	1.56E-06	1.56E-06	0.012
Z17201	0.077	0.087	0.082	2.97E-05	2.97E-05	0.013

Grand sum 1.644 **Grand mean** 0.082

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	1.04E-03	1.04E-04	1.02E-02	12.38
Between Run	1.31E-03	1.46E-04	4.60E-03	5.60
Total	2.35E-03		1.12E-02	**13.59**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.525	0.517	0.521	1.72E-05	1.72E-05	0.543
N17143	0.481	0.524	0.502	4.80E-04	4.80E-04	0.505
N17145	0.433	0.496	0.464	9.70E-04	9.70E-04	0.431
B17157	0.534	0.553	0.544	9.41E-05	9.41E-05	0.591
N17157	0.475	0.510	0.493	2.96E-04	2.96E-04	0.485
B17159	0.695	0.670	0.682	1.54E-04	1.54E-04	0.931
B17178	0.480	0.533	0.506	7.16E-04	7.16E-04	0.513
N17178	0.479	0.511	0.495	2.61E-04	2.61E-04	0.491
N17199	0.476	0.501	0.489	1.54E-04	1.54E-04	0.477
Z17201	0.513	0.506	0.510	1.12E-05	1.12E-05	0.520

Grand sum 10.413 **Grand mean** 0.521

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	6.30E-03	6.30E-04	2.51E-02	4.82
Between Run	6.59E-02	7.32E-03	5.78E-02	11.11
Total	7.22E-02		6.31E-02	**12.11**

Analyte: **VCT**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.017	0.017	0.017	4.00E-08	4.00E-08	0.001
N17143	0.017	0.017	0.017	1.00E-08	1.00E-08	0.001
N17145	0.018	0.018	0.018	1.00E-08	1.00E-08	0.001
B17157	0.018	0.019	0.019	3.02E-07	3.02E-07	0.001
N17157	0.017	0.018	0.017	1.23E-07	1.23E-07	0.001
B17159	0.018	0.019	0.018	2.03E-07	2.02E-07	0.001
B17178	0.018	0.020	0.019	9.02E-07	9.02E-07	0.001
N17178	0.017	0.019	0.018	5.62E-07	5.63E-07	0.001
N17199	0.018	0.017	0.018	8.10E-07	8.10E-07	0.001
Z17201	0.019	0.020	0.019	9.00E-08	9.00E-08	0.001

Grand sum 0.360 **Grand mean** 0.018

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	6.10E-06	6.10E-07	7.81E-04	4.34
Between Run	1.15E-05	1.28E-06	5.80E-04	3.22
Total	1.76E-05		9.73E-04	**5.40**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.109	0.104	0.106	5.52E-06	5.52E-06	0.023
N17143	0.109	0.101	0.105	1.48E-05	1.48E-05	0.022
N17145	0.098	0.100	0.099	4.90E-07	4.90E-07	0.020
B17157	0.109	0.110	0.109	4.00E-08	4.00E-08	0.024
N17157	0.103	0.100	0.101	2.72E-06	2.72E-06	0.021
B17159	0.124	0.108	0.116	6.24E-05	6.24E-05	0.027
B17178	0.099	0.104	0.102	7.02E-06	7.02E-06	0.021
N17178	0.102	0.101	0.102	3.60E-07	3.60E-07	0.021
N17199	0.104	0.103	0.104	1.60E-07	1.60E-07	0.022
Z17201	0.110	0.102	0.106	1.64E-05	1.64E-05	0.022

Grand sum 2.100 **Grand mean** 0.105

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	2.20E-04	2.20E-05	4.69E-03	4.47
Between Run	4.23E-04	4.71E-05	3.54E-03	3.37
Total	6.43E-04		5.88E-03	**5.60**

Analyte: **VBZ**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.058	0.059	0.059	2.25E-08	2.25E-08	0.007
N17143	0.068	0.072	0.070	3.80E-06	3.80E-06	0.010
N17145	0.062	0.065	0.063	2.56E-06	2.56E-06	0.008
B17157	0.065	0.065	0.065	6.25E-08	6.25E-08	0.008
N17157	0.058	0.058	0.058	4.00E-08	4.00E-08	0.007
B17159	0.064	0.071	0.068	1.44E-05	1.44E-05	0.009
B17178	0.057	0.058	0.057	6.40E-07	6.40E-07	0.007
N17178	0.063	0.068	0.065	6.76E-06	6.76E-06	0.008
N17199	0.062	0.062	0.062	2.50E-09	2.50E-09	0.008
Z17201	0.061	0.062	0.061	1.60E-07	1.60E-07	0.007

Grand sum 1.256 **Grand mean** 0.063

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	5.70E-05	5.70E-06	2.39E-03	3.80
Between Run	3.26E-04	3.62E-05	3.91E-03	6.22
Total	3.83E-04		4.58E-03	**7.29**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.323	0.291	0.307	2.50E-04	2.50E-04	0.188
N17143	0.351	0.345	0.348	9.00E-06	9.00E-06	0.242
N17145	0.302	0.317	0.309	5.55E-05	5.55E-05	0.192
B17157	0.326	0.312	0.319	4.56E-05	4.56E-05	0.203
N17157	0.317	0.321	0.319	4.62E-06	4.62E-06	0.203
B17159	0.328	0.311	0.320	7.23E-05	7.22E-05	0.205
B17178	0.306	0.305	0.305	2.03E-07	2.03E-07	0.186
N17178	0.312	0.308	0.310	3.80E-06	3.80E-06	0.192
N17199	0.336	0.336	0.336	0.00E+00	0.00E+00	0.225
Z17201	0.324	0.318	0.321	9.92E-06	9.92E-06	0.206

Grand sum 6.385 **Grand mean** 0.319

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	9.01E-04	9.01E-05	9.49E-03	2.97
Between Run	3.26E-03	3.62E-04	1.17E-02	3.65
Total	4.16E-03		1.50E-02	**4.71**

Analyte: **V07N**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.175	0.158	0.167	7.23E-05	7.22E-05	0.055
N17143	0.162	0.187	0.175	1.56E-04	1.56E-04	0.061
N17145	0.138	0.139	0.139	2.50E-07	2.50E-07	0.038
B17157	0.174	0.180	0.177	1.06E-05	1.06E-05	0.063
N17157	0.140	0.140	0.140	0.00E+00	0.00E+00	0.039
B17159	0.184	0.184	0.184	0.00E+00	0.00E+00	0.068
B17178	0.148	0.159	0.154	2.65E-05	2.65E-05	0.047
N17178	0.131	0.127	0.129	4.00E-06	4.00E-06	0.033
N17199	0.144	0.143	0.143	9.00E-08	9.00E-08	0.041
Z17201	0.176	0.170	0.173	9.00E-06	9.00E-06	0.060

Grand sum 3.157 **Grand mean** 0.158

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	5.58E-04	5.58E-05	7.47E-03	4.73
Between Run	6.81E-03	7.57E-04	1.87E-02	11.86
Total	7.37E-03		2.02E-02	**12.77**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.782	0.720	0.751	9.61E-04	9.61E-04	1.128
N17143	0.802	0.882	0.842	1.60E-03	1.60E-03	1.418
N17145	0.667	0.707	0.687	4.00E-04	4.00E-04	0.944
B17157	0.827	0.843	0.835	6.48E-05	6.48E-05	1.393
N17157	0.682	0.679	0.680	1.56E-06	1.56E-06	0.925
B17159	0.958	0.826	0.892	4.36E-03	4.36E-03	1.591
B17178	0.713	0.670	0.691	4.71E-04	4.71E-04	0.956
N17178	0.650	0.550	0.600	2.50E-03	2.50E-03	0.720
N17199	0.670	0.660	0.665	2.30E-05	2.30E-05	0.884
Z17201	0.822	0.746	0.784	1.44E-03	1.44E-03	1.229

Grand sum 14.854 **Grand mean** 0.743

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	2.36E-02	2.36E-03	4.86E-02	6.55
Between Run	1.57E-01	1.74E-02	8.68E-02	11.69
Total	1.81E-01		9.95E-02	**13.40**

Analyte: **VTC**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.043	0.041	0.042	6.40E-07	6.40E-07	0.004
N17143	0.047	0.046	0.046	4.00E-08	4.00E-08	0.004
N17145	0.044	0.044	0.044	6.25E-08	6.25E-08	0.004
B17157	0.043	0.049	0.046	7.56E-06	7.56E-06	0.004
N17157	0.046	0.046	0.046	0.00E+00	0.00E+00	0.004
B17159	0.044	0.046	0.045	3.60E-07	3.60E-07	0.004
B17178	0.043	0.045	0.044	1.00E-06	1.00E-06	0.004
N17178	0.047	0.046	0.046	4.00E-08	4.00E-08	0.004
N17199	0.043	0.042	0.043	4.23E-07	4.22E-07	0.004
Z17201	0.045	0.047	0.046	9.02E-07	9.02E-07	0.004

Grand sum 0.896 **Grand mean** 0.045

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	2.21E-05	2.21E-06	1.49E-03	3.32
Between Run	4.42E-05	4.91E-06	1.16E-03	2.59
Total	6.62E-05		1.89E-03	**4.21**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.256	0.245	0.251	3.25E-05	3.25E-05	0.126
N17143	0.278	0.263	0.271	5.55E-05	5.55E-05	0.147
N17145	0.254	0.262	0.258	1.48E-05	1.48E-05	0.133
B17157	0.267	0.278	0.272	2.86E-05	2.86E-05	0.148
N17157	0.269	0.261	0.265	1.64E-05	1.64E-05	0.141
B17159	0.295	0.251	0.273	4.71E-04	4.71E-04	0.149
B17178	0.253	0.257	0.255	4.62E-06	4.62E-06	0.130
N17178	0.279	0.277	0.278	1.10E-06	1.10E-06	0.154
N17199	0.257	0.256	0.257	9.00E-08	9.00E-08	0.132
Z17201	0.280	0.265	0.273	5.26E-05	5.26E-05	0.149

Grand sum 5.305 **Grand mean** 0.265

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.35E-03	1.35E-04	1.16E-02	4.39
Between Run	1.57E-03	1.75E-04	4.44E-03	1.68
Total	2.93E-03		1.25E-02	**4.70**

Analyte: **VBM**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.053	0.053	0.053	1.60E-07	1.60E-07	0.006
N17143	0.053	0.052	0.052	1.00E-08	1.00E-08	0.005
N17145	0.052	0.053	0.053	6.25E-08	6.25E-08	0.006
B17157	0.051	0.054	0.052	2.10E-06	2.10E-06	0.006
N17157	0.052	0.053	0.052	4.00E-08	4.00E-08	0.005
B17159	0.056	0.058	0.057	1.69E-06	1.69E-06	0.006
B17178	0.054	0.055	0.054	2.50E-07	2.50E-07	0.006
N17178	0.052	0.051	0.052	4.00E-08	4.00E-08	0.005
N17199	0.052	0.052	0.052	6.25E-08	6.25E-08	0.005
Z17201	0.052	0.054	0.053	3.60E-07	3.60E-07	0.006

Grand sum 1.061 **Grand mean** 0.053

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	9.56E-06	9.56E-07	9.77E-04	1.84
Between Run	4.42E-05	4.91E-06	1.41E-03	2.65
Total	5.37E-05		1.71E-03	**3.23**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.253	0.239	0.246	4.29E-05	4.29E-05	0.121
N17143	0.265	0.256	0.261	1.76E-05	1.76E-05	0.136
N17145	0.238	0.244	0.241	8.41E-06	8.41E-06	0.116
B17157	0.257	0.261	0.259	3.61E-06	3.61E-06	0.134
N17157	0.250	0.247	0.249	2.10E-06	2.10E-06	0.124
B17159	0.287	0.248	0.267	3.74E-04	3.74E-04	0.143
B17178	0.251	0.251	0.251	2.25E-08	2.25E-08	0.126
N17178	0.250	0.246	0.248	3.42E-06	3.42E-06	0.123
N17199	0.246	0.251	0.249	5.29E-06	5.29E-06	0.124
Z17201	0.259	0.251	0.255	1.33E-05	1.33E-05	0.130

Grand sum 5.050 **Grand mean** 0.252

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	9.42E-04	9.42E-05	9.71E-03	3.84
Between Run	1.12E-03	1.25E-04	3.91E-03	1.55
Total	2.07E-03		1.05E-02	**4.14**

Analyte: **2DF**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.054	0.053	0.053	8.10E-07	8.10E-07	0.006
N17143	0.056	0.057	0.057	4.00E-08	4.00E-08	0.006
N17145	0.055	0.056	0.056	3.03E-07	3.02E-07	0.006
B17157	0.057	0.058	0.057	2.02E-07	2.02E-07	0.007
N17157	0.057	0.057	0.057	2.50E-09	2.50E-09	0.006
B17159	0.055	0.056	0.055	2.25E-08	2.25E-08	0.006
B17178	0.053	0.055	0.054	9.03E-07	9.02E-07	0.006
N17178	0.052	0.055	0.054	1.82E-06	1.82E-06	0.006
N17199	0.053	0.054	0.054	6.40E-07	6.40E-07	0.006
Z17201	0.052	0.054	0.053	1.00E-06	1.00E-06	0.006

Grand sum 1.098 **Grand mean** 0.055

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	1.15E-05	1.15E-06	1.07E-03	1.95
Between Run	4.71E-05	5.24E-06	1.43E-03	2.60
Total	5.86E-05		1.79E-03	**3.26**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.149	0.143	0.146	9.61E-06	9.61E-06	0.042
N17143	0.156	0.153	0.154	1.44E-06	1.44E-06	0.048
N17145	0.144	0.149	0.147	7.56E-06	7.56E-06	0.043
B17157	0.153	0.153	0.153	6.25E-08	6.25E-08	0.047
N17157	0.148	0.149	0.149	1.60E-07	1.60E-07	0.044
B17159	0.168	0.144	0.156	1.33E-04	1.33E-04	0.049
B17178	0.142	0.145	0.143	3.42E-06	3.42E-06	0.041
N17178	0.146	0.148	0.147	6.40E-07	6.40E-07	0.043
N17199	0.143	0.149	0.146	9.00E-06	9.00E-06	0.042
Z17201	0.154	0.150	0.152	4.84E-06	4.84E-06	0.046

Grand sum 2.985 **Grand mean** 0.149

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	3.40E-04	3.40E-05	5.83E-03	3.91
Between Run	3.30E-04	3.67E-05	1.15E-03	0.77
Total	6.70E-04		5.95E-03	**3.98**

Analyte: **VTFT**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.056	0.055	0.055	2.50E-07	2.50E-07	0.006
N17143	0.057	0.056	0.057	1.23E-07	1.22E-07	0.006
N17145	0.055	0.056	0.055	4.00E-08	4.00E-08	0.006
B17157	0.058	0.060	0.059	1.00E-06	1.00E-06	0.007
N17157	0.056	0.056	0.056	1.60E-07	1.60E-07	0.006
B17159	0.057	0.060	0.059	1.56E-06	1.56E-06	0.007
B17178	0.054	0.055	0.054	5.63E-07	5.63E-07	0.006
N17178	0.054	0.055	0.054	4.90E-07	4.90E-07	0.006
N17199	0.055	0.055	0.055	2.25E-08	2.25E-08	0.006
Z17201	0.054	0.056	0.055	9.02E-07	9.02E-07	0.006

Grand sum 1.119 **Grand mean** 0.056

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	1.02E-05	1.02E-06	1.01E-03	1.81
Between Run	4.77E-05	5.30E-06	1.46E-03	2.62
Total	5.80E-05		1.78E-03	**3.18**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.330	0.317	0.324	4.49E-05	4.49E-05	0.210
N17143	0.333	0.323	0.328	2.45E-05	2.45E-05	0.216
N17145	0.304	0.315	0.310	2.97E-05	2.97E-05	0.192
B17157	0.347	0.351	0.349	4.20E-06	4.20E-06	0.243
N17157	0.326	0.322	0.324	3.61E-06	3.61E-06	0.209
B17159	0.370	0.315	0.342	7.76E-04	7.76E-04	0.234
B17178	0.311	0.314	0.312	3.06E-06	3.06E-06	0.195
N17178	0.325	0.316	0.320	2.03E-05	2.03E-05	0.205
N17199	0.322	0.327	0.324	6.50E-06	6.50E-06	0.210
Z17201	0.331	0.325	0.328	9.00E-06	9.00E-06	0.215

Grand sum 6.522 **Grand mean** 0.326

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.84E-03	1.84E-04	1.36E-02	4.16
Between Run	2.61E-03	2.91E-04	7.29E-03	2.24
Total	4.46E-03		1.54E-02	**4.73**

Analyte: **VMIK**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.239	0.230	0.235	2.03E-05	2.03E-05	0.110
N17143	0.236	0.237	0.236	4.23E-07	4.22E-07	0.112
N17145	0.225	0.231	0.228	7.29E-06	7.29E-06	0.104
B17157	0.227	0.232	0.230	5.76E-06	5.76E-06	0.105
N17157	0.231	0.235	0.233	4.41E-06	4.41E-06	0.109
B17159	0.222	0.240	0.231	7.92E-05	7.92E-05	0.106
B17178	0.236	0.231	0.234	6.25E-06	6.25E-06	0.109
N17178	0.220	0.232	0.226	3.91E-05	3.91E-05	0.102
N17199	0.227	0.218	0.223	2.03E-05	2.02E-05	0.099
Z17201	0.224	0.228	0.226	3.80E-06	3.80E-06	0.102

Grand sum 4.601 **Grand mean** 0.230

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	3.73E-04	3.73E-05	6.11E-03	2.66
Between Run	3.47E-04	3.85E-05	7.65E-04	0.33
Total	7.20E-04		6.16E-03	**2.68**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.626	0.609	0.618	6.97E-05	6.97E-05	0.763
N17143	0.659	0.660	0.660	2.25E-08	2.25E-08	0.870
N17145	0.594	0.612	0.603	7.31E-05	7.31E-05	0.727
B17157	0.626	0.634	0.630	1.81E-05	1.81E-05	0.794
N17157	0.644	0.634	0.639	2.65E-05	2.65E-05	0.816
B17159	0.672	0.577	0.624	2.27E-03	2.27E-03	0.780
B17178	0.619	0.609	0.614	2.45E-05	2.45E-05	0.755
N17178	0.602	0.599	0.601	2.56E-06	2.56E-06	0.721
N17199	0.600	0.608	0.604	1.85E-05	1.85E-05	0.730
Z17201	0.614	0.619	0.616	7.56E-06	7.56E-06	0.760

Grand sum 12.417 **Grand mean** 0.621

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	5.01E-03	5.01E-04	2.24E-02	3.61
Between Run	6.01E-03	6.68E-04	9.14E-03	1.47
Total	1.10E-02		2.42E-02	**3.89**

Analyte: **VTO**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.162	0.156	0.159	1.06E-05	1.06E-05	0.051
N17143	0.178	0.175	0.176	1.82E-06	1.82E-06	0.062
N17145	0.172	0.171	0.171	3.60E-07	3.60E-07	0.059
B17157	0.194	0.204	0.199	2.45E-05	2.45E-05	0.079
N17157	0.183	0.187	0.185	4.20E-06	4.20E-06	0.068
B17159	0.160	0.170	0.165	2.50E-05	2.50E-05	0.054
B17178	0.176	0.175	0.176	2.25E-08	2.25E-08	0.062
N17178	0.163	0.163	0.163	1.60E-07	1.60E-07	0.053
N17199	0.172	0.173	0.173	3.60E-07	3.60E-07	0.060
Z17201	0.175	0.175	0.175	4.00E-08	4.00E-08	0.061

Grand sum 3.484 **Grand mean** 0.174

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	1.34E-04	1.34E-05	3.66E-03	2.10
Between Run	2.42E-03	2.69E-04	1.13E-02	6.49
Total	2.56E-03		1.19E-02	**6.83**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.958	0.904	0.931	7.32E-04	7.32E-04	1.733
N17143	1.008	0.995	1.002	4.49E-05	4.49E-05	2.007
N17145	0.922	0.946	0.934	1.54E-04	1.54E-04	1.745
B17157	1.017	1.035	1.026	8.84E-05	8.84E-05	2.105
N17157	1.009	0.998	1.004	3.19E-05	3.19E-05	2.014
B17159	1.047	0.900	0.973	5.42E-03	5.42E-03	1.895
B17178	0.945	0.925	0.935	1.04E-04	1.04E-04	1.749
N17178	0.965	0.942	0.953	1.27E-04	1.27E-04	1.818
N17199	0.953	0.974	0.963	1.10E-04	1.10E-04	1.855
Z17201	0.987	0.949	0.968	3.57E-04	3.57E-04	1.872

Grand sum 19.377 **Grand mean** 0.969

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.43E-02	1.43E-03	3.79E-02	3.91
Between Run	1.93E-02	2.14E-03	1.88E-02	1.94
Total	3.36E-02		4.23E-02	**4.36**

Analyte: **VCM**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.022	0.021	0.021	8.10E-07	8.10E-07	0.001
N17143	0.021	0.022	0.021	6.25E-08	6.25E-08	0.001
N17145	0.021	0.021	0.021	1.23E-07	1.23E-07	0.001
B17157	0.021	0.021	0.021	4.00E-08	4.00E-08	0.001
N17157	0.022	0.021	0.022	6.25E-08	6.25E-08	0.001
B17159	0.022	0.023	0.022	2.02E-07	2.02E-07	0.001
B17178	0.022	0.022	0.022	4.00E-08	4.00E-08	0.001
N17178	0.020	0.020	0.020	2.25E-08	2.25E-08	0.001
N17199	0.021	0.020	0.021	4.00E-08	4.00E-08	0.001
Z17201	0.021	0.020	0.021	6.25E-08	6.25E-08	0.001

Grand sum 0.422 **Grand mean** 0.021

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	2.93E-06	2.93E-07	5.41E-04	2.57
Between Run	6.71E-06	7.46E-07	4.76E-04	2.25
Total	9.64E-06		7.21E-04	**3.42**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.082	0.076	0.079	7.56E-06	7.56E-06	0.012
N17143	0.084	0.083	0.083	3.02E-07	3.02E-07	0.014
N17145	0.075	0.077	0.076	1.10E-06	1.10E-06	0.012
B17157	0.080	0.081	0.081	3.02E-07	3.02E-07	0.013
N17157	0.081	0.080	0.080	2.03E-07	2.02E-07	0.013
B17159	0.093	0.078	0.085	5.55E-05	5.55E-05	0.014
B17178	0.079	0.079	0.079	4.00E-08	4.00E-08	0.012
N17178	0.079	0.080	0.080	4.90E-07	4.90E-07	0.013
N17199	0.078	0.080	0.079	1.82E-06	1.82E-06	0.012
Z17201	0.081	0.080	0.081	4.90E-07	4.90E-07	0.013

Grand sum 1.605 **Grand mean** 0.080

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.36E-04	1.36E-05	3.68E-03	4.59
Between Run	1.05E-04	1.17E-05	0.00E+00	0.00
Total	2.41E-04		3.68E-03	**4.59**

Analyte: **V08N**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.158	0.179	0.169	1.12E-04	1.12E-04	0.057
N17143	0.158	0.160	0.159	7.22E-07	7.22E-07	0.050
N17145	0.144	0.145	0.144	3.02E-07	3.03E-07	0.042
B17157	0.149	0.153	0.151	5.06E-06	5.06E-06	0.046
N17157	0.137	0.136	0.136	3.60E-07	3.60E-07	0.037
B17159	0.157	0.162	0.160	5.06E-06	5.06E-06	0.051
B17178	0.141	0.138	0.139	1.69E-06	1.69E-06	0.039
N17178	0.153	0.162	0.158	2.07E-05	2.07E-05	0.050
N17199	0.141	0.139	0.140	7.23E-07	7.22E-07	0.039
Z17201	0.133	0.138	0.136	6.25E-06	6.25E-06	0.037

Grand sum 2.983 **Grand mean** 0.149

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	3.06E-04	3.06E-05	5.54E-03	3.71
Between Run	2.40E-03	2.67E-04	1.09E-02	7.29
Total	2.71E-03		1.22E-02	**8.18**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.883	0.879	0.881	3.06E-06	3.06E-06	1.552
N17143	0.896	0.892	0.894	3.80E-06	3.80E-06	1.598
N17145	0.805	0.827	0.816	1.19E-04	1.19E-04	1.332
B17157	0.846	0.862	0.854	6.81E-05	6.81E-05	1.459
N17157	0.784	0.770	0.777	4.69E-05	4.69E-05	1.208
B17159	0.985	0.814	0.900	7.30E-03	7.30E-03	1.619
B17178	0.810	0.883	0.846	1.34E-03	1.34E-03	1.433
N17178	0.863	0.887	0.875	1.54E-04	1.54E-04	1.531
N17199	0.805	0.783	0.794	1.12E-04	1.12E-04	1.261
Z17201	0.744	0.744	0.744	2.50E-09	2.50E-09	1.108

Grand sum 16.762 **Grand mean** 0.838

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.83E-02	1.83E-03	4.28E-02	5.10
Between Run	5.07E-02	5.64E-03	4.36E-02	5.20
Total	6.90E-02		6.11E-02	**7.29**

Analyte: **VDE**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.081	0.082	0.082	4.00E-08	4.00E-08	0.013
N17143	0.083	0.082	0.083	5.63E-07	5.63E-07	0.014
N17145	0.080	0.081	0.080	3.02E-07	3.02E-07	0.013
B17157	0.081	0.082	0.082	2.50E-07	2.50E-07	0.013
N17157	0.082	0.085	0.084	1.69E-06	1.69E-06	0.014
B17159	0.079	0.085	0.082	8.12E-06	8.12E-06	0.013
B17178	0.078	0.078	0.078	1.00E-08	1.00E-08	0.012
N17178	0.079	0.080	0.080	1.23E-07	1.23E-07	0.013
N17199	0.075	0.074	0.074	2.50E-09	2.50E-09	0.011
Z17201	0.078	0.077	0.077	9.00E-08	9.00E-08	0.012

Grand sum 1.604 **Grand mean** 0.080

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	2.24E-05	2.24E-06	1.50E-03	1.87
Between Run	1.46E-04	1.62E-05	2.64E-03	3.29
Total	1.68E-04		3.04E-03	**3.79**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.431	0.408	0.419	1.23E-04	1.23E-04	0.352
N17143	0.443	0.440	0.441	3.06E-06	3.06E-06	0.390
N17145	0.403	0.416	0.409	4.03E-05	4.03E-05	0.335
B17157	0.426	0.434	0.430	1.85E-05	1.85E-05	0.370
N17157	0.431	0.430	0.431	8.10E-07	8.10E-07	0.371
B17159	0.467	0.399	0.433	1.14E-03	1.14E-03	0.375
B17178	0.408	0.404	0.406	3.42E-06	3.42E-06	0.330
N17178	0.419	0.414	0.416	8.12E-06	8.12E-06	0.347
N17199	0.392	0.402	0.397	2.45E-05	2.45E-05	0.316
Z17201	0.417	0.413	0.415	4.41E-06	4.41E-06	0.345

Grand sum 8.396 **Grand mean** 0.420

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	2.73E-03	2.73E-04	1.65E-02	3.94
Between Run	3.40E-03	3.77E-04	7.22E-03	1.72
Total	6.13E-03		1.80E-02	**4.30**

Analyte: **V4C**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.068	0.065	0.067	1.69E-06	1.69E-06	0.009
N17143	0.068	0.070	0.069	1.00E-06	1.00E-06	0.010
N17145	0.068	0.069	0.068	3.03E-07	3.02E-07	0.009
B17157	0.067	0.069	0.068	1.32E-06	1.32E-06	0.009
N17157	0.069	0.068	0.069	2.50E-07	2.50E-07	0.009
B17159	0.069	0.073	0.071	4.00E-06	4.00E-06	0.010
B17178	0.064	0.066	0.065	7.22E-07	7.23E-07	0.008
N17178	0.060	0.061	0.061	6.40E-07	6.40E-07	0.007
N17199	0.074	0.074	0.074	9.00E-08	9.00E-08	0.011
Z17201	0.086	0.087	0.087	3.03E-07	3.02E-07	0.015

Grand sum 1.396 **Grand mean** 0.070

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	2.06E-05	2.06E-06	1.44E-03	2.06
Between Run	8.58E-04	9.54E-05	6.83E-03	9.78
Total	8.79E-04		6.98E-03	**10.00**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.395	0.378	0.386	7.31E-05	7.31E-05	0.299
N17143	0.413	0.402	0.408	2.76E-05	2.76E-05	0.332
N17145	0.384	0.398	0.391	5.11E-05	5.11E-05	0.306
B17157	0.398	0.405	0.402	1.02E-05	1.02E-05	0.322
N17157	0.410	0.397	0.404	4.16E-05	4.16E-05	0.326
B17159	0.435	0.375	0.405	9.12E-04	9.12E-04	0.328
B17178	0.380	0.388	0.384	1.85E-05	1.85E-05	0.295
N17178	0.393	0.391	0.392	1.32E-06	1.32E-06	0.307
N17199	0.380	0.386	0.383	6.76E-06	6.76E-06	0.293
Z17201	0.401	0.392	0.396	2.45E-05	2.45E-05	0.314

Grand sum 7.902 **Grand mean** 0.395

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	2.33E-03	2.33E-04	1.53E-02	3.87
Between Run	1.49E-03	1.66E-04	0.00E+00	0.00
Total	3.83E-03		1.53E-02	**3.87**

Analyte: **V4CE**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.092	0.090	0.091	4.22E-07	4.22E-07	0.017
N17143	0.092	0.092	0.092	1.23E-07	1.23E-07	0.017
N17145	0.089	0.091	0.090	8.10E-07	8.10E-07	0.016
B17157	0.093	0.096	0.095	1.96E-06	1.96E-06	0.018
N17157	0.094	0.094	0.094	1.00E-08	1.00E-08	0.018
B17159	0.089	0.097	0.093	1.81E-05	1.81E-05	0.017
B17178	0.088	0.090	0.089	1.69E-06	1.69E-06	0.016
N17178	0.091	0.088	0.089	1.44E-06	1.44E-06	0.016
N17199	0.087	0.086	0.086	6.25E-08	6.25E-08	0.015
Z17201	0.089	0.089	0.089	2.50E-09	2.50E-09	0.016

Grand sum 1.815 **Grand mean** 0.091

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	4.92E-05	4.92E-06	2.22E-03	2.44
Between Run	1.27E-04	1.41E-05	2.14E-03	2.36
Total	1.76E-04		3.08E-03	**3.40**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.609	0.570	0.589	3.82E-04	3.82E-04	0.695
N17143	0.599	0.588	0.594	3.08E-05	3.08E-05	0.705
N17145	0.537	0.551	0.544	4.49E-05	4.49E-05	0.592
B17157	0.594	0.604	0.599	2.60E-05	2.60E-05	0.717
N17157	0.585	0.582	0.583	2.10E-06	2.10E-06	0.680
B17159	0.647	0.530	0.589	3.38E-03	3.38E-03	0.693
B17178	0.555	0.549	0.552	9.30E-06	9.30E-06	0.609
N17178	0.588	0.577	0.583	3.03E-05	3.02E-05	0.679
N17199	0.549	0.559	0.554	2.55E-05	2.55E-05	0.615
Z17201	0.591	0.580	0.585	3.03E-05	3.02E-05	0.685

Grand sum 11.543 **Grand mean** 0.577

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	7.93E-03	7.93E-04	2.82E-02	4.88
Between Run	6.83E-03	7.59E-04	0.00E+00	0.00
Total	1.48E-02		2.82E-02	**4.88**

Analyte: **VCB**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.042	0.039	0.041	1.44E-06	1.44E-06	0.003
N17143	0.042	0.042	0.042	1.60E-07	1.60E-07	0.004
N17145	0.041	0.040	0.040	1.60E-07	1.60E-07	0.003
B17157	0.041	0.042	0.042	1.23E-07	1.22E-07	0.003
N17157	0.041	0.041	0.041	1.00E-08	1.00E-08	0.003
B17159	0.040	0.042	0.041	1.00E-06	1.00E-06	0.003
B17178	0.039	0.039	0.039	0.00E+00	0.00E+00	0.003
N17178	0.040	0.039	0.039	2.50E-07	2.50E-07	0.003
N17199	0.039	0.038	0.038	1.00E-08	1.00E-08	0.003
Z17201	0.038	0.039	0.039	2.50E-07	2.50E-07	0.003

Grand sum 0.804 **Grand mean** 0.040

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	6.81E-06	6.81E-07	8.25E-04	2.05
Between Run	2.80E-05	3.12E-06	1.10E-03	2.75
Total	3.48E-05		1.38E-03	**3.43**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.300	0.284	0.292	6.97E-05	6.97E-05	0.170
N17143	0.305	0.300	0.303	6.50E-06	6.50E-06	0.183
N17145	0.275	0.285	0.280	2.21E-05	2.21E-05	0.157
B17157	0.295	0.301	0.298	9.61E-06	9.61E-06	0.177
N17157	0.294	0.290	0.292	3.42E-06	3.42E-06	0.170
B17159	0.319	0.277	0.298	4.49E-04	4.49E-04	0.178
B17178	0.280	0.277	0.278	1.69E-06	1.69E-06	0.155
N17178	0.290	0.285	0.288	5.06E-06	5.06E-06	0.165
N17199	0.276	0.283	0.280	1.23E-05	1.23E-05	0.157
Z17201	0.289	0.283	0.286	6.50E-06	6.50E-06	0.164

Grand sum 5.788 **Grand mean** 0.289

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.17E-03	1.17E-04	1.08E-02	3.74
Between Run	1.32E-03	1.46E-04	3.81E-03	1.32
Total	2.49E-03		1.15E-02	**3.97**

Analyte: **VEB**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.061	0.059	0.060	5.63E-07	5.63E-07	0.007
N17143	0.063	0.063	0.063	2.02E-07	2.03E-07	0.008
N17145	0.061	0.061	0.061	6.25E-08	6.25E-08	0.007
B17157	0.063	0.064	0.063	5.63E-07	5.63E-07	0.008
N17157	0.062	0.061	0.061	7.22E-07	7.23E-07	0.008
B17159	0.060	0.064	0.062	4.84E-06	4.84E-06	0.008
B17178	0.059	0.059	0.059	2.50E-09	2.50E-09	0.007
N17178	0.057	0.054	0.055	1.96E-06	1.96E-06	0.006
N17199	0.057	0.051	0.054	9.00E-06	9.00E-06	0.006
Z17201	0.057	0.056	0.057	2.50E-07	2.50E-07	0.006

Grand sum 1.190 **Grand mean** 0.060

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	3.63E-05	3.63E-06	1.91E-03	3.20
Between Run	1.87E-04	2.07E-05	2.93E-03	4.92
Total	2.23E-04		3.49E-03	**5.87**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.394	0.372	0.383	1.23E-04	1.23E-04	0.294
N17143	0.418	0.408	0.413	2.76E-05	2.76E-05	0.341
N17145	0.385	0.399	0.392	4.69E-05	4.69E-05	0.307
B17157	0.400	0.408	0.404	1.33E-05	1.33E-05	0.326
N17157	0.396	0.395	0.396	4.00E-08	4.00E-08	0.313
B17159	0.439	0.375	0.407	1.01E-03	1.01E-03	0.332
B17178	0.382	0.380	0.381	6.40E-07	6.40E-07	0.290
N17178	0.387	0.381	0.384	9.00E-06	9.00E-06	0.295
N17199	0.363	0.381	0.372	7.74E-05	7.74E-05	0.276
Z17201	0.397	0.400	0.398	2.40E-06	2.40E-06	0.317

Grand sum 7.858 **Grand mean** 0.393

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	2.62E-03	2.62E-04	1.62E-02	4.12
Between Run	3.08E-03	3.42E-04	6.32E-03	1.61
Total	5.70E-03		1.74E-02	**4.43**

Analyte: **VXY**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.186	0.186	0.186	0.00E+00	0.00E+00	0.069
N17143	0.189	0.183	0.186	8.41E-06	8.41E-06	0.069
N17145	0.172	0.182	0.177	2.50E-05	2.50E-05	0.063
B17157	0.186	0.194	0.190	1.56E-05	1.56E-05	0.072
N17157	0.191	0.188	0.189	1.96E-06	1.96E-06	0.072
B17159	0.200	0.208	0.204	1.72E-05	1.72E-05	0.083
B17178	0.194	0.200	0.197	7.84E-06	7.84E-06	0.078
N17178	0.170	0.173	0.172	2.25E-06	2.25E-06	0.059
N17199	0.169	0.169	0.169	2.25E-08	2.25E-08	0.057
Z17201	0.168	0.163	0.165	5.76E-06	5.76E-06	0.055

Grand sum 3.669 **Grand mean** 0.183

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	1.68E-04	1.68E-05	4.10E-03	2.24
Between Run	2.83E-03	3.14E-04	1.22E-02	6.65
Total	3.00E-03		1.29E-02	**7.02**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.674	0.636	0.655	3.55E-04	3.55E-04	0.859
N17143	0.710	0.686	0.698	1.44E-04	1.44E-04	0.973
N17145	0.632	0.660	0.646	2.04E-04	2.04E-04	0.835
B17157	0.695	0.714	0.704	8.65E-05	8.65E-05	0.992
N17157	0.702	0.700	0.701	8.10E-07	8.10E-07	0.982
B17159	0.780	0.659	0.719	3.62E-03	3.62E-03	1.035
B17178	0.672	0.674	0.673	1.21E-06	1.21E-06	0.905
N17178	0.657	0.652	0.654	7.29E-06	7.29E-06	0.856
N17199	0.639	0.660	0.649	1.12E-04	1.12E-04	0.843
Z17201	0.671	0.627	0.649	5.02E-04	5.02E-04	0.842

Grand sum 13.497 **Grand mean** 0.675

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.01E-02	1.01E-03	3.17E-02	4.70
Between Run	1.40E-02	1.55E-03	1.65E-02	2.45
Total	2.40E-02		3.58E-02	**5.30**

Analyte: **VBF**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.060	0.058	0.059	8.10E-07	8.10E-07	0.007
N17143	0.057	0.058	0.058	3.60E-07	3.60E-07	0.007
N17145	0.055	0.057	0.056	1.00E-06	1.00E-06	0.006
B17157	0.056	0.057	0.056	1.22E-07	1.23E-07	0.006
N17157	0.058	0.060	0.059	6.40E-07	6.40E-07	0.007
B17159	0.056	0.063	0.060	1.41E-05	1.41E-05	0.007
B17178	0.058	0.060	0.059	1.21E-06	1.21E-06	0.007
N17178	0.053	0.054	0.053	6.40E-07	6.40E-07	0.006
N17199	0.055	0.058	0.056	2.56E-06	2.56E-06	0.006
Z17201	0.053	0.053	0.053	1.23E-07	1.22E-07	0.006

Grand sum 1.139 **Grand mean** 0.057

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	4.31E-05	4.31E-06	2.07E-03	3.65
Between Run	9.93E-05	1.10E-05	1.83E-03	3.22
Total	1.42E-04		2.77E-03	**4.87**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.173	0.166	0.169	1.37E-05	1.37E-05	0.057
N17143	0.172	0.174	0.173	7.22E-07	7.22E-07	0.060
N17145	0.158	0.164	0.161	7.02E-06	7.02E-06	0.052
B17157	0.169	0.174	0.171	7.84E-06	7.84E-06	0.059
N17157	0.173	0.172	0.173	4.90E-07	4.90E-07	0.060
B17159	0.192	0.164	0.178	1.89E-04	1.89E-04	0.063
B17178	0.168	0.168	0.168	9.00E-08	9.00E-08	0.057
N17178	0.164	0.163	0.164	1.60E-07	1.60E-07	0.054
N17199	0.163	0.168	0.165	6.50E-06	6.50E-06	0.055
Z17201	0.166	0.167	0.166	4.22E-07	4.23E-07	0.055

Grand sum 3.376 **Grand mean** 0.169

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	4.52E-04	4.52E-05	6.72E-03	3.98
Between Run	4.44E-04	4.93E-05	1.44E-03	0.85
Total	8.96E-04		6.88E-03	**4.07**

Analyte: **VST**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.203	0.197	0.200	8.41E-06	8.41E-06	0.080
N17143	0.211	0.211	0.211	2.25E-08	2.25E-08	0.089
N17145	0.207	0.214	0.211	1.30E-05	1.30E-05	0.089
B17157	0.202	0.210	0.206	1.56E-05	1.56E-05	0.085
N17157	0.205	0.208	0.206	2.72E-06	2.72E-06	0.085
B17159	0.200	0.210	0.205	2.60E-05	2.60E-05	0.084
B17178	0.200	0.200	0.200	1.00E-08	1.00E-08	0.080
N17178	0.201	0.201	0.201	1.23E-07	1.22E-07	0.081
N17199	0.192	0.193	0.193	1.60E-07	1.60E-07	0.074
Z17201	0.195	0.195	0.195	2.50E-09	2.50E-09	0.076

Grand sum 4.054 **Grand mean** 0.203

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	1.32E-04	1.32E-05	3.63E-03	1.79
Between Run	6.81E-04	7.57E-05	5.59E-03	2.76
Total	8.13E-04		6.67E-03	**3.29**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.808	0.764	0.786	4.97E-04	4.97E-04	1.235
N17143	0.852	0.847	0.850	6.25E-06	6.25E-06	1.444
N17145	0.761	0.787	0.774	1.68E-04	1.68E-04	1.197
B17157	0.811	0.824	0.818	4.62E-05	4.62E-05	1.337
N17157	0.818	0.801	0.810	6.89E-05	6.89E-05	1.311
B17159	0.909	0.782	0.845	3.99E-03	3.99E-03	1.430
B17178	0.773	0.760	0.766	4.29E-05	4.29E-05	1.174
N17178	0.779	0.767	0.773	3.19E-05	3.19E-05	1.195
N17199	0.778	0.792	0.785	4.83E-05	4.83E-05	1.233
Z17201	0.778	0.790	0.784	3.84E-05	3.84E-05	1.228

Grand sum 15.980 **Grand mean** 0.799

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	9.87E-03	9.87E-04	3.14E-02	3.93
Between Run	1.63E-02	1.82E-03	2.04E-02	2.55
Total	2.62E-02		3.74E-02	**4.69**

Analyte: **VOX**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.070	0.068	0.069	1.56E-06	1.56E-06	0.009
N17143	0.075	0.078	0.076	1.96E-06	1.96E-06	0.012
N17145	0.069	0.071	0.070	6.40E-07	6.40E-07	0.010
B17157	0.072	0.075	0.074	1.82E-06	1.82E-06	0.011
N17157	0.072	0.075	0.073	2.40E-06	2.40E-06	0.011
B17159	0.073	0.074	0.073	4.90E-07	4.90E-07	0.011
B17178	0.068	0.067	0.067	2.25E-08	2.25E-08	0.009
N17178	0.065	0.064	0.064	2.25E-08	2.25E-08	0.008
N17199	0.066	0.070	0.068	4.20E-06	4.20E-06	0.009
Z17201	0.059	0.060	0.059	4.00E-08	4.00E-08	0.007

Grand sum 1.389 **Grand mean** 0.069

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	2.63E-05	2.63E-06	1.62E-03	2.34
Between Run	4.60E-04	5.12E-05	4.93E-03	7.09
Total	4.87E-04		5.19E-03	**7.47**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.210	0.194	0.202	6.48E-05	6.48E-05	0.082
N17143	0.231	0.236	0.233	7.02E-06	7.02E-06	0.109
N17145	0.207	0.214	0.210	1.33E-05	1.33E-05	0.088
B17157	0.219	0.226	0.222	1.19E-05	1.19E-05	0.099
N17157	0.219	0.215	0.217	3.61E-06	3.61E-06	0.094
B17159	0.238	0.208	0.223	2.16E-04	2.16E-04	0.099
B17178	0.201	0.187	0.194	4.97E-05	4.97E-05	0.075
N17178	0.212	0.207	0.209	4.20E-06	4.20E-06	0.088
N17199	0.195	0.205	0.200	2.45E-05	2.45E-05	0.080
Z17201	0.186	0.185	0.185	4.23E-07	4.22E-07	0.069

Grand sum 4.191 **Grand mean** 0.210

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	7.91E-04	7.91E-05	8.89E-03	4.25
Between Run	3.87E-03	4.30E-04	1.33E-02	6.32
Total	4.66E-03		1.60E-02	**7.62**

Analyte: **VTP**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.043	0.042	0.043	9.00E-08	9.00E-08	0.004
N17143	0.043	0.044	0.044	4.22E-07	4.23E-07	0.004
N17145	0.042	0.042	0.042	9.00E-08	9.00E-08	0.004
B17157	0.042	0.042	0.042	4.00E-08	4.00E-08	0.003
N17157	0.043	0.043	0.043	0.00E+00	0.00E+00	0.004
B17159	0.041	0.044	0.042	1.69E-06	1.69E-06	0.004
B17178	0.041	0.040	0.041	4.00E-08	4.00E-08	0.003
N17178	0.043	0.040	0.042	2.40E-06	2.40E-06	0.003
N17199	0.042	0.042	0.042	2.50E-09	2.50E-09	0.003
Z17201	0.041	0.040	0.041	2.02E-07	2.02E-07	0.003

Grand sum 0.841 **Grand mean** 0.042

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	9.96E-06	9.96E-07	9.98E-04	2.37
Between Run	1.89E-05	2.10E-06	7.43E-04	1.77
Total	2.89E-05		1.24E-03	**2.96**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.257	0.245	0.251	3.72E-05	3.72E-05	0.126
N17143	0.260	0.260	0.260	1.00E-08	1.00E-08	0.135
N17145	0.234	0.242	0.238	1.41E-05	1.41E-05	0.113
B17157	0.256	0.260	0.258	3.42E-06	3.42E-06	0.133
N17157	0.253	0.246	0.250	1.23E-05	1.23E-05	0.125
B17159	0.276	0.239	0.257	3.37E-04	3.37E-04	0.132
B17178	0.241	0.237	0.239	2.40E-06	2.40E-06	0.114
N17178	0.248	0.249	0.249	2.03E-07	2.03E-07	0.124
N17199	0.238	0.246	0.242	1.64E-05	1.64E-05	0.117
Z17201	0.247	0.245	0.246	1.00E-06	1.00E-06	0.121

Grand sum 4.980 **Grand mean** 0.249

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	8.47E-04	8.47E-05	9.21E-03	3.70
Between Run	1.09E-03	1.21E-04	4.27E-03	1.71
Total	1.94E-03		1.01E-02	**4.07**

Analyte: **VIPB**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.122	0.120	0.121	1.69E-06	1.69E-06	0.029
N17143	0.129	0.131	0.130	8.10E-07	8.10E-07	0.034
N17145	0.120	0.127	0.124	9.61E-06	9.61E-06	0.031
B17157	0.122	0.128	0.125	7.02E-06	7.02E-06	0.031
N17157	0.123	0.121	0.122	1.56E-06	1.56E-06	0.030
B17159	0.123	0.127	0.125	5.76E-06	5.76E-06	0.031
B17178	0.116	0.118	0.117	1.69E-06	1.69E-06	0.027
N17178	0.114	0.121	0.118	1.16E-05	1.16E-05	0.028
N17199	0.113	0.111	0.112	1.00E-06	1.00E-06	0.025
Z17201	0.107	0.109	0.108	1.32E-06	1.32E-06	0.023

Grand sum 2.402 **Grand mean** 0.120

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	8.41E-05	8.41E-06	2.90E-03	2.41
Between Run	7.88E-04	8.75E-05	6.29E-03	5.24
Total	8.72E-04		6.93E-03	**5.77**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	1.039	0.985	1.012	7.29E-04	7.29E-04	2.047
N17143	1.094	1.099	1.097	4.41E-06	4.41E-06	2.405
N17145	0.970	1.002	0.986	2.56E-04	2.56E-04	1.943
B17157	1.057	1.099	1.078	4.37E-04	4.37E-04	2.324
N17157	1.004	1.012	1.008	1.48E-05	1.48E-05	2.031
B17159	1.128	0.967	1.048	6.42E-03	6.42E-03	2.195
B17178	0.986	1.012	0.999	1.70E-04	1.70E-04	1.996
N17178	0.948	0.901	0.925	5.52E-04	5.52E-04	1.709
N17199	0.885	0.885	0.885	2.25E-08	2.25E-08	1.566
Z17201	0.903	0.916	0.909	4.16E-05	4.16E-05	1.653

Grand sum 19.888 **Grand mean** 0.994

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.73E-02	1.73E-03	4.15E-02	4.18
Between Run	9.00E-02	1.00E-02	6.43E-02	6.47
Total	1.07E-01		7.66E-02	**7.70**

Analyte: **VBZN**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	1.329	1.300	1.314	2.13E-04	2.13E-04	3.454
N17143	1.309	1.310	1.309	1.00E-08	1.00E-08	3.429
N17145	1.240	1.266	1.253	1.77E-04	1.77E-04	3.141
B17157	1.307	1.324	1.315	6.72E-05	6.72E-05	3.461
N17157	1.293	1.320	1.307	1.85E-04	1.85E-04	3.415
B17159	1.237	1.314	1.275	1.47E-03	1.47E-03	3.253
B17178	1.263	1.272	1.267	2.30E-05	2.30E-05	3.213
N17178	1.228	1.211	1.219	7.66E-05	7.66E-05	2.974
N17199	1.186	1.183	1.184	2.89E-06	2.89E-06	2.805
Z17201	1.183	1.155	1.169	2.02E-04	2.02E-04	2.734

Grand sum 25.228 **Grand mean** 1.261

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	4.83E-03	4.83E-04	2.20E-02	1.74
Between Run	5.32E-02	5.91E-03	5.21E-02	4.13
Total	5.80E-02		5.65E-02	**4.48**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	13.809	13.124	13.466	1.17E-01	1.17E-01	362.691
N17143	13.936	14.190	14.063	1.61E-02	1.61E-02	395.519
N17145	12.456	12.959	12.708	6.33E-02	6.33E-02	322.976
B17157	13.575	13.966	13.770	3.82E-02	3.82E-02	379.229
N17157	14.027	13.738	13.882	2.09E-02	2.09E-02	385.423
B17159	14.734	12.714	13.724	1.02E+00	1.02E+00	376.683
B17178	13.403	13.285	13.344	3.45E-03	3.45E-03	356.130
N17178	13.165	13.451	13.308	2.04E-02	2.04E-02	354.206
N17199	12.407	12.918	12.663	6.52E-02	6.52E-02	320.690
Z17201	12.958	12.692	12.825	1.78E-02	1.78E-02	328.964

Grand sum 267.505 **Grand mean** 13.375

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	2.76E+00	2.76E-01	5.26E-01	3.93
Between Run	4.55E+00	5.06E-01	3.39E-01	2.53
Total	7.32E+00		6.25E-01	**4.68**

Analyte: **V3B**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.058	0.056	0.057	3.60E-07	3.60E-07	0.006
N17143	0.059	0.058	0.058	2.03E-07	2.02E-07	0.007
N17145	0.056	0.056	0.056	2.50E-09	2.50E-09	0.006
B17157	0.057	0.058	0.058	4.90E-07	4.90E-07	0.007
N17157	0.058	0.058	0.058	2.50E-09	2.50E-09	0.007
B17159	0.055	0.059	0.057	3.61E-06	3.61E-06	0.006
B17178	0.054	0.053	0.053	9.00E-08	9.00E-08	0.006
N17178	0.053	0.055	0.054	5.63E-07	5.62E-07	0.006
N17199	0.053	0.052	0.053	2.25E-08	2.25E-08	0.006
Z17201	0.053	0.052	0.053	2.02E-07	2.02E-07	0.006

Grand sum 1.112 **Grand mean** 0.056

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	1.11E-05	1.11E-06	1.05E-03	1.89
Between Run	9.27E-05	1.03E-05	2.14E-03	3.86
Total	1.04E-04		2.39E-03	**4.30**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.387	0.368	0.378	9.31E-05	9.31E-05	0.285
N17143	0.399	0.396	0.398	1.96E-06	1.96E-06	0.316
N17145	0.358	0.368	0.363	2.55E-05	2.55E-05	0.263
B17157	0.381	0.389	0.385	1.89E-05	1.89E-05	0.296
N17157	0.389	0.384	0.387	5.29E-06	5.29E-06	0.299
B17159	0.416	0.357	0.386	8.56E-04	8.56E-04	0.298
B17178	0.360	0.358	0.359	1.10E-06	1.10E-06	0.258
N17178	0.376	0.366	0.371	2.55E-05	2.55E-05	0.275
N17199	0.357	0.367	0.362	2.21E-05	2.21E-05	0.262
Z17201	0.369	0.369	0.369	1.00E-08	1.00E-08	0.273

Grand sum 7.513 **Grand mean** 0.376

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	2.10E-03	2.10E-04	1.45E-02	3.86
Between Run	2.99E-03	3.32E-04	7.81E-03	2.08
Total	5.08E-03		1.65E-02	**4.38**

Analyte: **VDB**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.125	0.123	0.124	1.82E-06	1.82E-06	0.031
N17143	0.126	0.124	0.125	9.02E-07	9.02E-07	0.031
N17145	0.120	0.121	0.121	7.22E-07	7.23E-07	0.029
B17157	0.123	0.126	0.124	3.06E-06	3.06E-06	0.031
N17157	0.124	0.125	0.124	3.60E-07	3.60E-07	0.031
B17159	0.119	0.123	0.121	3.61E-06	3.61E-06	0.029
B17178	0.112	0.113	0.112	1.23E-07	1.23E-07	0.025
N17178	0.116	0.114	0.115	7.23E-07	7.22E-07	0.027
N17199	0.113	0.116	0.114	2.72E-06	2.72E-06	0.026
Z17201	0.114	0.113	0.114	4.22E-07	4.22E-07	0.026

Grand sum 2.387 **Grand mean** 0.119

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	2.89E-05	2.89E-06	1.70E-03	1.43
Between Run	4.56E-04	5.06E-05	4.89E-03	4.09
Total	4.85E-04		5.17E-03	**4.33**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.625	0.595	0.610	2.24E-04	2.24E-04	0.745
N17143	0.643	0.646	0.645	2.25E-06	2.25E-06	0.831
N17145	0.576	0.589	0.582	4.16E-05	4.16E-05	0.678
B17157	0.617	0.633	0.625	6.48E-05	6.48E-05	0.781
N17157	0.623	0.616	0.620	1.23E-05	1.22E-05	0.768
B17159	0.667	0.571	0.619	2.29E-03	2.29E-03	0.766
B17178	0.576	0.578	0.577	7.23E-07	7.23E-07	0.666
N17178	0.587	0.574	0.581	4.29E-05	4.29E-05	0.675
N17199	0.572	0.592	0.582	1.06E-04	1.06E-04	0.677
Z17201	0.587	0.590	0.589	2.40E-06	2.40E-06	0.693

Grand sum 12.057 **Grand mean** 0.603

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	5.58E-03	5.58E-04	2.36E-02	3.92
Between Run	1.01E-02	1.12E-03	1.68E-02	2.78
Total	1.57E-02		2.90E-02	**4.81**

Analyte: **V1D**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.050	0.049	0.049	3.60E-07	3.60E-07	0.005
N17143	0.050	0.050	0.050	1.60E-07	1.60E-07	0.005
N17145	0.048	0.048	0.048	1.23E-07	1.22E-07	0.005
B17157	0.050	0.050	0.050	1.00E-08	1.00E-08	0.005
N17157	0.050	0.050	0.050	9.00E-08	9.00E-08	0.005
B17159	0.047	0.050	0.049	1.69E-06	1.69E-06	0.005
B17178	0.046	0.045	0.046	4.00E-08	4.00E-08	0.004
N17178	0.046	0.046	0.046	6.25E-08	6.25E-08	0.004
N17199	0.044	0.045	0.045	2.02E-07	2.02E-07	0.004
Z17201	0.045	0.044	0.044	6.25E-08	6.25E-08	0.004

Grand sum 0.951 **Grand mean** 0.048

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	5.60E-06	5.60E-07	7.48E-04	1.57
Between Run	8.55E-05	9.50E-06	2.11E-03	4.45
Total	9.11E-05		2.24E-03	**4.72**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	0.349	0.331	0.340	8.19E-05	8.19E-05	0.231
N17143	0.358	0.356	0.357	8.10E-07	8.10E-07	0.255
N17145	0.323	0.330	0.326	1.30E-05	1.30E-05	0.213
B17157	0.346	0.350	0.348	4.41E-06	4.41E-06	0.242
N17157	0.349	0.348	0.349	2.25E-08	2.25E-08	0.243
B17159	0.371	0.317	0.344	7.29E-04	7.29E-04	0.237
B17178	0.321	0.323	0.322	1.21E-06	1.21E-06	0.207
N17178	0.330	0.329	0.329	9.00E-08	9.00E-08	0.217
N17199	0.326	0.334	0.330	1.68E-05	1.68E-05	0.218
Z17201	0.327	0.333	0.330	7.56E-06	7.56E-06	0.218

Grand sum 6.750 **Grand mean** 0.337

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.71E-03	1.71E-04	1.31E-02	3.87
Between Run	2.40E-03	2.67E-04	6.92E-03	2.05
Total	4.11E-03		1.48E-02	**4.38**

Analyte: **VNB**

Quality material QL054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	1.624	1.600	1.612	1.45E-04	1.45E-04	5.197
N17143	1.565	1.668	1.617	2.66E-03	2.66E-03	5.228
N17145	1.571	1.616	1.593	4.97E-04	4.97E-04	5.078
B17157	1.622	1.595	1.608	1.92E-04	1.92E-04	5.174
N17157	1.689	1.699	1.694	2.50E-05	2.50E-05	5.737
B17159	1.529	1.605	1.567	1.48E-03	1.48E-03	4.911
B17178	1.457	1.484	1.470	1.76E-04	1.76E-04	4.324
N17178	1.517	1.552	1.535	3.19E-04	3.19E-04	4.710
N17199	1.498	1.619	1.558	3.69E-03	3.69E-03	4.858
Z17201	1.524	1.595	1.560	1.24E-03	1.24E-03	4.865

Grand sum 31.629 **Grand mean** 1.581

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev (%)
Within Run	2.08E-02	2.08E-03	4.56E-02	2.89
Between Run	6.28E-02	6.98E-03	4.95E-02	3.13
Total	8.36E-02		6.73E-02	**4.26**

Quality material QH054

Run Batch ID	Result 1	Result 2	Mean	SS 1	SS 2	2*mean^2
B17143	10.426	9.603	10.014	1.69E-01	1.69E-01	200.574
N17143	10.978	10.318	10.648	1.09E-01	1.09E-01	226.768
N17145	9.743	10.062	9.902	2.54E-02	2.54E-02	196.111
B17157	10.003	9.906	9.954	2.38E-03	2.38E-03	198.176
N17157	10.351	10.245	10.298	2.81E-03	2.81E-03	212.102
B17159	10.825	9.352	10.089	5.42E-01	5.42E-01	203.564
B17178	9.539	9.378	9.458	6.50E-03	6.50E-03	178.911
N17178	9.730	9.676	9.703	7.16E-04	7.16E-04	188.302
N17199	9.453	9.766	9.609	2.45E-02	2.45E-02	184.670
Z17201	9.722	10.080	9.901	3.19E-02	3.19E-02	196.056

Grand sum 199.154 **Grand mean** 9.958

	Sum squares	Mean Sq Error	Std Dev	Rel Std Dev
Within Run	1.83E+00	1.83E-01	4.28E-01	4.30
Between Run	2.11E+00	2.35E-01	1.61E-01	1.61
Total	3.94E+00		4.57E-01	**4.59**

Table C3: Stability

Stability of VOCs in blood was evaluated using bovine serum as a surrogate for whole blood, which cannot be processed to remove VOCs. For these analysis bovine serum was spiked with VOCs and dispensed into glass ampules that were flamed sealed with a water torch. These samples remained in these sealed ampules for chill-warm, bench-top and processed sample stability tests. For the long-term stability tests testing material was transferred to blood collection tubes via winged blood collection sets. Because these quality material ampules had 47% headspace, the partitioning of highly nonpolar analytes (i.e., n-alkanes, methylcyclopentane, cyclohexane) between the serum and headspace was significantly influenced (>15%) by temperature differences of a few degrees Celsius. To ensure that the samples had similar VOC concentrations they were equilibrated at 23.5 ± 0.5°C using a heating block. Analytical runs for these results are denoted in column headers. All analytes can be confidently reported in 6 months with the exception of tetrachloroethylene and methylcyclopentane, which had drift >15% at 4 months.

Stability

Chill-warm stability = Samples undergo 3 chill-warm cycles mimicking intended sample handling conditions

Description: Samples were equilibrated to RT for at least 4 hr and then rechilled to 4°C for 3 cycles
Quality material 1 f = QL_Initial and QL_ChillThaw; Quality material 2 = QH_Initial, QH_ChillThaw

Bench-top stability = Short-term stability of samples for length of time at RT needed to handle samples is evaluated

Description: Original samples (not yet prepared for instrument analysis) were stored at RT for at least 4 hr
Quality material 1 = QL-Initial, QL-benchtop: Quality material 2 = QH-Initial, QH-benchtop

Processed sample stability = Short-term stability of processed samples, including resident time on autosampler is evaluated

Description: Processed samples (ready for instrument analysis) were stored at 15°C for at least 24 hr
Quality material 1 = QL-Initial, QL-processed; Quality material 2 = QH-Initial, QH-processed

Long-term stability = Long-term stability that equals or exceeds time between date of first sample collection and date of last sample analysis

Description: Samples stored at 4°C for up to 18 months. Initial measurment combines vials prepared first with those prepared last to average prep order drift of the initial lot. Quality material 1 = LTSQL; Quality Material 2 = LTSQH

All stability sample results are to be within ±15% of nominal concentration

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Chloroethane (VCE)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.226	0.216	0.204	0.208	0.199	0.228	0.189	14.2
Replicate 2	0.197	0.195	0.157	0.181	0.152	0.199	0.191	
Replicate 3	0.205	0.187	0.189	0.122	0.176	0.192	0.170	
Replicate 4	0.205	0.189	0.182	0.143	0.161	0.166	0.163	
Mean	0.208	0.197	0.183	0.163	0.172	0.196	0.178	
% difference from initial measurement	--	**-5.62**	--	**-10.8**	**-6.16**	--	**-9.16**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	1.006	0.959	0.907	0.887	0.931	0.929	0.807	14.2
Replicate 2	0.918	0.892	0.815	0.864	0.885	0.800	0.732	
Replicate 3	0.945	0.946	0.983	0.863	0.958	0.803	0.770	
Replicate 4	0.958	0.920	0.986	0.895	0.991	0.722	0.838	
Mean	0.957	0.929	0.923	0.877	0.941	0.813	0.787	
% difference from initial measurement	--	**-2.85**		**-4.96**	**2.02**	--	**-3.27**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Vinylbromide (VVB)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17348	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.117	0.112	0.105	0.109	0.103	0.104	0.089	12.7
Replicate 2	0.115	0.106	0.102	0.111	0.104	0.094	0.081	
Replicate 3	0.115	0.109	0.120	0.114	0.112	0.105	0.091	
Replicate 4	0.112	0.103	0.117	0.109	0.102	0.099	0.083	
Mean	0.115	0.107	0.111	0.111	0.106	0.100	0.086	
% difference from initial measurement	--	**-6.62**	--	**-0.449**	**-4.94**	--	**-14.4**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.589	0.544	0.548	0.539	0.554	0.522	0.408	14.2
Replicate 2	0.548	0.518	0.493	0.539	0.539	0.444	0.356	
Replicate 3	0.559	0.550	0.591	0.538	0.590	0.448	0.390	
Replicate 4	0.560	0.532	0.584	0.547	0.594	0.394	0.405	
Mean	0.564	0.536	0.554	0.541	0.569	0.452	0.390	
% difference from initial measurement	--	**-5.02**	**--**	**-2.37**	**2.73**	--	**-13.8**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Furan (VFN)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B18150	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.072	0.078	0.062	0.068	0.062	0.068	0.068	6.9
Replicate 2	0.067	0.076	0.061	0.070	0.062	0.067	0.070	
Replicate 3	0.074	0.072	0.065	0.051	0.067	0.065	0.072	
Replicate 4	0.071	0.072	0.066	0.064	0.063	0.060	0.067	
Mean	0.071	0.075	0.064	0.063	0.064	0.065	0.069	
% difference from initial measurement	--	**4.94**	--	**-0.598**	**0.143**	--	**6.47**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B18150	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.163	0.161	0.147	0.147	0.151	0.150	0.147	6.9
Replicate 2	0.158	0.151	0.132	0.145	0.147	0.133	0.131	
Replicate 3	0.160	0.160	0.176	0.149	0.156	0.132	0.148	
Replicate 4	0.157	0.156	0.180	0.153	0.159	0.123	0.138	
Mean	0.160	0.157	0.159	0.148	0.153	0.134	0.141	
% difference from initial measurement	--	**-1.56**	**--**	**-6.67**	**-3.57**	--	**5.00**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Ethyl Ether (VDEE)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.207	0.202	0.208	0.200	0.196	0.217	0.215	14.2
Replicate 2	0.213	0.206	0.208	0.218	0.196	0.229	0.214	
Replicate 3	0.211	0.204	0.221	0.199	0.221	0.208	0.204	
Replicate 4	0.211	0.214	0.211	0.201	0.198	0.193	0.198	
Mean	0.211	0.207	0.212	0.204	0.203	0.212	0.208	
% difference from initial measurement	--	**-1.84**	--	**-3.59**	**-4.30**	--	**-1.87**	

Quality material 2	B17334	B17334		B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.507	0.509	0.496	0.498	0.498	0.494	0.467	14.2
Replicate 2	0.485	0.468	0.460	0.479	0.499	0.481	0.474	
Replicate 3	0.509	0.498	0.520	0.508	0.492	0.470	0.477	
Replicate 4	0.479	0.510	0.538	0.530	0.539	0.448	0.512	
Mean	0.495	0.496	0.503	0.504	0.507	0.473	0.483	
% difference from initial measurement	--	**0.227**	**--**	**0.082**	**0.744**	--	**2.00**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Methylene Chloride (VMC)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17320	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.413	0.403	0.385	0.377	0.385	0.385	0.362	13.7
Replicate 2	0.401	0.407	0.380	0.401	0.379	0.380	0.349	
Replicate 3	0.410	0.407	0.403	0.380	0.408	0.403	0.349	
Replicate 4	0.406	0.413	0.394	0.385	0.372	0.394	0.332	
Mean	0.408	0.408	0.391	0.386	0.386	0.391	0.348	
% difference from initial measurement	--	**0.019**	--	**-1.25**	**-1.18**	--	**-10.8**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	1.51	1.50	1.43	1.43	1.46	1.42	1.37	14.2
Replicate 2	1.46	1.43	1.33	1.43	1.44	1.33	1.28	
Replicate 3	1.50	1.50	1.50	1.43	1.48	1.30	1.30	
Replicate 4	1.51	1.49	1.55	1.50	1.54	1.22	1.37	
Mean	1.49	1.48	1.45	1.45	1.48	1.32	1.33	
% difference from initial measurement	--	**-1.01**	**--**	**-0.368**	**1.86**	--	**1.03**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Methyl-*tert*-Butyl Ether (VME)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.072	0.069	0.064	0.061	0.062	0.078	0.078	14.2
Replicate 2	0.073	0.072	0.065	0.069	0.066	0.079	0.070	
Replicate 3	0.062	0.070	0.065	0.063	0.069	0.072	0.073	
Replicate 4	0.074	0.074	0.065	0.064	0.062	0.067	0.067	
Mean	0.070	0.071	0.065	0.064	0.065	0.074	0.072	
% difference from initial measurement	--	**1.23**	--	**-0.360**	**0.029**	--	**-2.94**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.260	0.259	0.224	0.221	0.229	0.256	0.248	14.2
Replicate 2	0.255	0.254	0.213	0.232	0.232	0.244	0.234	
Replicate 3	0.262	0.254	0.234	0.226	0.237	0.243	0.241	
Replicate 4	0.266	0.257	0.245	0.239	0.242	0.223	0.247	
Mean	0.261	0.256	0.229	0.229	0.235	0.242	0.242	
% difference from initial measurement	--	**-1.75**	**--**	**0.202**	**2.68**	--	**0.316**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Hexane (V06)**

Quality material 1	B18039	B18039	B17320	B17320	B17320	B18009	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.310	0.317	0.651	0.731	0.651	0.372	0.305	12.0
Replicate 2	0.323	0.344	0.652	0.774	0.625	0.320	0.274	
Replicate 3	0.315	0.321	0.783	0.581	0.714	0.233	0.295	
Replicate 4	0.391	0.359	0.788	0.730	0.658	0.223	0.269	
Mean	0.335	0.335	0.719	0.704	0.662	0.287	0.286	
% difference from initial measurement	--	**0.132**	--	**-2.01**	**-7.89**	--	**-0.449**	

Quality material 2	B18088	B18088	B17320	B17320	B17320	B18072	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.584	0.635	0.944	1.08	0.957	0.406	0.362	9.9
Replicate 2	0.567	0.624	0.868	1.09	0.930	0.381	0.274	
Replicate 3	0.611	0.565	1.13	1.07	1.08	0.373	0.357	
Replicate 4	0.602	0.537	1.15	1.11	1.14	0.340	0.390	
Mean	0.591	0.590	1.02	1.09	1.03	0.375	0.346	
% difference from initial measurement	--	**-0.167**	**--**	**6.31**	**0.387**	--	**-7.81**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Chloroform (VCF)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.060	0.060	0.059	0.063	0.056	0.068	0.058	14.2
Replicate 2	0.059	0.062	0.058	0.068	0.056	0.068	0.055	
Replicate 3	0.059	0.058	0.059	0.066	0.061	0.050	0.057	
Replicate 4	0.059	0.059	0.058	0.063	0.055	0.047	0.052	
Mean	0.059	0.060	0.058	0.065	0.057	0.058	0.056	
% difference from initial measurement	--	**0.952**	--	**11.3**	**-2.19**	--	**-4.79**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.268	0.265	0.255	0.267	0.259	0.234	0.243	14.2
Replicate 2	0.256	0.252	0.236	0.271	0.257	0.218	0.230	
Replicate 3	0.274	0.264	0.269	0.260	0.262	0.208	0.235	
Replicate 4	0.277	0.261	0.279	0.275	0.270	0.192	0.241	
Mean	0.269	0.261	0.260	0.268	0.262	0.213	0.237	
% difference from initial measurement	--	**-3.11**	**--**	**3.23**	**0.945**	--	**11.4**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Ethyl Acetate (VEA)**

Quality material 1	B18039	B18039	B17320	B17320	B17320	B17320	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	10.9	10.3	11.6	10.7	10.5	11.6	8.01	13.7
Replicate 2	10.9	10.3	11.7	11.9	10.3	11.7	7.69	
Replicate 3	7.88	9.99	9.60	11.9	12.6	9.6	10.1	
Replicate 4	7.96	9.97	9.11	10.6	11.5	9.1	10.5	
Mean	9.40	10.1	10.5	11.3	11.2	10.5	9.07	
% difference from initial measurement	--	**7.90**	--	**7.46**	**7.03**	--	**-13.5**	

Quality material 2	B18088	B18088	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	13.1	16.0	13.8	11.7	12.5	9.29	11.6	14.2
Replicate 2	13.8	16.0	12.7	12.3	12.7	9.23	11.6	
Replicate 3	16.8	15.6	8.31	12.1	9.32	12.04	9.86	
Replicate 4	17.1	16.0	8.63	13.1	9.82	10.90	9.40	
Mean	15.2	15.9	10.9	12.3	11.1	10.4	10.6	
% difference from initial measurement	--	**4.66**	**--**	**13.2**	**1.85**	--	**2.27**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Tetrahydrofuran (VTHF)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17348	B18312	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	1.24	1.22	1.30	1.39	1.34	1.24	1.17	10.8
Replicate 2	1.25	1.28	1.32	1.48	1.37	1.40	1.31	
Replicate 3	1.25	1.22	1.33	1.52	1.35	1.20	1.31	
Replicate 4	1.35	1.43	1.29	1.17	1.36	1.19	1.26	
Mean	1.27	1.29	1.31	1.39	1.36	1.26	1.26	
% difference from initial measurement	--	**0.942**	--	**6.11**	**3.62**	--	**0.480**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17348	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	4.35	4.28	4.14	4.43	4.15	3.99	4.99	12.7
Replicate 2	4.11	4.40	4.09	4.64	4.23	4.35	4.30	
Replicate 3	4.35	3.99	4.47	4.45	4.25	3.99	4.33	
Replicate 4	4.21	4.47	4.76	4.51	4.39	4.08	4.12	
Mean	4.25	4.28	4.36	4.51	4.26	4.10	4.44	
% difference from initial measurement	--	**0.721**	**--**	**3.28**	**-2.46**	--	**8.13**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Methylcyclopentane (VMCP)**

Quality material 1	B18039	B18039	B17320	B17320	B17320	B18072	B18193	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement***	**Long-term stability**	**Number of months**
Replicate 1	0.161	0.157	0.251	0.271	0.240	0.152	0.101	4.0
Replicate 2	0.170	0.170	0.229	0.287	0.233	0.138	0.097	
Replicate 3	0.168	0.161	0.292	0.274	0.274	0.067	0.111	
Replicate 4	0.194	0.185	0.284	0.267	0.246	0.062	0.102	
Mean	0.173	0.168	0.264	0.275	0.248	0.105	0.103	
% difference from initial measurement	--	**-3.03**	--	**4.06**	**-6.08**	--	**-1.74**	

Quality material 2	B18088	B18088	B17320	B17320	B17320	B18009	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.308	0.312	0.458	0.500	0.471	0.202	0.160	12.0
Replicate 2	0.297	0.306	0.425	0.508	0.460	0.192	0.130	
Replicate 3	0.334	0.280	0.555	0.507	0.534	0.161	0.149	
Replicate 4	0.297	0.263	0.535	0.538	0.562	0.149	0.177	
Mean	0.309	0.309	0.493	0.513	0.507	0.176	0.154	
% difference from initial measurement	--	**0.119**	**--**	**4.09**	**2.75**	--	**-12.3**	

†Low concentration long-term stability samples had substantial preparation order drift, thus intial measurment consists of an average of amuple sequence 8 and 27.

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Isobutyronitrile (VIBN)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17348	B18312	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.328	0.331	0.331	0.376	0.329	0.35	0.32	10.8
Replicate 2	0.343	0.358	0.353	0.404	0.335	0.37	0.35	
Replicate 3	0.355	0.336	0.341	0.421	0.354	0.33	0.35	
Replicate 4	0.374	0.396	0.342	0.308	0.342	0.35	0.34	
Mean	0.350	0.355	0.342	0.377	0.340	0.35	0.34	
% difference from initial measurement	--	**1.42**	--	**10.4**	**-0.485**	--	**-2.95**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17320	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	1.10	1.08	0.969	1.05	1.01	0.97	1.25	13.7
Replicate 2	1.06	1.05	0.971	1.10	1.01	0.97	1.20	
Replicate 3	1.11	1.06	1.10	1.06	1.00	1.10	1.08	
Replicate 4	1.08	1.14	1.17	1.10	1.05	1.17	1.10	
Mean	1.09	1.09	1.05	1.08	1.02	1.05	1.16	
% difference from initial measurement	--	**-0.162**	**--**	**2.42**	**-3.45**	--	**9.94**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**1,2-Dichloroethane (V2A)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B18193	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.051	0.050	0.050	0.051	0.049	0.053	0.047	8.3
Replicate 2	0.051	0.052	0.050	0.055	0.050	0.058	0.045	
Replicate 3	0.049	0.050	0.051	0.054	0.053	0.047	0.051	
Replicate 4	0.050	0.051	0.050	0.051	0.049	0.045	0.051	
Mean	0.050	0.051	0.050	0.052	0.050	0.051	0.049	
% difference from initial measurement	--	**0.806**	--	**4.54**	**-0.391**	--	**-4.62**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.274	0.273	0.264	0.267	0.268	0.253	0.257	14.2
Replicate 2	0.264	0.265	0.246	0.272	0.268	0.244	0.247	
Replicate 3	0.275	0.273	0.277	0.269	0.272	0.234	0.253	
Replicate 4	0.281	0.272	0.284	0.283	0.280	0.214	0.261	
Mean	0.273	0.271	0.268	0.273	0.272	0.236	0.255	
% difference from initial measurement	--	**-0.774**	**--**	**1.98**	**1.62**	--	**7.71**	

*initial measurement from B17320 run

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**1,1,1-Trichloroethane (VTE)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B18009	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.029	0.026	0.027	0.027	0.026	0.023	0.019	12.0
Replicate 2	0.028	0.027	0.026	0.029	0.026	0.021	0.019	
Replicate 3	0.028	0.026	0.029	0.029	0.028	0.020	0.020	
Replicate 4	0.028	0.026	0.029	0.028	0.026	0.018	0.019	
Mean	0.028	0.026	0.028	0.028	0.027	0.021	0.019	
% difference from initial measurement	--	**-6.80**	--	**1.53**	**-3.99**	--	**-6.38**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17348	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.128	0.119	0.120	0.121	0.120	0.083	0.075	12.7
Replicate 2	0.122	0.114	0.109	0.121	0.118	0.073	0.069	
Replicate 3	0.124	0.118	0.128	0.121	0.124	0.080	0.073	
Replicate 4	0.123	0.115	0.129	0.125	0.127	0.076	0.074	
Mean	0.124	0.117	0.121	0.122	0.122	0.078	0.073	
% difference from initial measurement	--	**-6.30**	**--**	**0.531**	**0.572**	--	**-6.66**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Cyclohexane (VC06)**

Quality material 1	B18039	B18039	B17320	B17320	B17320	B18039	B18312	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.161	0.157	0.076	0.082	0.075	0.047	0.027	9.1
Replicate 2	0.170	0.170	0.074	0.087	0.076	0.046	0.025	
Replicate 3	0.168	0.161	0.090	0.089	0.082	0.032	0.055	
Replicate 4	0.194	0.185	0.087	0.085	0.076	0.032	0.059	
Mean	0.173	0.168	0.082	0.086	0.077	0.039	0.042	
% difference from initial measurement	--	**-3.03**	--	**4.92**	**-5.62**	--	**5.86**	

Quality material 2	B18088	B18088	B17320	B17320	B17320	B18039	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.230	0.232	0.287	0.312	0.287	0.109	0.085	11.0
Replicate 2	0.222	0.230	0.263	0.323	0.280	0.103	0.070	
Replicate 3	0.238	0.207	0.346	0.308	0.329	0.088	0.090	
Replicate 4	0.216	0.201	0.342	0.323	0.337	0.089	0.092	
Mean	0.226	0.231	0.310	0.317	0.308	0.097	0.084	
% difference from initial measurement	--	**2.01**	**--**	**2.30**	**-0.405**	--	**-13.3**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Carbon Tetrachloride (VCT)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B18039	B18312	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.029	0.028	0.027	0.031	0.025	0.021	0.014	9.1
Replicate 2	0.028	0.028	0.026	0.033	0.025	0.020	0.014	
Replicate 3	0.027	0.025	0.027	0.028	0.027	0.014	0.018	
Replicate 4	0.026	0.024	0.027	0.028	0.025	0.013	0.016	
Mean	0.027	0.026	0.027	0.030	0.025	0.017	0.015	
% difference from initial measurement	--	**-5.14**	--	**13.1**	**-4.50**	--	**-9.60**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17348	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.091	0.082	0.081	0.093	0.081	0.055	0.046	12.7
Replicate 2	0.087	0.079	0.075	0.094	0.081	0.049	0.041	
Replicate 3	0.096	0.081	0.089	0.085	0.086	0.053	0.045	
Replicate 4	0.097	0.080	0.090	0.089	0.088	0.049	0.047	
Mean	0.093	0.080	0.084	0.090	0.084	0.052	0.045	
% difference from initial measurement	--	**-13.6**	**--**	**7.37**	**0.379**	--	**-13.4**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Benzene (VBZ)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.070	0.084	0.068	0.085	0.059	0.075	0.083	14.2
Replicate 2	0.067	0.085	0.069	0.091	0.058	0.073	0.081	
Replicate 3	0.077	0.072	0.067	0.070	0.073	0.112	0.130	
Replicate 4	0.076	0.074	0.067	0.064	0.068	0.104	0.124	
Mean	0.073	0.079	0.068	0.078	0.064	0.091	0.105	
% difference from initial measurement	--	**8.45**	--	**14.8**	**-5.25**	--	**14.7**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.305	0.303	0.278	0.290	0.287	0.264	0.270	14.2
Replicate 2	0.297	0.294	0.260	0.292	0.282	0.241	0.253	
Replicate 3	0.305	0.302	0.345	0.291	0.295	0.260	0.250	
Replicate 4	0.306	0.298	0.356	0.302	0.303	0.237	0.257	
Mean	0.303	0.299	0.310	0.294	0.292	0.251	0.258	
% difference from initial measurement	--	**-1.27**	**--**	**-5.19**	**-5.82**	--	**2.75**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	***n*-Heptane (V07N)**

Quality material 1	B18039	B18039	B17320	B17320	B17320	B18009	B18193	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.111	0.111	0.142	0.150	0.147	0.131	0.097	6.1
Replicate 2	0.111	0.114	0.141	0.162	0.143	0.118	0.101	
Replicate 3	0.109	0.117	0.163	0.168	0.156	0.105	0.123	
Replicate 4	0.118	0.119	0.162	0.159	0.144	0.102	0.119	
Mean	0.112	0.115	0.152	0.160	0.148	0.114	0.110	
% difference from initial measurement	--	**2.75**	--	**5.19**	**-2.89**	--	**-3.47**	

Quality material 2	B18039	B18039	B17320	B17320	B17320	B18009	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.322	0.314	0.507	0.528	0.502	0.249	0.253	12.0
Replicate 2	0.307	0.306	0.450	0.537	0.492	0.260	0.186	
Replicate 3	ampule cracked	0.323	0.558	0.532	0.545	0.220	0.236	
Replicate 4	ampule cracked	0.335	0.558	0.568	0.569	0.220	0.260	
Mean	0.315	0.320	0.518	0.541	0.527	0.237	0.234	
% difference from initial measurement	--	**1.58**	**--**	**4.45**	**1.69**	--	**-1.43**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Trichloroethylene (VTC)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B18039	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.046	0.043	0.043	0.044	0.042	0.031	0.027	11.0
Replicate 2	0.044	0.044	0.043	0.047	0.043	0.030	0.026	
Replicate 3	0.045	0.043	0.046	0.043	0.046	0.026	0.029	
Replicate 4	0.044	0.043	0.046	0.045	0.043	0.025	0.027	
Mean	0.045	0.044	0.044	0.045	0.043	0.028	0.027	
% difference from initial measurement	--	**-2.76**	--	**0.398**	**-2.05**	--	**-3.20**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B18009	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.221	0.215	0.221	0.221	0.224	0.152	0.135	12.0
Replicate 2	0.213	0.206	0.205	0.226	0.223	0.144	0.126	
Replicate 3	0.218	0.217	0.232	0.224	0.229	0.156	0.132	
Replicate 4	0.222	0.212	0.241	0.235	0.233	0.149	0.135	
Mean	0.219	0.212	0.224	0.226	0.227	0.151	0.132	
% difference from initial measurement	--	**-2.96**	**--**	**0.881**	**1.09**	--	**-12.5**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Bromodichloromethane (VBM)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B18312	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.065	0.063	0.062	0.063	0.062	0.060	0.055	12.3
Replicate 2	0.064	0.064	0.061	0.068	0.062	0.061	0.059	
Replicate 3	0.065	0.063	0.065	0.064	0.066	0.054	0.062	
Replicate 4	0.065	0.065	0.063	0.064	0.060	0.052	0.059	
Mean	0.065	0.064	0.063	0.065	0.062	0.057	0.059	
% difference from initial measurement	--	**-1.34**	--	**2.97**	**-0.298**	--	**3.83**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.297	0.292	0.282	0.282	0.284	0.248	0.260	14.2
Replicate 2	0.283	0.282	0.261	0.287	0.285	0.237	0.250	
Replicate 3	0.291	0.291	0.294	0.287	0.289	0.229	0.257	
Replicate 4	0.298	0.290	0.307	0.303	0.299	0.212	0.261	
Mean	0.292	0.288	0.286	0.290	0.289	0.231	0.257	
% difference from initial measurement	--	**-1.26**	**--**	**1.26**	**1.05**	--	**11.0**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**2,5-Dimethylfuran (2DF)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17348	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.053	0.050	0.050	0.051	0.051	0.055	0.060	12.7
Replicate 2	0.053	0.051	0.050	0.055	0.051	0.054	0.057	
Replicate 3	0.053	0.049	0.053	0.045	0.054	0.055	0.063	
Replicate 4	0.053	0.051	0.052	0.053	0.050	0.055	0.059	
Mean	0.053	0.051	0.051	0.051	0.051	0.055	0.060	
% difference from initial measurement	--	**-5.05**	--	**-1.28**	**-0.090**	--	**9.33**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.134	0.128	0.129	0.129	0.130	0.116	0.121	14.2
Replicate 2	0.130	0.123	0.118	0.131	0.129	0.110	0.115	
Replicate 3	0.133	0.126	0.135	0.129	0.132	0.107	0.118	
Replicate 4	0.135	0.125	0.141	0.137	0.136	0.098	0.123	
Mean	0.133	0.126	0.131	0.131	0.132	0.108	0.119	
% difference from initial measurement	--	**-5.70**	**--**	**0.646**	**0.956**	--	**10.5**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**α,α,α-trifluorotoluene (VTFT)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.056	0.054	0.052	0.053	0.052	0.055	0.046	14.2
Replicate 2	0.055	0.055	0.051	0.056	0.052	0.053	0.045	
Replicate 3	0.055	0.053	0.055	0.054	0.055	0.048	0.046	
Replicate 4	0.056	0.054	0.054	0.054	0.050	0.045	0.043	
Mean	0.056	0.054	0.053	0.054	0.052	0.050	0.045	
% difference from initial measurement	--	**-3.05**	--	**2.17**	**-1.26**	--	**-10.3**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.261	0.252	0.242	0.243	0.246	0.219	0.195	14.2
Replicate 2	0.252	0.242	0.225	0.249	0.244	0.205	0.182	
Replicate 3	0.255	0.251	0.258	0.247	0.251	0.201	0.187	
Replicate 4	0.263	0.249	0.266	0.262	0.259	0.179	0.196	
Mean	0.258	0.248	0.248	0.250	0.250	0.201	0.190	
% difference from initial measurement	--	**-3.62**	**--**	**1.11**	**0.929**	--	**-5.53**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**4-Methyl-2-pentanone (VMIK)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17348	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.127	0.127	0.128	0.126	0.125	0.148	0.166	12.7
Replicate 2	0.128	0.127	0.124	0.135	0.130	0.147	0.165	
Replicate 3	0.127	0.128	0.123	0.126	0.131	0.142	0.157	
Replicate 4	0.126	0.131	0.127	0.124	0.125	0.145	0.157	
Mean	0.127	0.129	0.125	0.128	0.128	0.145	0.161	
% difference from initial measurement	--	**1.11**	--	**2.03**	**2.14**	--	**10.7**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.540	0.545	0.522	0.527	0.537	0.501	0.535	14.2
Replicate 2	0.530	0.527	0.495	0.547	0.533	0.492	0.539	
Replicate 3	0.531	0.535	0.572	0.550	0.539	0.476	0.549	
Replicate 4	0.554	0.547	0.592	0.580	0.571	0.441	0.552	
Mean	0.539	0.539	0.545	0.551	0.545	0.477	0.544	
% difference from initial measurement	--	**-0.035**	**--**	**1.08**	**0.024**	--	**13.9**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Toluene (VTO)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.187	0.199	0.180	0.195	0.174	0.209	0.179	14.2
Replicate 2	0.184	0.206	0.182	0.212	0.174	0.211	0.164	
Replicate 3	0.190	0.186	0.179	0.190	0.187	0.201	0.196	
Replicate 4	0.191	0.191	0.179	0.185	0.173	0.194	0.198	
Mean	0.188	0.196	0.180	0.196	0.177	0.204	0.184	
% difference from initial measurement	--	**4.04**	--	**8.57**	**-1.62**	--	**-9.63**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.946	0.935	0.879	0.905	0.890	0.818	0.740	14.2
Replicate 2	0.912	0.908	0.823	0.926	0.904	0.794	0.744	
Replicate 3	0.943	0.935	0.981	0.904	0.909	0.779	0.745	
Replicate 4	0.967	0.932	1.017	0.960	0.948	0.722	0.782	
Mean	0.942	0.927	0.925	0.924	0.913	0.778	0.753	
% difference from initial measurement	--	**-1.57**	**--**	**-0.153**	**-1.33**	--	**-3.24**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Dibromochloromethane (VCM)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.025	0.024	0.025	0.025	0.025	0.024	0.024	14.2
Replicate 2	0.026	0.025	0.025	0.027	0.025	0.024	0.023	
Replicate 3	0.025	0.025	0.025	0.026	0.026	0.022	0.024	
Replicate 4	0.025	0.025	0.025	0.025	0.023	0.021	0.022	
Mean	0.025	0.025	0.025	0.026	0.025	0.023	0.023	
% difference from initial measurement	--	**-0.517**	--	**3.02**	**-0.015**	--	**1.67**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.093	0.091	0.088	0.088	0.090	0.082	0.081	14.2
Replicate 2	0.089	0.089	0.083	0.091	0.090	0.079	0.078	
Replicate 3	0.091	0.091	0.092	0.091	0.091	0.076	0.081	
Replicate 4	0.094	0.092	0.097	0.097	0.095	0.071	0.082	
Mean	0.092	0.091	0.090	0.092	0.091	0.077	0.080	
% difference from initial measurement	--	**-1.17**	**--**	**2.10**	**1.63**	--	**4.40**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	***n*-Octane (V08N)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B18009	B18312	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.123	0.109	0.116	0.115	0.117	0.111	0.082	10.1
Replicate 2	0.119	0.112	0.116	0.127	0.120	0.100	0.091	
Replicate 3	0.119	0.106	0.125	0.119	0.121	0.095	0.116	
Replicate 4	0.118	0.108	0.121	0.118	0.114	0.092	0.104	
Mean	0.120	0.109	0.119	0.120	0.118	0.100	0.098	
% difference from initial measurement	--	**-9.38**	--	**0.365**	**-1.20**	--	**-1.21**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B18039	B18312	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.491	0.439	0.466	0.474	0.467	0.257	0.221	9.1
Replicate 2	0.486	0.430	0.429	0.484	0.475	0.243	0.214	
Replicate 3	0.487	0.431	0.510	0.478	0.494	† 0.218	0.218	
Replicate 4	0.487	0.425	0.536	0.510	0.521	† 0.221	0.218	
Mean	0.488	0.431	0.485	0.487	0.489	0.235	0.218	
% difference from initial measurement	--	**-11.6**	**--**	**0.282**	**0.821**	--	**-7.29**	

†second vial of initial measurement broke, so the average of the first two measurements was used as Replicate 3 and Replicate 4

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**1,2-Dibromoethane (VDE)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.082	0.080	0.081	0.081	0.080	0.079	0.065	14.2
Replicate 2	0.082	0.082	0.080	0.088	0.081	0.080	0.065	
Replicate 3	0.083	0.080	0.082	0.083	0.084	0.071	0.065	
Replicate 4	0.083	0.083	0.081	0.082	0.078	0.069	0.063	
Mean	0.082	0.081	0.081	0.083	0.081	0.075	0.064	
% difference from initial measurement	--	**-1.25**	--	**2.76**	**-0.391**	--	**-13.9**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.396	0.393	0.376	0.377	0.382	0.344	0.302	14.2
Replicate 2	0.384	0.382	0.354	0.389	0.386	0.337	0.294	
Replicate 3	0.391	0.392	0.393	0.386	0.388	0.326	0.300	
Replicate 4	0.404	0.394	0.414	0.413	0.405	0.300	0.309	
Mean	0.394	0.390	0.384	0.391	0.390	0.327	0.301	
% difference from initial measurement	--	**-0.926**	**--**	**1.83**	**1.43**	--	**-7.77**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Tetrachloroethylene (V4C)**

Quality material 1	B17334	B17334	B17348	B17348	B17320	B18039	B18193	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.077	0.092	0.075	0.067	0.080	0.076	0.040	5.1
Replicate 2	0.076	0.093	0.066	0.062	0.080	0.075	0.039	
Replicate 3	0.070	0.074	0.070	0.076	0.084	0.042	0.093	
Replicate 4	0.072	0.076	0.071	0.068	0.078	0.041	0.093	
Mean	0.074	0.084	0.070	0.068	0.080	0.058	0.066	
% difference from initial measurement	--	**13.7**	--	**-3.16**	**9.26**	--	**13.7**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B18072	B18193	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.314	0.311	0.315	0.370	0.318	0.196	0.159	4.0
Replicate 2	0.300	0.300	0.295	0.379	0.319	0.201	0.155	
Replicate 3	0.350	0.307	0.331	0.330	0.327	0.182	0.180	
Replicate 4	0.360	0.306	0.345	0.353	0.339	0.175	0.176	
Mean	0.331	0.306	0.321	0.358	0.326	0.188	0.167	
% difference from initial measurement	--	**-7.63**	**--**	**11.3**	**1.32**	--	**-11.2**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**1,1,1,2-Tetrachloroethane (V4CE)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.086	0.085	0.085	0.086	0.086	0.087	0.077	14.2
Replicate 2	0.088	0.086	0.085	0.092	0.086	0.088	0.075	
Replicate 3	0.087	0.085	0.088	0.089	0.089	0.076	0.074	
Replicate 4	0.088	0.087	0.087	0.087	0.083	0.074	0.070	
Mean	0.087	0.086	0.086	0.088	0.086	0.081	0.074	
% difference from initial measurement	--	**-1.60**	--	**2.49**	**-0.289**	--	**-8.87**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.547	0.536	0.533	0.533	0.537	0.484	0.445	14.2
Replicate 2	0.524	0.519	0.499	0.548	0.543	0.467	0.433	
Replicate 3	0.536	0.537	0.551	0.543	0.549	0.451	0.442	
Replicate 4	0.551	0.537	0.583	0.581	0.571	0.415	0.451	
Mean	0.540	0.532	0.542	0.551	0.550	0.454	0.443	
% difference from initial measurement	--	**-1.36**	**--**	**1.70**	**1.47**	--	**-2.54**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Chlorobenzene (VCB)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B18009	B18193	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.039	0.038	0.038	0.039	0.037	0.033	0.028	6.1
Replicate 2	0.039	0.039	0.038	0.041	0.038	0.032	0.027	
Replicate 3	0.039	0.039	0.040	0.039	0.041	0.032	0.028	
Replicate 4	0.039	0.040	0.039	0.038	0.037	0.031	0.028	
Mean	0.039	0.039	0.039	0.039	0.038	0.032	0.028	
% difference from initial measurement	--	**-0.476**		**2.23**	**-0.270**	--	**-13.0**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.285	0.283	0.275	0.278	0.279	0.239	0.202	14.2
Replicate 2	0.272	0.272	0.259	0.284	0.279	0.234	0.197	
Replicate 3	0.277	0.281	0.270	0.280	0.280	0.225	0.203	
Replicate 4	0.290	0.282	0.286	0.299	0.294	0.210	0.208	
Mean	0.281	0.280	0.273	0.285	0.283	0.227	0.203	
% difference from initial measurement	--	**-0.467**		**4.65**	**3.88**	--	**-10.6**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Ethylbenzene (VEB)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.052	0.058	0.053	0.063	0.051	0.066	0.054	14.2
Replicate 2	0.054	0.060	0.053	0.054	0.051	0.069	0.052	
Replicate 3	0.053	0.054	0.052	0.054	0.054	0.045	0.053	
Replicate 4	0.053	0.056	0.052	0.054	0.051	0.048	0.052	
Mean	0.053	0.057	0.052	0.056	0.052	0.057	0.053	
% difference from initial measurement	--	**7.47**	--	**6.83**	**-1.46**	--	**-7.50**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.357	0.354	0.342	0.346	0.344	0.306	0.303	14.2
Replicate 2	0.350	0.347	0.316	0.358	0.348	0.315	0.290	
Replicate 3	0.361	0.356	0.354	0.349	0.349	0.305	0.296	
Replicate 4	0.371	0.358	0.370	0.377	0.367	0.272	0.305	
Mean	0.360	0.354	0.346	0.358	0.352	0.300	0.299	
% difference from initial measurement	--	**-1.70**	**--**	**3.47**	**1.94**	--	**-0.304**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	***m/p*-Xylene (VXY)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.125	0.134	0.143	0.161	0.140	0.185	0.161	14.2
Replicate 2	0.124	0.137	0.142	0.173	0.142	0.193	0.158	
Replicate 3	0.126	0.126	0.135	0.155	0.143	0.138	0.164	
Replicate 4	0.130	0.128	0.136	0.142	0.134	0.134	0.159	
Mean	0.126	0.131	0.139	0.158	0.140	0.163	0.161	
% difference from initial measurement	--	**3.88**	--	**13.4**	**0.549**	--	**-1.30**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.556	0.551	0.568	0.597	0.575	0.541	0.542	14.2
Replicate 2	0.543	0.534	0.574	0.646	0.586	0.527	0.534	
Replicate 3	0.565	0.553	0.593	0.595	0.610	0.512	0.536	
Replicate 4	0.617	0.572	0.626	0.643	0.615	0.456	0.548	
Mean	0.570	0.552	0.590	0.620	0.597	0.509	0.540	
% difference from initial measurement	--	**-3.17**	**--**	**5.06**	**1.06**	--	**6.11**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Bromoform (VBF)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.064	0.062	0.063	0.063	0.063	0.060	0.064	14.2
Replicate 2	0.064	0.064	0.062	0.068	0.063	0.062	0.064	
Replicate 3	0.064	0.062	0.064	0.065	0.065	0.056	0.063	
Replicate 4	0.065	0.065	0.063	0.063	0.061	0.055	0.062	
Mean	0.064	0.064	0.063	0.065	0.063	0.059	0.063	
% difference from initial measurement	--	**-1.04**	--	**2.70**	**0.053**	--	**8.06**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.185	0.181	0.174	0.175	0.178	0.166	0.172	14.2
Replicate 2	0.179	0.178	0.166	0.181	0.179	0.161	0.168	
Replicate 3	0.183	0.182	0.182	0.180	0.181	0.156	0.172	
Replicate 4	0.189	0.182	0.193	0.193	0.189	0.142	0.176	
Mean	0.184	0.181	0.179	0.182	0.182	0.156	0.172	
% difference from initial measurement	--	**-1.53**	**--**	**2.07**	**1.67**	--	**10.3**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Styrene (VST)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.136	0.148	0.134	0.146	0.130	0.166	0.149	14.2
Replicate 2	0.136	0.157	0.137	0.164	0.132	0.173	0.145	
Replicate 3	0.136	0.134	0.132	0.139	0.140	0.126	0.145	
Replicate 4	0.138	0.144	0.131	0.136	0.125	0.125	0.143	
Mean	0.137	0.146	0.134	0.146	0.132	0.147	0.145	
% difference from initial measurement	--	**6.72**	--	**9.46**	**-1.28**	--	**-1.26**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.686	0.691	0.638	0.644	0.645	0.620	0.594	14.2
Replicate 2	0.667	0.674	0.607	0.667	0.662	0.597	0.582	
Replicate 3	0.708	0.673	0.676	0.663	0.648	0.581	0.579	
Replicate 4	0.731	0.677	0.702	0.694	0.690	0.535	0.601	
Mean	0.698	0.679	0.656	0.667	0.661	0.583	0.589	
% difference from initial measurement	--	**-2.72**	**--**	**1.72**	**0.831**	--	**1.00**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	***o*-Xylene (VOX)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.071	0.070	0.067	0.071	0.066	0.085	0.067	14.2
Replicate 2	0.070	0.073	0.068	0.077	0.067	0.086	0.065	
Replicate 3	0.070	0.067	0.065	0.070	0.069	0.065	0.066	
Replicate 4	0.070	0.071	0.065	0.067	0.065	0.063	0.065	
Mean	0.070	0.070	0.066	0.071	0.067	0.075	0.066	
% difference from initial measurement	--	**-0.008**	--	**7.53**	**0.552**	--	**-12.2**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.217	0.210	0.191	0.201	0.199	0.193	0.179	14.2
Replicate 2	0.205	0.203	0.181	0.209	0.201	0.189	0.176	
Replicate 3	0.218	0.206	0.204	0.196	0.199	0.182	0.176	
Replicate 4	0.226	0.209	0.214	0.212	0.208	0.166	0.182	
Mean	0.216	0.207	0.198	0.205	0.202	0.182	0.178	
% difference from initial measurement	--	**-4.33**	**--**	**3.55**	**2.16**	--	**-2.47**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**1,2,3-Trichloropropane (VTP)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.042	0.041	0.042	0.041	0.043	0.043	0.039	14.2
Replicate 2	0.043	0.041	0.041	0.045	0.043	0.044	0.039	
Replicate 3	0.042	0.041	0.042	0.043	0.043	0.038	0.037	
Replicate 4	0.043	0.043	0.042	0.042	0.040	0.037	0.037	
Mean	0.043	0.041	0.042	0.043	0.042	0.041	0.038	
% difference from initial measurement	--	**-2.99**	--	**2.70**	**0.547**	--	**-5.65**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.253	0.245	0.237	0.238	0.242	0.221	0.215	14.2
Replicate 2	0.244	0.239	0.226	0.247	0.247	0.217	0.213	
Replicate 3	0.247	0.245	0.246	0.244	0.245	0.209	0.217	
Replicate 4	0.255	0.245	0.263	0.262	0.256	0.192	0.223	
Mean	0.250	0.243	0.243	0.248	0.248	0.210	0.217	
% difference from initial measurement	--	**-2.48**	**--**	**1.90**	**1.88**	--	**3.55**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Isopropylbenzene (VIPB)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B18009	B18312	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.114	0.110	0.111	0.113	0.112	0.100	0.081	10.1
Replicate 2	0.113	0.114	0.111	0.122	0.110	0.099	0.087	
Replicate 3	0.115	0.110	0.112	0.121	0.116	0.098	0.092	
Replicate 4	0.117	0.116	0.112	0.114	0.107	0.096	0.085	
Mean	0.115	0.112	0.112	0.117	0.111	0.098	0.086	
% difference from initial measurement	--	**-1.98**	--	**5.33**	**-0.383**	--	**-12.4**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B18039	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.940	0.939	0.888	0.902	0.899	0.705	0.599	11.0
Replicate 2	0.918	0.917	0.842	0.934	0.918	0.687	0.568	
Replicate 3	0.930	0.956	0.927	0.931	0.921	0.671	0.589	
Replicate 4	0.960	0.953	0.981	0.997	0.958	0.667	0.609	
Mean	0.937	0.941	0.910	0.941	0.924	0.682	0.591	
% difference from initial measurement	--	**0.463**	**--**	**3.47**	**1.59**	--	**-13.4**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Benzonitrile (VBZN)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	1.21	1.18	1.23	1.23	1.21	1.41	1.35	14.2
Replicate 2	1.20	1.22	1.23	1.43	1.38	1.46	1.31	
Replicate 3	1.27	1.19	1.31	1.22	1.37	1.16	1.27	
Replicate 4	1.34	1.32	1.21	1.23	1.35	1.13	1.28	
Mean	1.26	1.22	1.24	1.28	1.33	1.29	1.30	
% difference from initial measurement	--	**-2.53**	--	**2.70**	**6.99**	--	**0.805**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17320	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	13.5	13.3	12.4	13.4	12.5	12.41	13.3	13.7
Replicate 2	13.1	12.6	12.0	13.2	12.9	11.95	13.3	
Replicate 3	13.2	13.4	12.8	12.5	13.0	12.78	13.5	
Replicate 4	13.9	13.4	13.9	14.0	14.1	13.88	12.8	
Mean	13.4	13.2	12.8	13.3	13.1	12.8	13.2	
% difference from initial measurement	--	**-1.66**	**--**	**3.98**	**2.74**	--	**3.8**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**1,3-Dichlorobenzene (V3B)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B18009	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.058	0.056	0.057	0.058	0.057	0.049	0.044	12.0
Replicate 2	0.059	0.058	0.057	0.062	0.057	0.048	0.043	
Replicate 3	0.058	0.056	0.058	0.059	0.059	0.048	0.042	
Replicate 4	0.059	0.059	0.057	0.058	0.055	0.049	0.041	
Mean	0.059	0.057	0.057	0.059	0.057	0.049	0.042	
% difference from initial measurement	--	**-2.27**	--	**3.43**	**-0.329**	--	**-12.9**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B18009	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.384	0.380	0.355	0.357	0.362	0.292	0.255	12.0
Replicate 2	0.374	0.377	0.343	0.378	0.374	0.300	0.253	
Replicate 3	0.380	0.383	0.379	0.374	0.372	0.302	0.257	
Replicate 4	0.392	0.385	0.399	0.405	0.389	0.306	0.265	
Mean	0.382	0.381	0.369	0.378	0.374	0.300	0.258	
% difference from initial measurement	--	**-0.274**	**--**	**2.61**	**1.45**	--	**-14.1**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**1,4-Dichlorobenzene (VDB)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.124	0.119	0.121	0.123	0.121	0.123	0.106	14.2
Replicate 2	0.124	0.125	0.123	0.132	0.122	0.129	0.104	
Replicate 3	0.123	0.121	0.121	0.125	0.126	0.111	0.102	
Replicate 4	0.127	0.127	0.123	0.123	0.119	0.109	0.097	
Mean	0.125	0.123	0.122	0.126	0.122	0.118	0.102	
% difference from initial measurement	--	**-1.42**	--	**3.04**	**0.161**	--	**-13.6**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.612	0.605	0.560	0.564	0.567	0.527	0.445	14.2
Replicate 2	0.597	0.599	0.546	0.594	0.591	0.531	0.440	
Replicate 3	0.601	0.605	0.597	0.595	0.597	0.522	0.446	
Replicate 4	0.624	0.613	0.638	0.637	0.623	0.473	0.470	
Mean	0.609	0.606	0.585	0.597	0.594	0.513	0.450	
% difference from initial measurement	--	**-0.490**	**--**	**2.08**	**1.55**	--	**-12.3**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**1,2-Dichlorobenzene (V1D)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.049	0.047	0.050	0.048	0.048	0.051	0.044	14.2
Replicate 2	0.049	0.048	0.049	0.054	0.048	0.051	0.044	
Replicate 3	0.049	0.048	0.048	0.049	0.050	0.043	0.042	
Replicate 4	0.050	0.048	0.049	0.049	0.046	0.042	0.041	
Mean	0.049	0.048	0.049	0.050	0.048	0.047	0.043	
% difference from initial measurement	--	**-2.82**	--	**2.21**	**-2.35**	--	**-9.20**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	0.340	0.339	0.318	0.321	0.325	0.294	0.260	14.2
Replicate 2	0.338	0.334	0.308	0.339	0.338	0.295	0.260	
Replicate 3	0.340	0.339	0.341	0.337	0.339	0.292	0.265	
Replicate 4	0.351	0.345	0.359	0.363	0.356	0.263	0.269	
Mean	0.342	0.339	0.331	0.340	0.339	0.286	0.264	
% difference from initial measurement	--	**-0.878**	**--**	**2.59**	**2.46**	--	**-7.86**	

Method name:	Volatile Organic Compounds in Blood
Method #:	2100
Matrix:	Whole Blood
Units:	ng/mL
Analyte:	**Nitrobenzene (VNB)**

Quality material 1	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	1.70	1.58	1.56	1.62	1.55	1.97	1.77	14.2
Replicate 2	1.73	1.72	1.51	1.63	1.64	2.01	1.74	
Replicate 3	1.74	1.68	1.52	1.56	1.63	1.78	1.74	
Replicate 4	1.67	1.75	1.58	1.50	1.49	1.71	1.67	
Mean	1.71	1.68	1.54	1.57	1.58	1.87	1.73	
% difference from initial measurement	--	**-1.69**	--	**2.20**	**2.38**	--	**-7.51**	

Quality material 2	B17334	B17334	B17320	B17320	B17320	B17304	B19010	
	Initial measurement	**Three chill-warm cycles**	**Initial measurement**	**Bench-top stability**	**Processed sample stability**	**Initial measurement**	**Long-term stability**	**Number of months**
Replicate 1	10.4	10.4	9.01	9.09	9.16	9.74	10.2	14.2
Replicate 2	10.3	10.1	8.86	9.34	9.53	9.85	10.1	
Replicate 3	10.3	10.3	9.63	9.47	9.44	9.63	10.3	
Replicate 4	10.6	10.5	10.2	10.3	10.0	8.74	9.84	
Mean	10.4	10.3	9.43	9.55	9.54	9.49	10.1	
% difference from initial measurement	--	**-0.734**	**--**	**1.25**	**1.19**	--	**6.79**	

Table C4: LOD, Specificity, Fit for intended use

Analytes	Limit of Detection (LOD)	Interferences successfully checked in at least 50 human samples	Accuracy, precision, LOD, specificity and stability meet performance specifications for intended use
Chloroethane	0.045	yes	yes
Vinyl Bromide	0.045	yes	yes
Furan	0.025	yes	yes
Ethyl ether	0.040	yes	yes
Methylene Chloride	0.250	yes	yes
Methyl *tert* -Butyl Ether	0.010	yes	yes
n -Hexane	0.122	yes	yes
Chloroform	0.008	yes	yes
Ethyl Acetate	0.158	yes	yes
Methylcyclopentane	0.020	yes	yes
Isobutyronitrile	0.040	yes	yes
Tetrahydrofuran	0.125	yes	yes
1,2-Dichloroethane	0.010	yes	yes
1,1,1-Trichloroethane	0.010	yes	yes
Cyclohexane	0.020	yes	yes
Carbon Tetrachloride	0.005	yes	yes
Benzene	0.024	yes	yes
n -Heptane	0.100	yes	yes
Trichloroethylene	0.012	yes	yes
Bromodichloromethane	0.006	yes	yes
2,5-Dimethylfuran	0.011	yes	yes
α,α,α-Trifluorotoluene	0.040	yes	yes
4-Methyl-2-Pentanone	0.100	yes	yes
Toluene	0.025	yes	yes
Dibromochloromethane	0.005	yes	yes
n -Octane	0.100	yes	yes
1,2-Dibromoethane	0.015	yes	yes
Tetrachloroethylene	0.048	yes	yes
1,1,1,2-Tetrachloroethane	0.040	yes	yes
Chlorobenzene	0.011	yes	yes
Ethylbenzene	0.024	yes	yes
m /*p* -Xylene	0.034	yes	yes
Bromoform	0.008	yes	yes
Styrene	0.030	yes	yes
o -Xylene	0.024	yes	yes
1,2,3-Trichloropropane	0.040	yes	yes
Isopropylbenzene	0.040	yes	yes
Benzonitrile	0.150	yes	yes
1,3-Dichlorobenzene	0.025	yes	yes
1,4-Dichlorobenzene	0.040	yes	yes
1,2-Dichlorobenzene	0.025	yes	yes
Nitrobenzene	0.320	yes	yes