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The following pages present the criteria from *R210 - Specific Requirements: Kentucky Underground Storage Tank Testing Laboratory Accreditation Program* in a checklist format. All laboratories participating in this program shall be assessed to ISO/IEC 17025 and to these requirements. The format of the checklist follows the formatting of ISO/IEC 17025 and consists of the additional clauses specified in the program requirements. The laboratory's policies and procedures must meet these requirements. Quality system documentation and supporting records must be available for the assessor's review.

Laboratory Instructions: If the requirements include the need for a written policy, procedure or arrangement, that requirement statement in this checklist is shaded. *The laboratory should complete the document reference identifiers in the checklist's second column (labeled 'reference') for each shaded requirement.* The appropriate 'reference' can include quality manual, laboratory manual, SOPs, records, etc. references. The references provided should specify procedure number, page number and section number, where possible. *Completion of this checklist serves to help both the laboratory and the assessor prepare for the assessment and may save a significant amount of assessment time and cost.*

Assessor Instructions: Review the laboratory's documented quality system to verify compliance with the applicable Kentucky UST Program documentation requirements. Assess to verify that the documented quality system is indeed implemented as described. Every checklist item should be accompanied by a tick mark in the yes, no or n/a space. Record comments related to any requirement in the space provided and sign on the appropriate line on page 2. Assess the laboratory's technical competence to perform specific tests or specific types of tests. Record comments related to tests on *A312 – Method Matrix: ISO/IEC 17025*. Additional comments can be noted on the draft scope. All deficiencies must be identified and explained in the assessor deficiency report.

To the best of my knowledge, all laboratory document references below as well as actual laboratory practice have been assessed for compliance with the relevant clauses of ISO/IEC 17025 and **R101 – General Requirements: Accreditation of ISO/IEC 17025 Laboratories**. I hereby attest that all ‘Yes’ marked compliance clauses, whether initialed or not, meet the aforementioned requirements. Any areas of noncompliance have been fully described in the Assessor Deficiency Report.

CAB Name:			
Address:			
Contact:			
Phone:		Email:	
Master Code:		Assessment ID:	
Certificate(s):		Conformity Standard:	
Assessment Dates:		Assessment Type:	
Assessor(s):		Assessor Signature(s):	
AcO:			



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		Compliance			Comments
		Y	N	NA	
4. Management Requirements					
4.11 Corrective Action					
4E.11.1 The laboratory shall document, investigate and take corrective action for all episodes where QC data shows an out-of-control situation. The laboratory shall keep records of all out-of-control events, the determined cause(s) and corrective actions taken. All reported data from and out-of-control event shall be appropriately qualified.					
4.13 Control of Records					
The laboratory shall establish and maintain a records system ensuring that:					
4E.13.1 All observations and calculations are recorded in a permanent manner (such as laboratory notebooks, pro-forma work sheets, or magnetic media) at the time they are made and that the units of measurement in which observations are recorded are stated.					
4E.13.2 Original records are uniquely identified and traceable to the test items to which they refer and to any test reports based upon them.					
4E.13.3 Records are traceable, retrievable, and legible and					



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include sufficient information and explanation such that they can be readily interpreted by staff other than those responsible for their generation.					
4E.13.4 Records contain sufficient information to permit identification of possible sources of error and to permit, where feasible and necessary, satisfactory repetition of the test under the original conditions.					
4E.13.5 Records contain sufficient details of any significant departures from test specifications or other specified procedures including authorization for such departures.					
4E.13.6 Records are checked for data transcription or calculation errors and the checks are documented.					
4E.13.7 Records identify the person or persons responsible for their creation and the date of such creation and for the person(s) checking data transcriptions and calculations and the date of such checking.					
4E.13.8 Corrections or amendments to test records are made in a manner that does not obliterate the original data and are signed or initialed and dated by the person responsible.					
4E.13.9 A list of all staff documenting their initials and/or signatures are used in documents such as logbooks shall be maintained.					



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4E.13.10 Test records shall be protected from loss, damage, misuse, or deterioration and shall be retained for an appropriate period in a manner that permits retrieval when required. Test records that are created and/ or retained on magnetic media (e.g., computer disks) or photographic media (e.g., microfiche) shall be stored in a manner that protects them from the hazards that degrade such media. Provision shall be made for the printing of such records when required.					
5. Technical Requirements					
5.2 Personnel					
5E.2.1 <u>Technical Manager</u> . The technical manager (however named) shall possess a four-year college degree from an accredited education institution in chemistry or a related science or equivalent and have at least 3 years of non-academic laboratory experience; the technical manager shall be on-site at least 50% of the time.					



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5E.2.2 <u>Quality Manager</u> . The quality manager (however named) shall possess a four-year college degree from an accredited educational institution in a basic or applied science or equivalent and have at least 1 year of non-academic laboratory experience and training in statistics. Alternatively, the quality manager can have a college degree in other than the basic or applied sciences, with at least 4 years of non-academic analytical chemistry experience and training in statistics. The technical manager may also function as the quality manager so long as he/she does not act in the position as the sample analyst/technician analyzing the samples or act as the immediate supervisor of the analyst/technician involved with the analysis of the samples. The quality manager may be employed by the laboratory on a part-time basis or as a consultant.					
5E.2.3 <u>Senior Technical Staff</u> . Persons in each senior technical position shall have a bachelor's degree in a relevant scientific field or equivalent experience. At least one year of non-academic experience in relevant analysis is required. Successful training in specific methods used in the laboratory shall be verified and documented as performance evaluations using reference/control materials of the matrices of concern. Proficiency testing results must be documented.					
Persons filling the following job functions must meet the					



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associated minimum experience and training requirements:					
5E.2.3.1 <u>Inductively coupled plasma-emission (ICP) spectroscopy</u> : One year experience with satisfactory completion of a short course on ICP or an equivalent in-house training course.					
5E.2.3.2 <u>Flameless atomic absorption spectroscopy</u> : One year with satisfactory completion of a short course on graphite furnace atomic absorption (GFAA) or an equivalent in-house training course.					
5E.2.3.3 <u>Flame atomic absorption (FLAA) spectroscopy</u> : One year with satisfactory completion of a short course on FLAA or an equivalent in-house training course.					
5E.2.3.4 <u>X-ray fluorescence (XRF) spectroscopy</u> : One year with satisfactory completion of a short course on XRF or an equivalent in-house training course.					
5E.2.3.5 <u>Gas chromatography</u> : One year with satisfactory completion of a short course on basic GC or an equivalent in-house training course.					
5E.2.3.6 <u>Mass spectrometry</u> : One year with satisfactory completion of a vendor's training course, professional sponsored short course, or equivalent in-house training course.					



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5E.2.3.7 <u>Mass spectra interpretation</u> : One year with satisfactory completion of a vendor's training course, professional sponsored short course, or equivalent in-house training course.					
5E.2.3.8 <u>General chemistry and instrumentation</u> : Six months.					
5E.2.3.9 <u>Field testing</u> : Six months					
5E.2.3.10 <u>Sample collection</u> : Six months					
5E.2.4 <u>Analyst/Technician</u> . Analysts/technicians shall have completed a training course (or an equivalent in-house course) in relevant analyses and have demonstrated ability to produce reliable results through accurate analysis of reference materials (RMs), proficiency testing samples, or in-house quality control samples. Their performance must be documented. Junior staff (nondegreed personnel with less than 3 years relevant experience) must work under the direct supervision of the technical manager, or under the supervision of a senior technical person described above or under the instruction of an analyst/technician who has performed successfully over a period of three years in the relevant analyses using the same technologies being applied for the analysis of environmental samples.					
5E.2.5 <u>Minimum Level of Experience Required for</u>					



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<u>Independent Operation.</u>					
5E.2.5.1 Sample preparation: 3 months per method used.					
5E.2.5.2 Routine sample analysis: 6 months per method used.					
5E.2.6 <u>Requirements during Training.</u> Analyst/technicians in training may perform work on samples submitted for environmental analysis as long as the following conditions are met:					
5E.2.6.1 They have demonstrated the ability to produce reliable results through accurate analysis of RMs, proficiency testing samples or in-house quality control samples; and					
5E.2.6.2 Their immediate supervisor or instructor is readily available in their work area when they are preparing and/or analyzing the samples.					
5E.2.7 The laboratory shall have documented evidence contained in their training records of proficiency of all personnel for each test method or activity performed on the matrices of concern.					
5.1 Accommodation and Environmental Conditions					
5E.3.1 <u>Quality issues.</u> In order to prevent contamination of samples or standards, the laboratory shall:					



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5E.3.1.1 Use distilled/demineralized water that is demonstrated to be free of interferants at applicable detection limits.					
5E.3.1.2 Check and record the conductivity of distilled/demineralized water at least once a week using a calibrated conductivity meter which is external to the water system. The point of water collection shall be from a frequently used access point.					
5E.3.1.3 Exhaust hoods shall be vented in such a manner to prevent cross contamination of samples and equipment. (Example: The hood outlet of the organic extraction laboratory should not be near the air intake for the volatile organic laboratory. Evidence can be obtained by examination of laboratory blanks for contamination.)					
5E.3.1.4 Provide sample storage facilities which prevent cross contamination of samples with standards, solvents, or reagents. See section 11E4 of this criteria. (Evidence of compliance may be obtained through the examination of storage areas, or through the use of laboratory storage blanks, travel/trip blanks or other blanks stored with samples.)					
5E.3.2 <u>Laboratory Safety</u> : Each laboratory shall have a safety and chemical hygiene plan (see OSHA rule 29 CFR 1910), as part of their standard operating procedure. Where					



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safety practices are included as part of an approved method, the practices shall be strictly followed. While more specific safety criteria are not an aspect of this accreditation program, laboratory personnel should apply general and customary safety practices as a part of good laboratory procedures. The laboratory shall:					
5E.3.2.1 Have toxic chemical handling areas consisting of impervious, non-reactive material covered with absorbent material.					
5E.3.2.2 Provide exhaust hoods for personnel protection (see 29 CFR 1910.1450, Occupational Exposure to Toxic Substances in Laboratories and ANSI/AIHA Z9.5-1992, Standard for Laboratory Ventilation);					
5E.3.2.3 Have procedures and facilities for handling material that may transmit infectious agents (see NIH 88-8395 or equivalent);					
5E.3.2.4 Store reagents, corrosives, explosives, oxidants, and flammable solvents appropriately (see OSHA rule 29 CFR 1910.1450);					
5E.3.3 <u>Waste Disposal</u> : Each laboratory shall have waste collection, storage, and disposal procedures and policies (reference: 40 CFR 261, 262, and 264), as part of their standard operating procedures. Where disposal practices are included as part of an approved method, these practices					



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shall be strictly followed. While more specific disposal criteria are not an aspect of this accreditation program, the laboratory should apply appropriate federal, state, and local disposal practices as a part of good laboratory procedures.					
5.4 Test Methods and Method Validation					
The laboratory shall:					
5E.4.1 Have documented procedures for making and controlling revisions to in-house SOPs (use revised SOPs only after written authorization by senior technical personnel);					
5E.4.2 Have documented procedures for data collecting and reducing, reporting and record keeping;					
5E.4.3 Have documented method performance procedures to apply at appropriate levels of all measurement systems;					
5E.4.4 Have documented procedures to verify test reports;					
5E.4.5 Have documented procedures for correcting erroneously reported results;					
5E.4.6 Prepare analytical standards at a frequency consistent with method requirements and good QC (frequency is a function of concentration and type of matrix; generally, the lower the concentration the less stable the standard);					



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5E.4.7 Specify the methods and do routine analyses for checking all solvents and reagents used for dilutions and extractions;					
5E.4.8 SOPs for test methods shall supply or refer to information addressing the following areas: Interferences Instrument Calibration Safety Considerations Quality Control Procedures Apparatus and Equipment Detailed Step-by-Step Procedure Reagents and Supplies Sample Calculations Sample Preservation and Storage Method Performance Criteria (accuracy and precision) Sample Preparation					
5E.4.9 <u>Acceptable Methodology</u> . Procedures published by federal agencies (e.g., USEPA, NIOSH), nationally or internationally recognized technical authorities or other validated procedures may be acceptable to use once the laboratory has demonstrated adequate performance with the					



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method for each particular matrix. Alternative procedures and/or modifications of methods may be used if they have been EPA or State approved.					
5E.4.10 <u>Calibration range</u> . Linear calibration ranges (or working calibration ranges) shall be established and routinely verified for each method.					
5E.4.11 <u>Method detection limits</u> . Method detection limits (MDLs) shall be established and statistically verified at least annually where appropriate for each method and matrix of concern.					
5E.4.11.1 For methods with stated MDLs, the laboratory shall demonstrate and document its ability to achieve such MDLs.					
5E.4.11.2 MDLs shall be determined using procedures published or recognized by USEPA. An example of an acceptable recommended procedure is in 40 CFR Part 136, Appendix B.					
5.5 Equipment					
<u>For analytical balances/pan balances:</u>					
5E.5.1 Analytical balances shall be capable of weighing to 0.1 mg					
5E.5.2 Records of balance calibration shall be kept					



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covering at least the effective range of its use traceable to Class 2 or 3 (per ASTM E617) reference weights (formerly classified as Class S and S-1).					
5E.5.3 Records showing functional/calibration checks for each day of use for analytical balances and monthly for pan balances shall be maintained.					
5E.5.4 The balances shall be serviced and calibrated at least annually by an authorized person and a certificate shall be provided and retained identifying traceability to an appropriate national/international measurement standards body, such as the National Institute of Standards and Technology (NIST).					
5E.5.5 The reference weights shall be calibrated at least every five years.					
<u>For pH meters:</u>					
5E.5.6 The laboratory shall use a clean pH meter with appropriate electrode with scale graduations at least 0.1 pH units (calibrated to ± 0.1 pH units for each use period).					
5E.5.7 Either a thermometer or a sensor for temperature measurement to make corrections for pH measurement or an automatic compensation device shall be in use.					
5E.5.8 Either a magnetic, TFE-coated stirring bar or a mechanical bar with inert plastic-coated impeller shall be available.					



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5E.5.9 Records shall be kept showing daily, or before each use, calibration, whichever is less frequent. Calibration shall be performed with at least two buffers in the pH range expected in the samples.					
5E.5.10 Aliquots of standard pH 4 & pH 7, or pH 7 & pH 10 shall be used only once.					
<u>For conductivity meter:</u>					
5E.5.11 A conductivity meter with an error not exceeding 1% or 1 μmhos/cm, whichever is greater, shall be in use.					
5E.5.12 Records shall be kept to show a daily, or before each use, calibration check, whichever is less frequent.					
5E.5.13 Records shall be kept showing that the cell constant is determined annually.					
<u>For glassware:</u>					
5E.5.14 Glassware shall be cleaned in a manner appropriate for the analytical procedures for which it is used including protocols for: metals, ammonia, phosphorus, volatiles and semivolatiles. These cleaning procedures shall be documented.					
<u>For refrigerators:</u>					



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5E.5.15 The bulb of the thermometer in each refrigerator shall be immersed in liquid.					
5E.5.16 Thermometers shall be graduated in increments no larger than 1°C.					
5E.5.17 Records shall be kept to show that refrigerator temperatures are maintained in the range of 2 - 5°C ± 1°C.					
5E.5.18 Samples to be analyzed for volatile organic compounds (VOCs) shall be stored in separate refrigerators from all other samples.					
<u>For ovens:</u>					
5E.5.19 Thermometers shall be graduated in increments no larger than 1°C.					
5E.5.20 If oven temperature cannot be read without opening the door, the bulb of the thermometer shall be immersed in a sand bath. (A second thermometer should be used to evaluate hysteresis of operation.)					
5E.5.21 Oven temperatures shall be controlled and monitored (e.g., beginning and end of each use cycle) to meet applicable method requirements.					
<u>For microwave ovens:</u>					



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5E.5.22 The calibration of the power available for heating shall be documented at least weekly in order to determine that the microwave has not started to degrade and that absolute power settings (watts) may be compared from one microwave to another. (EPA 600/8-91/213; NTIS PB92-114172)					
<u>For hot plates:</u>					
5E.5.23 Monitor temperature at the center of the hot plate where appropriate and document results. (Note: An uncovered beaker containing 50 ml of a liquid such as an oil located in the center of the hot plate can be used to estimate the temperature.)					
<u>For incubators/water baths:</u>					
5E.5.24 Method specific temperature requirements shall be controlled and monitored during the course of a test and appropriate records maintained to assure compliance.					
<u>For thermometers:</u>					
5E.5.25 The laboratory shall have access to a NIST-traceable thermometer.					
5E.5.26 The calibration (correction factors) of working liquid-in-glass thermometers shall be checked at least annually against a NIST-traceable certified thermometer.					



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5E.5.27 The calibration (correction factors) of dial-type thermometers shall be checked at least quarterly against a NIST-traceable thermometer.					
5E.5.28 The NIST-traceable thermometer(s) shall be calibrated at least every five years.					
<u>For autopipetors/dilutors:</u>					
5E.5.29 Apparatus having sufficient sensitivity for the application shall be in use.					
5E.5.30 Records shall be kept showing delivery volumes are checked gravimetrically as appropriate each month of use.					
5.6 Measurement Traceability					
The laboratory shall:					
5E.6.1 Use quality control materials and calibration standards that are traceable to appropriate national/international measurement standards, where available;					
5E.6.2 Document the frequency, conditions, and standards used to establish calibration of all analytical/testing methodology;					



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5E.6.3 Verify and document all working standards versus primary (reference) standards where available;					
5E.6.4 Document the traceability of the specific calibration, calibration check, control, or reference standards, samples, or mixtures of such standards or samples used to establish or verify the validity of the analytical measurement;					
5E.6.5 Label reference materials/reagents with concentrations, date of preparation, expiration date and the identity of the person preparing the reagent;					
5E.6.6 Refrain from using any material beyond the specified expiration date unless documented procedures have been followed for assigning a revised expiration date; and					
5E.6.7 Have standards preparation documentation such as a preparations record book.					
5E.6.8 Instrument performance checks shall be carried out before use for analysis of samples. Such checks shall include, as appropriate, evaluation of instrument sensitivity, noise levels and absorbance/emission levels versus historical values. Acceptance criteria shall be stated.					
5E.6.9 Standard curves shall be prepared to adequately					



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cover the expected concentration ranges of the samples using a minimum of 3 data points for each analyte and one blank, unless otherwise specified by the method employed. Acceptance criteria shall be stated. If acceptance criteria are not met, the problem must be resolved before generating reportable data.					
5E.6.10 Field testing devices shall be calibrated as required by the testing procedure. Acceptance criteria shall be stated. In the absence of a requirement in the testing procedure, calibration shall be in accordance with the manufacturer's specification. Calibration records shall be maintained.					
5.8 Handling of Test Items					
The laboratory shall:					
5E.8.1 Have adequate written procedures for receipt, storage and processing of samples (including as applicable trip and field blanks) to ensure that holding times are met;					
5E.8.2 Give samples an unambiguous sample identification when logged.					
5E.8.3 Maintain a permanent record for sample log-in data.					
5E.8.4 Store samples in such a way as to maintain their identity, integrity, stability, and concentration.					



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5E.8.5 Maintain sample preservation records.					
5E.8.6 Follow appropriate documented chain-of-custody procedures, when required.					
5E.8.7 Document failure of sample collector to use appropriate containers, preservatives, packaging, and incorrect documentation and labeling upon receipt of samples.					
5E.8.8 Samples disposal must meet waste disposal criteria as applicable.					
5.9 Assuring the Quality of Results					
5E.9.1 <u>Quality Control (QC) Procedures.</u> The laboratory shall comply with the quality control (QC) procedures required by applicable federal or state environmental or public health agencies when testing for specific analytes. The laboratory shall have QC procedures (SOPs) specific to each test technology addressing, as appropriate, the use of:					
5E.9.1.1 Reagent/method blank analyses;					
5E.9.1.2 Trip blanks and field blanks;					
5E.9.1.3 Replicate/duplicate analyses;					
5E.9.1.4 Spiked sample analysis;					



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5E.9.1.5 Blind samples;					
5E.9.1.6 Surrogate standards;					
5E.9.1.7 Laboratory control samples (LCSs);					
5E.9.1.8 Control charts or the equivalent (e.g., quality control database);					
5E.9.1.9 Calibration standards, blanks, and calibration devices (e.g., electronic conductivity meter, NIST-traceable thermometer);					
5E.9.1.10 Reference material samples; and					
5E.9.1.11 Internal standards.					
5E.9.2 Quality Control Practices.					
5E.9.2.1 The laboratory shall continually evaluate its performance (system process control) for each method and matrix which includes the determination of accuracy and precision.					
5E.9.2.2 Supervisory personnel shall conduct a documented review of the data calculations and QC results.					
5E.9.2.3 Deviations or deficiencies in QC shall be reported to management, and such reports shall be documented. QC					



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data shall be retrievable for all analytical results.					
5E.9.2.4 Method detection limits (MDLs) shall be determined and documented.					
5E.9.3 <u>Acceptance Limits</u> . Acceptable performance limits for analytical instrumentation as well as each method shall be documented based upon the continuing statistical evaluation of data generated by the analysis of quality control samples, unless specific minimum acceptance limits are established by the method.					
5E.9.4 Where applicable, the following minimum QC shall be practiced in the laboratory:					
<u>For Inorganics/ Classical Chemistry:</u>					
5E.9.4.1 One calibration check standard and associated blank in 20 samples tested; the lab should repeat analysis of all affected samples if the calibration check standard is outside $\pm 10\%$ of expected value unless the method specifies otherwise (Broader acceptance ranges must be fully justified and documented).					
5E.9.4.2 One reagent, method, or digestion blank (carried through preparation) in 20 (or per batch).					
5E.9.4.3 One matrix spike in 20 (or per batch).					



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5E.9.4.4 One duplicate or matrix spiked duplicate in 20 (or per batch).					
5E.9.4.5 One laboratory control sample in 20 (or per batch).					
For Organics:					
5E.9.4.6 One calibration check standard in 20 samples (or method-specific frequency) inside established control limits; if any are outside the limits, repeat analysis of all affected samples.					
5E.9.4.7 One reagent, method or preparation blank (carried through preparation) in 20 (or per batch).					
5E.9.4.8 One matrix spike in 20 (or per batch).					
5E.9.4.9 One duplicate or matrix spike duplicate in 20 (or per batch).					
5E.9.4.10 Internal or external standards and surrogates (where available) shall be used for all samples.					
5E.9.4.11 As required by the method, one laboratory control sample (consists of a representative matrix spiked with a reference standard containing the target analytes) in 20 (or per batch).					
5E.9.5 The laboratory shall establish control limits for all					

Requirement	Reference	{RESERVED FOR A2LA ASSESSORS ONLY}			
		Compliance			Comments
		Y	N	NA	
the above types of QC samples and be able to explain and document the basis for such established limits.					
5E.9.6 <u>Control Charts</u> . Control charts or control data shall be used to track laboratory performance with the associated acceptance limits for each matrix and to evaluate instrument performance.					

Document Revision History

Date	Description
12/19/2011	Added CAB Information Block