Comment Deadline: December 5, 2022
ASB Std 056, Standard for Evaluation of Measurement Uncertainty in Forensic Toxicology

#	Section	Type of Comment (E-Editorial, T-Technical)	Comments	Proposed Resolution	Final Resolution
40	Scope	Technical	As a general statement, the Board of Directors of the American Board of Forensic Toxicology (ABFT) vehemently opposes the application of ASB 056 to postmortem forensic toxicology (PMFT). The ABFT recognizes the value of measurement uncertainty (MU) in forensic toxicology where administrative limits are designated, e.g., legislative per se designation of a blood alcohol concentration. For the most part, administrative limits are not determined by forensic toxicologists, but by governmental agencies. No such designated limits exist in PMFT. By further explanation, requiring or advocating for MU in postmortem toxicology ignores the underlying basic concepts of PMFT. At best, inclusion of MU in reported postmortem findings is misleading, and at worst, leads to a false sense of exactness of a given analytical finding. It has been demonstrated that the majority of uncertainty related to postmortem analyses is pre-analytical in nature, e.g., circumstances of death, time between death and autopsy, postmortem redistribution, ambient conditions where the decedent is found, life-saving interventions. There is no accounting for such uncertainties in ASB 056, and in fact, none could be made given that virtually no two cases are the same and the influence of such factors is indeterminate. Additionally, PMFT findings are contextual in nature in relation to interpretation and certification of cause and manner of death. The reported number itself is generally meaningless without other information. The inclusion of MU does not add value to such interpretation and indeed would mislead the reader into believing the MU value specifies the limits of the analyte concentration at the time of death.	Modify scope of standard.	REJECT: While proposed resolution was not accepted, the Consensus Body did modify Language in Section 4.2.9 (Report the Expanded Uncertainty) to delete wording related to when MU shall be reported and merely reference Std 053. ANSI/ASB Standard 053, Standard for Report Content in Forensic Toxicology, is a published national standard which governs when MU shall be reported for testing. Regarding the comments regarding reporting MU in postmortem cases ,the position of the Consensus body and others in the scientific community is that reporting of a measurement result without MU is incomplete and has a greater potential to be misleading and to give a false sense of exactness than reporting with MU. https://www.nist.gov/pml/nist-technical-note-1297/nist-tn-1297-appendix-c-nist-technical-communications-program
	Continuation of previous comment		Broadly, PMFT results provide a piece of information used in the determination of cause and manner of death. A myriad of other factors are used by forensic pathologists in reaching conclusions in any given case. Coincidentally, in the United States, standard medical tests do not have MU reported. Even in the face of disease diagnosis based on such tests, e.g., Hb A1C >6.4% and fasting glucose >126 mg/dL in the diagnosis and subsequent treatment of Type II diabetes, MU is not reported. While ISO 15189 requires evaluation of MU, which can be based on quality control materials, no requirement of reporting MU is required. It is difficult to imagine a scenario in PMFT where requirement of MU surpasses in importance the absence of required MU reporting in the diagnosis and treatment of a living patient. Likewise, the use of control performance is fit-for-purpose for the intended use of PMFT results and subsequent interpretation. PMFT laboratories should be prepared to offer such performance data upon request, but also provide the caveats around such determination as delineated in this commentary. While an argument will no doubt be made that all that the MU refers to is the analytical component of a PMFT analysis, the intended audience will not understand this principle, but worse, the reported MU falsely represents some unintended level of confidence or value. It does not take into account the most dramatic influencing factors related to pre-analytical effects that impact the analytical component, e.g., analyte recovery, analyte stability. In essence, MU in postmortem forensic toxicology is deceiving and represents a futile attempt to add unfounded significance to a reported concentration. In this regard, the Board of Directors of ABFT is prepared to issue a position statement rebuking the value of MU in PMFT and the requirement of such by accrediting bodies.		
58	Scope	T	MU is appropriate for testing where legal actions may stem from these calculations. (It is implied in the document that MU is for Per Se laws by the reference to breath alcohol instruments and legal specifications. Refer to section 4.1. paragraph 3. and other sections where it is using examples of legal specifications and calibration of breath alcohol measuring instruments. Clarify/ state that it is specifically ante-mortem testing where legal specifications are being utilized.)	Add that "this is for forensic toxicological analysis in the following sub-disciplines: human performance toxicology (e.g., drug facilitated crimes and driving-under-the-influence of alcohol or drugs), and court-ordered toxicology (e.g., probation and parole, drug courts, child services)."	REJECT: The position of the Consensus body and others in the scientific community is that reporting of a measurement result without MU is incomplete and has a greater potential to be misleading and to give a false sense of exactness than reporting with MU. https://www.nist.gov/pml/nist-technical-note-1297/nist-tn-1297-appendix-c-nist-technical-communications-program, ISO 17025, ISO 15189
74	Title	T	Many breath alcohol programs are not part of traditional forensic toxicology testing laboratories (e.g., blood, urine, hair, tissue testing). The application of this standard to breath alcohol programs may be overlooked if the wording "breath alcohol programs" is excluded from the title.	Change the title to "Standard for Evaluation of Measurement Uncertainty in Forensic Toxicology Laboratories and Breath Alcohol Programs."	REJECT: The position of the Consensus Body is not to change the title as proposed to keep the document title consistent with other previously published standards. The Scope was revised to specifically call out that calibration fo breath alcohol measuring insturments was included.

15	type A step 4	E	ISO 17025 treats MU evaluation and estimation differently	change estimation to evaluation	ACCEPT
14	type B Step 5	E	ISO 17025 treats MU evaluation and estimation differently	change estimation to evaluation	ACCEPT
47	2	E	The first four do not appear to be required for the implementation of the standard. They are important references, but may be more appropriate in the bibliography since they are not indispensible to the application of the standard.	Consider moving to bibliography	ACCEPT
70	2	E	National Institute of Standards and Technology, SOP 29-Standard Operating Procedure for the Assignment of Uncertainty, 2018 a.	No space between "2018" and "a" is needed.	ACCEPT
65	3	E	General definitions here	Include definitions of Type A and Type B	REJECT: The Consensus Body feels that it is more appropriate to keep the GUM definitions of Type A and Type B Uncertainty within Section 4.2.4.1.
71	3.3	T	NOTE 2 Statistical bias can occur in the absence of prejudice, partiality, or discriminatory intent.	Confusion between non-statistical bias and other concepts (prejudice, partiality, etc.). Suggest changing to "Statistical bias is different from cognitive bias or other human factors."	PARTIAL ACCEPT: The Consensus Body feels that Note 2 is not a necessary part of the definition for this document. Therefore, Note 2 was removed.
48	3.7	E	"quality control" is the term more frequently used in the document	be consistent in use of control or quality control	ACCEPT: The Consensus Body reviewed the document and replaced "Quality Control" with "Control" where appropriate to align with defintion 3.7 Control
41	3.9	T	LLOQ present, but not ULOQ	include if needed	REJECT: ULOQ is not a term used in the document.
42	4.1	E	"and is a helpful reference"	this is a normative ref	PARTIAL ACCEPT: The Consensus Body moved this reference to the Bibliography based on acceptance of another comment. Therefore, the language here is now appropriate.
59	4.1 Background (out of paragraph 3)	T	When discussing comparison of quantitative testing between laboratories, this is discussing proficiency testing. Proficiency testing is another way, along with properly validating a method to ensure that required tests and calibrations performed are reliable, accurate and comparable. Performing proficiency tests and validating a method validates the evaluated MU.	The sentence should be modified to state “Comparison of quantitative test or calibration results between laboratories, such as proficiency surveys, or evaluation of quantitative results in relation to a legal specification or requirement may aid in the validity of the evaluated MU. “	REJECT: The intent of this sentence is not limited to proficiency testing but is meant to cover both comparison of results submitted to an interlaboratory comparison such as a proficiency test and to cover the following scenario: comparision of blood alcohol results from two separate laboratories (local lab and reference laboratory).
1	4.2.1.1	T	ISO 17025 7.6.3 has different requirements for evaluating uncertainty and estimating uncertainty when it is cannot be rigorously evaluated (e.g. postmortem). The "evaluation" requirement should be more specific than all tests that produce a quantitative result.	Add: The laboratory procedure should specify how and when estimations of MU will be used in place of a rigorous evaluation.	REJECT: Section 4.2.1.4 requires meeting the requirements of ANSI/ASB Standard 017, Standard Practices for Measurement Traceability in Forensic Toxicology and ANSI/ASB Standard 036, Standard Practices for Method Validation in Forensic Toxicology, which provides data necessary to perform an evaluation of MU.
60	4.2.1.1	T	MU is appropriate for testing where legal actions may stem from these calculations. (It is implied in the document that MU is for Per Se laws by the reference to breath alcohol instruments and legal specifications. Refer to section 4.1. paragraph 3. and other sections where it is using examples of legal specifications and calibration of breath alcohol measuring instruments. Clarify/ state that it is specifically ante-mortem testing where legal specifications are being utilized.)	Add the wording “ for forensic toxicological analysis in the following sub-disciplines: human performance toxicology (e.g., drug facilitated crimes and driving-under-the-influence of alcohol or drugs), and court-ordered toxicology (e.g., probation and parole, drug courts, child services).” to this sentence.	REJECT: The position of the Consensus body and others in the scientific community is that the evaluation of measurement uncertainty is important to determining whether a method is fit for purpose. Evaluating MU is separate from reporting of MU.
62	4.2.1.1	T	To keep this document as-is but still remind labs/subcommittees that qualitative results need to address performance measures as well as quantitative, perhaps the scope section should reflect that the document does not address performance measures associated with qualitative results (see suggestion). The scope could be rewritten as follows:	1 Scope This document provides minimum requirements for evaluating measurement uncertainty for forensic toxicology testing activities that produce quantitative results as well as calibration of breath alcohol measuring instruments. It does not address evaluating measurement uncertainty for breath alcohol testing.	ACCEPT WITH MODIFICATION: The Consensus Body modified the scope to clarify that the standard only applies to quantitative forensic toxicology testing activities. Further language was also added to indicate which subdisciplines within forensic toxicology are included in the scope of this standard.
61	4.2.1.2	T	Clarify/reword the expectation of this sentence. Is the intent to be that if the results is needed in a matrix that the method isn’t validated in, then the MU may need to be evaluated in a separate manner to adjust for a matrix bias?	Change to "Multiple matrices may need to be evaluated separately based on the purpose of testing and need to evaluate if there is a matrix bias.	REJECT: Section 4.2.1.4 requires meeting the requirements of ANSI/ASB Standard 036, Standard Practices for Method Validation in Forensic Toxicology. Standard 036 requires that methods be validated for each matrix being tested.
2	4.2.1.3	T	This statement is redundant to 4.2.1.2 which already requires evaluating separately. It is not clear why this would be attempted.	Delete or clarify what is not acceptable.	ACCEPT: The Consensus Body changed 4.2.1.3 to a Note under 4.2.1.2 and clarified language.

3	4.2.1.4	T	Stating the methods shall meet the minimum requirements is beyond the scope of MU. For example, a method with a CV of 25% can still be evaluated for MU and may be determined to be fit for purpose.	The data used to evaluate MU shall conform to the procedures set forth in:	REJECT: The sentence is approriate as written. ANSI/ASB Standard 017, Standard Practices for Measurement Traceability in Forensic Toxicology and ANSI/ASB Standard 036, Standard Practices for Method Validation in Forensic Toxicology are both normative references and all requirements within those documents are to be followed.
66	4.2.2	E	Examples listed for "Specify the Measurement Process"	In one example list the instrumentation to align with the text in the paragraph above.	ACCEPT
4	4.2.3	T	It is not practical to give a quantitative value to training and experience. This is part of reproducibility.	Change to robustness. Delete experience, training, etc.	REJECT: The list in Section 4.2.3 identified components that must be considered and includes the impact of training and experience as a components to uncertainty. Assessment of human factors' impact is required to determine the differences, if any and how much, on measurement uncertainty. The manner in which a laboratory assesses reproducibility data may overlook differences or trends following changes in staffing.
72	4.2.3	E	; missing after point b)		ACCEPT
5	4.2.4.1	T	While all digits may be practical with software, it is burdensome for hand calculations and seems to be an excessive requirement.	At least 5 digits shall be carried through	REJECT: The language was changed to reflect a minimum of three signficant figures.
83	4.2.4.2	T	There is a disconnect between ASB 036 and ASB 054 that should be addressed in Section 4.2.4.2 of ASB 056. ASB 036 requires controls to be run at a low concentration (i.e., low calibrator x 3) and a high concentration (i.e., high calibrator x 0.8) during validation. ASB 054 requires controls to be run at the low and high concentrations for each batch. ASB 056 has a general description of Type A data, but does not specifically require the use of controls spanning the entire range of measurement values (best practice). To this point, a method could be validated following ASB 036 and not have control data points at the low and high limits of the standard curve for appropriate UofM calculations.	Clearly define that controls (Type A) shall span the entire range of measurement values. State that laboratories may need to capture additional data points beyond those obtained during method validation (ASB 036) to achieve this requirement.	REJECT: The language "representative range" is appropriate. Additionally, 4.2.4.2.3 is a general requirement and subsequent sections delineate specifics on how to evaluate representativeness.
67	4.2.4.2.1	E	Statement about utizong proficiency data for Type A	Include an example of which proficiency organizations are accpetable here.	REJECT: A given proficiency test provider may offer some tests that are metrologically traceable while other tests are not. Specific names of vendors are not included within this document.
6	4.2.4.2.1, 2,3 and 4	E	Incomplete sentences	Data for type A evaluations shall…	ACCEPT WITH MODIFICATION: Modifications were made to the format to establish sentences.
8	4.2.4.3	E	ISO 17025 treats MU evaluation and estimation differently	change estimate to calculation	ACCEPT WITH MODIFICATION: The Consensus Body clarified the language by removing "estimate" entirely
26	4.2.4.3	T	This section reads like an instruction manual. It is not clear what parts or requirements and what parts are best practice recommendations.	Remove non-requirements to a separate best practice document.	ACCEPT WITH MODIFICATION: Wording in Section 4.2.4.3 was reformatted to clearly separate requirements from additional informational text.
43	4.2.4.3	T	What if there is more than ONE Type A contributor	suggest guidance as to evaluation	ACCEPT WITH MODIFICATION: The language in Section 4.2.4.3 was clarified to clearly indicate that there may be more than one Type A uncertainty component and how to handle those situations
49	4.2.4.3	T	1st paragraph refers to "each identified Type A component" but the standard does not provide any requirements (or guidance) on how to handle multiple Type A contributors.	In the 4th paragrpah, add instructions for how to apply the divisor if there is more than one Type A contributor. e.g. the divisor for multiple measurements can only be applied to one Type A contributor or all Type A's. If only one, how to select which one.	REJECT: Having two Type A components in an uncertainty budget is unique. The CB does not believe that every unique situation can be addressed in this standard.
50	4.2.4.3	T	"A graphical representation of all QC measurements used for the Type A uncertainty component that demonstrates statistical control of the measurements used shall be maintained." If it is a requirement to maintain the proof of statisitical control, the standard should define what is considered to demonstrate control.	Specify what is considered sufficient statistical control to be appropriate data to use for Type A consideration. E.g. histogram plot shows normal distribution.	REJECT: The reference to generating a graphical representation was deleted. The Consensus Body added ANSI/ASB Std 054, Standard for a Quality Control Program in Forensic Toxicology Laboratories, as a normative reference.
16	4.2.4.3 3rd paragraph	T	Why require with "shall" the use of the less accurate MU determination when result is reported as an average? Laboratories should be permitted to use other techniques for averaged MU when they can be supported.	change shall to should	REJECT: Then intent of this document is to standardize the approach for evaluating Measurement Uncertainty.
17	4.2.4.3 4th paragraph	T	Why require with "shall" the use of the less accurate MU determination when result is reported as an average? Laboratories should be permitted to use other techniques for averaged MU when they can be supported.	change shall to should	REJECT: Then intent of this document is to standardize the approach for evaluating Measurement Uncertainty.

7	4.2.4.3 first paragraph	T	Maintaining a graphical representation is burdensome. It does not seem appropriate to require "statistical control" in this context. 4.2.4.3.1.2 is better because it allows "other statistical means" to determine heteroscedascity.	Remove graphical representation requirement or change shall to may.	ACCEPT: The graphical representation requirement was deleted and the Consensus Body added ANSI/ASB Std 054, Standard for a Quality Control Program in Forensic Toxicology Laboratories, as a normative reference.
68	4.2.4.3.1.1	T	Mentions that MU values from Validation may be used if demonstrated to be equivalent.	An example or Define documentation necessary to continue using values from validation.	REJECT: The language specifies that it is the laboratories responsibility to demonstrate that validation data continues to be representative of day-to-day use.
69	4.2.4.3.1.4	T	Options for calculating MU - Type A	Indicate which option is "best practice"	REJECT: Different methods and frequency of use produce varying amounts of data and may require different approaches.
52	4.2.4.3.2	T	Uses the term "measurement standard" throughout this section. Testing Lab section uses calibrator and control terms which are defined in Section 3. Suggest defining measurement standard or use cal/control terminology.	Define "measurement standard" in section 3. Alternatively, don't introduce a new term and continue to use calibrator or control.	ACCEPT: Definition of measurement standard was added to section 3
9	4.2.4.3.2.2	E	ISO 17025 treats MU evaluation and estimation differently	change estimate to calculation	ACCEPT
44	4.2.4.3.2.2	T	use of residual plots for the calibration curve	remove calibration curve since residual plots and calibration curve are not the same thing	ACCEPT
51	4.2.4.3.2.2	T	"...shown through the use of residual plots for the calibration curve..." For breath instruments, the program is not creating a calibration curve.	Provide a more appropriate example of how a breath instrument program would assess variance across the cal range.	REJECT: Wording referring to calibration curve was deleted
45	4.2.4.3.2.3	T	use of term measurement standard instead of calibrator	use calibrator since this is what is defined in terms	REJECT: A definition of measurement standard was added to section 3
18	4.2.4.4	E	It is not clear what needs to be done to type B components based on their distribution.	change handled to evaluated	ACCEPT
20	4.2.4.5.1	E	informal language is difficult to interpret	change both uses of can to may	ACCEPT
36	4.2.4.5.1	E	consistent formatting for sentences 1 and 2 in 2nd paragraph "If the test or calibration method includes the preparation of multiple calibrators or measurement ... and then a or b above can be applied. Alternatively, the components can be quantified as a group for each calibrator concentration and then a) through c) applied. "	If the test or calibration method includes the preparation of multiple calibrators or measurement standards, the individual components can be quantified individually across all calibrator concentrations (e.g., a single component quantity value can be used for the pipette uncertainty that adequately covers the pipettes used to prepare all calibrator concentrations) and then a) or b) above can be applied. Alternatively, the components can be quantified as a group for each calibrator concentration and then a) through c) can be applied.	ACCEPT
46	4.2.4.5.1	T	seems odd to keep using calibrator and measurement standards in paragraphs when the terms and definitions have already defined calibrator as a measurment standard.	Just use the word calibrator	REJECT: A definition of measurement standard was added to section 3. Text modified for clarity
10	4.2.4.5.1 a, b and c	E	ISO 17025 treats MU evaluation and estimation differently	change estimating to evaluating	ACCEPT
53	4.2.4.5.1.c	E	the first part of sentence refers to calibrator or measurement standard, the second half instructs to only use the value for the applicable calibrator	Add "or measurement standard" to the end of the sentence	ACCEPT
19	4.2.4.5.1a,b and c	E	If estimating...use is missing the type of requirement this is	add laboratories shall before use	ACCEPT
21	4.2.5.1	E	Incomplete sentence	Add Laboratories shall before quantify	ACCEPT
22	4.2.5.2	E	informal language is difficult to interpret	add "the component should be divided by" before the appropriate factor	ACCEPT WITH MODIFICATION: Quantity was used instead of component in the revised text.
23	4.2.5.3	E	informal language is difficult to interpret	"the laboratory shall use" before the appropriate and "the laboratory shall" before divide by	ACCEPT
24	4.2.6.1	E	Incomplete sentence	Add The laboratory shall before calculate	ACCEPT
25	4.2.6.1	E	saying "include" implies additional methods are also acceptable	Change to "either the root sum of squares or the Monte Carlo method shall be used."	REJECT: Language here is informative and not intended to limit methods that can be used.
28	4.2.6.2.1	T	The second paragraph indicates that bias cannot be evaluated without traceable reference material. However, 4.2.1.4 requires that tests with MU evaluation must meet ASB 017. Methods that don't meet this can still have estimated uncertainty, but this is outside the scope of 056.	Delete second paragraph.	REJECT: Controls do not have to be metrologically traceable to calculate measurement uncertainty; however, controls do need to be metrologically traceable to evaluate bias.
73	4.2.6.2.2	T	"bias" is mentioned throughout	Suggest changing to "statistical bias" here and elsewhere in the standard to avoid confusion with human factors	REJECT: Bias is defined in section 3

11	4.2.6.2.2.1 c1	E	ISO 17025 treats MU evaluation and estimation differently	change estimation to evaluation	ACCEPT
29	4.2.6.2.2.2	E	b) is a run-on sentence	Insert period between uncertainty and both.	ACCEPT
12	4.2.6.2.2.2 b	E	ISO 17025 treats MU evaluation and estimation differently	delete estimation of before MU shall be reported	ACCEPT
54	4.2.6.2.2.2.c	E	4.2.9.h requires approach b or c from this section to be clearly communicated in the report. 4.2.6.2.2.2b includes requirement to report, c does not indicate the need for reporting	For consistency, add to c that it must be clearly communicated in the report. Alternatively, could remove the report statement from b.	REJECT: For c) the bias is not reported separately. Bias is included in the expanded uncertainty
55	4.2.7.1	T	Does not indicate how to determine degrees of freedom.	Add instruction on how to determine the degrees of freedom (e.g. based on the number of data points from Type A contributor). Include how to detemine if there is more than one Type A contributor.	ACCEPT WITH MODIFICATION: Added (n-1) to both Section 4.2.7.1 and within step 6 of each Annex.
37	4.2.7.2	T	The intent of this statement is to use the 95.45% column in the student's t-distribution correct? If so, adding the (often referred to as approximately 95%) gets confusing on which column to use, 95.45% or 95%.	Delete (often referred to as approximately 95%).	ACCEPT
30	4.2.8	E	The word "evaluate" has been used to mean "calculate" throughout the document.	Change Evaluate to Inteperate. Replace first sentence: The laboratory shall have a procedure to interpret whether the evaluated measurement uncertainty is acceptable for the testing purpose.	REJECT: Title of the section is based on NIST SOP 29. The document was reviewed for appropriate use of "calculate". Changes were made througout the document including in section 4.2.8.
31	4.2.8	T	expanded MU is a percentage of the reported result. C) sounds nonsensical.	Delete c)	REJECT: Step 7 requires the laboratory to determine whether the evaluated MU is acceptable. Indeed an expanded MU of 100% would require justification as acceptable. Whether expanded MU is expressed as a percentage or in the units of the reported result, c) needs to be considered. A laboratory that chooses to express expanded MU as a percentage may naturally consider c) if the expanded MU is 100%. This may be less apparent for a laboratory that doesn't express MU as a percentage.
32	4.2.8	E	The parentheses contain a run-on sentence	change to e.g., the quality control limits should be less than or equal to the expanded MU.	ACCEPT
56	4.2.8.c	E	"...with an LLOQ of 0.01..."	"an" should be "a"	REJECT: "an" is grammatically correct
13	4.2.9	E	ISO 17025 treats MU evaluation and estimation differently	change estimated to evaluated MU	Partial ACCEPT: The Consensus Body did modify as proposed. Language in Section 4.2.9 (Report the Expanded Uncertainty) to delete wording related to when MU shall be reported and merely reference Std 053 based on another public comment. This change removed the word "estimated" entirely.
33	4.2.9	T	053 does not state that MU must be reported for all quantitative results. 5.5 "When accreditation, regulation or internal laboratory proecdures require an estimated uncertainty to be calculated, it shall be included in the laboratory report". 17025 7.8.3.1 c only requires reporting when it is relevant to the validity or application of the test results, a customer's instruction requires or MU affects conformity to a specification limit. It is inappropriate to report postmortem concentrations with MU because it grossly underestimates preanalytical variability.	Add the word "applicable" between all and quantitative	REJECT: While proposed resolution was not accepted, the Consensus Body did modify Language in Section 4.2.9 (Report the Expanded Uncertainty) to delete wording related to when MU shall be reported and merely reference Std 053. ANSI/ASB Standard 053, Standard for Report Content in Forensic Toxicology, is a published national standard which governs when MU shall be reported for testing. Regarding the comments regarding reporting MU in postmortem cases ,the position of the Consensus body and others in the scientific community is that reporting of a measurement result without MU is incomplete and has a greater potential to be misleading and to give a false sense of exactness than reporting with MU. https://www.nist.gov/pml/nist-technical-note-1297/nist-tn-1297-appendix-c-nist-technical-communications-program
34	4.2.9 d	T	There may be results for ethanol that have more than 2 significant figures and the MU has fewer digits. For example, 0.151 +/- 0.015 should not be rounded to 0.01. AR 3125 gets this wrong as well. F) does a better job.	Change to "should be reported to the same level of significance as the result." or delete d in favor of f.	REJECT: The example the commenter provided does meet the requirements of 4.2.9 d &f and would not be rounded.
35	4.2.9 g	T	What does this mean? We are supposed to report UM separately for each analyte and each testing platform.	Change to what laboratories shall do.	ACCEPT

63	4.2.9(g)	T	It's not clear to us why laboratories "shall not report the single largest measurement uncertainty for a group of analytes within a method or the largest measurement uncertainty for a single analyte across multiple methods."	Explain why such large uncertainties shouldn't be reported?	ACCEPT: Section 4.2.9 g was modified to be a shall statement. Added Note: Combining the MU across multiple analytes or methods would lead to an overestimation of the MU which does not meet the intent of a measurement uncertainty evaluation.
64	4.3	T	We are not sure why labs should have so much latitude in determining how often to evaluate this. Shouldn't there be a minimum of some kind?	Set a minimum, in addition to laying out these factors	REJECT: The Consensus Body considered setting a minimum interval but setting a single interval that is appropriate for every analyte, analytical method and laboratory is not possible. Section 4.3 was modified to require consideration of the described factors and justification to support their decision.
75	4.3	T	There should be a maximum allowable period of time (not equal to infinity) for the periodic evaluation of measurement uncertainty. At a minimum, a reasonable time frame for review would be one accreditation cycle (i.e., 4 years).	Add the following sentence to the end of the document: "At a minimum, measurement uncertainty shall be reviewed and recalculated every 4 years."	REJECT: The Consensus Body considered setting a minimum interval but setting a single interval that is appropriate for every analyte, analytical method and laboratory is not possible. Section 4.3 was modified to require consideration of the described factors and justification to support their decision.
76	Annex A	T	1st page: In the interest of aligning with the direction of the forensic toxicology community, this example should specify that two separate GC columns (e.g., one dual column instrument; two instruments with different analytical columns) was utilized. As currently worded, Annex A appears to justify the use of a single analytical column with FID for reporting alcohol results.	Specify that two different analytical columns were used for blood alcohol analysis using FID.	ACCEPT
77	Annex A	T	Page 24, Type B Evaluation of uncertainty components - Interference from the matrix (second instance): This section is incorrectly labeled and does not represent "interference from the matrix". Note that interference from the matrix was previously addressed on page 22. The section on page 24 represents a laboratory administrative requirement for quality assurance. Furthermore, this administrative requirement is in part a reflection of method consistency, and rather than being a component used to calculate UofM, it should be used to support/justify the calculated UofM. Imagine the large impact on UofM of adding in the typical +/- 20% administrative requirement for drug quantitative methods.	Either remove this section, or rename the heading appropriately (e.g., laboratory administrative duplicate requirement).	ACCEPT
78	Annex A	T	Page 25, Pipette Diluter: Diluters are equipped with two separate syringes, each with their own type B uncertainty component. One syringe measures the sample, and the other syringe measures the internal standard. Both individually measured volumes are delivered to the headspace vial. There needs to be two separate uncertainty components in the UofM calculations when using a diluter.	Two different uncertainties from the diluter (1 - sample measurement; 2 - internal standard measurement) need to be included in the UofM calculations.	ACCEPT: The example was modified to include an uncertainty component for both the sample syringe and the Internal Standard Syringe.
79	Annex A	T	Page 26, Evaluation of bias, Step 3: Although laboratories may choose to add additional components to their uncertainty budget, the addition of CRM bias is confusing considering CRM uncertainty is already covered in the CRM uncertanty component. Note that Section 4.2.4.1 states that double-counting of a component should be avoided. Furthermore, the sentence "The greatest uncertainty is 0.0014% for the 0.3% CRM." uses % to represent BAC% as opposed to mathematical percentage, and the calculation below uses % with two different meanings of % (1 - BAC%, 2 - mathematical percentage). The use of multiple definitions of "%" in the same calculation may cause confusion.	Either remove this section, or clarify the use of "%" in the sentence/calculation.	ACCEPT
80	Annex A	T	Page 27, Step 6, Step 8 - final reported uncertainty: U = 8.7% at a 95.45% coverage probability (the equivalent of 13.3% at a 99.73% coverage probability) is absolutely terrible for a BAC method using an FID detector. If the method was truly that bad, the laboratory would have difficulty passing a proficiency test. Moreover, it is unreasonable that the reported uncertainty for BAC is worse than that reported in Annex B (AMP - 8.4%, METH - 8.3%) for an LC-MS/MS method.	The reported uncertainty of measurement needs to be reasonable for a blood alcohol method (i.e., no greater than 5% at a 95.45% coverage probability). Remove the unnecessary uncertainty components added to the budget to achieve a reasonable UofM value.	REJECT: Control limits were changed from 5% or .005 to 10% to make the example more reasonable.
81	Annex A, Annex B	T	Considering the matrix: It is unreasonable to put a heavy emphasis on the effects of the matrix for a BAC method where the sample is diluted (Annex A), and dismiss/resolve matrix effects for an LC-MS/MS method (Annex B) where the matrix could actually have a significant contribution because of ionization suppression/enhancement. Annex A and Annex B should not be looked at independently (in a box), but rather work together in a complementary fashion to emphasize how the field of toxicology actually works across differenty types of analytical technologies.	Review Annex A and Annex B and make appropriate changes to reflect how measurement uncertainty is actually calculated for most forensic toxicology laboratories. The Working Group should take a poll to see how their laboratories address the UofM budget. Specifically, if matrix effects are resolved in Annex B (LC-MS/MS method), it should certainly be resolved/removed in Annex A (HSGC-FID with dilution).	REJECT: Title of section was modified from Intererence from the Matrix to Homogenization.
27	Annex A, B, C and D	T	This section is informative and therefore outside the scope of minimum requirements. The example could be mistaken for showing the way calculations must be performed.	Remove Annex A to a separate document that serves as a supplement or example for 056.	REJECT: Each Annex is identified as informative. There is value in having the examples within the standard as opposed to a complementary document.
38	Annex B	T	Example should follow standards outlined in ASB 054 - this example uses 5 calibration as opposed to the 6 required.	Include example which uses 6 calibration points.	ACCEPT

39	Annex B	E	Test specimen should be singular "The measurement results from single aliquots of a test specimens are reported."	…from single aliquots of a test specimen are reported.	ACCEPT
82	Annex B	T	Page 39, Step 8 - Report the uncertainty: The reported uncertainty for both AMP and METH are very low (less than 10%) for an LC-MS/MS method where the standard curve spans 2 orders of magnitude. The toxicology community generally allows +/- 20% for bias in drug confirmation methods (ASB 036, ASB 054) because it is reasonably achievable. While a reported uncertainty of measurement of less than 10% is certainly possible, it is not appropriate to include these relatively low reported values in Annex B. Annex B will be used by the toxicology community as an example of what to expect for most LC-MS/MS confirmation methods.	Poll the Working Group to see what values their laboratories calculated for the UofM of AMP and METH using LC-MS/MS. For example, our laboratory reports the following UofMs: AMP - 13.1%, METH - 12.2% at a 95.45% coverage probability. Based on the polling information, adjust the final reported UofMs to reflect a more reasonable number (i.e., between 10%-20%). Type A uncertainty can be increased to accommodate the change.	REJECT: The example was clarified to indicate that only validation data was used.
87	Annex B	E	Top of page 35 - both values should be 0.74%.	Change 0.754% to 0.74%	ACCEPT
88	Annex B	T	Page 37 - Evaluation of bias example. Specified that amphetamine bias is insignficant and no additional component for the uncertainty of the CRM used to evaluate bias will be added. However the next paragraph mentions methamphetamine bias is significant but the CRM statement is missing.	Clarify that the CRM for methamphetamine used to evaluate bias must be included.	REJECT: The paragraph concerning amphetamine was modified. The second sentence concerning methamphetamine indicates that given that bias is signficant, steps 3, 4, and 5 must be addressed for methamphetamine. Those steps then follow immediately after.
89	Annex B	E	I think a better visual of how all the components come together to calculate the final uncertainty would be helpful. I found it hard to follow the big square root equation with the subscripts. The example portion of this document will probably be the most helpful to people trying to follow it.	Add in an example spreadsheet that shows the name of each component, value, final results, etc. Include one with and without bias to make it more clear how it is handled differently.	ACCEPT
84	Annex C	T	This example represents the calibration of a breath alcohol method, but only addresses one calibration point (0.100 g/210L). On page 41, Step 3 - the statement "The instrument has demonstrated constant variance across the concentration range of the measurement standards...the 0.100 g/210 L measurement standard has the greatest observed variance..." is not realistic in practice. There is typically more variance at lower concentrations (e.g., at 0.04 g/210L). It is also confusing that the reported UofM on the bottom of page 45 only applies to the 0.100 concentration, specifically when the verbiage in the above referenced sentence suggests that that 0.100 concentration was used to obtain the UofM for the entire range of concentrations.	Either provide Type A data showing constant variance at all levels and reword the final reported UofM to encompass the entire range of concentrations, or do the following: 1) remove the referenced sentence on page 41, Step 3; 2) At the end of the Annex C, make a statement that uncertainties were also calculated for the other calibration levels, and list each result separately. In either case, ensure that the number of levels reported is in accordance with ASB 055 and encompasses a practical concentration range.	ACCEPT: Modified Annex C to reflect heteroscedasticity. Reporting language was also modified to reflect the concentration range for the calibration method.
85	Annex D	T	The last sentence of the first paragraph states that the "current calibration as well as historical control data...was used in the calculation." However, the current calibration data was not used in the actual calculation for type A data.	Either include current calibration data in the calculation, or remove the reference to it in the last sentence of the first paragraph.	ACCEPT: The reference to calibration data was removed.
86	Annex D	T	The first paragraph states that all instruments demonstrated constant variance across the standard concentration levels. There is typically more variance at lower concentrations (e.g., at 0.04 g/210L), and this statement is generally not accurate. Although not specifically stated, Annex D implies that because of the constant variance, the 0.100 control data can be used to report UofM for the entire range of concentrations. However, the UofM reported on the bottom of page 51 only applies to the 0.100 concentration.	Clearly define how using control data from a single concentration should be applied for reporting UofM. Specifically, address if using data from a single concentration is appropriate to represent the entire concentration range, or if it is only applicable to that specific concentration.	REJECT: The Annex already defines that there is homoscedasticity. Therefore, a single concentration may be applied.
57	Annexes	E	Most labs use a spreadsheet to summarize the MU calculations. This would be much easier to follow in the Annexes to see the components and calcs summarized in one place.	Add a spreadsheet to each Annex.	ACCEPT