

What's new at DFS?

Reporting of Uncertainty of Measurement Implementation

January 2014

WHAT IS UNCERTAINTY OF MEASUREMENT?

UNCERTAINTY IS NOT ERROR

Uncertainty is Confidence

- Ordinary use of the word “uncertainty” does not inspire confidence
- Technical use of the word “uncertainty” indicates a level of confidence
- Allows assessment of reliability and confidence of the method utilized

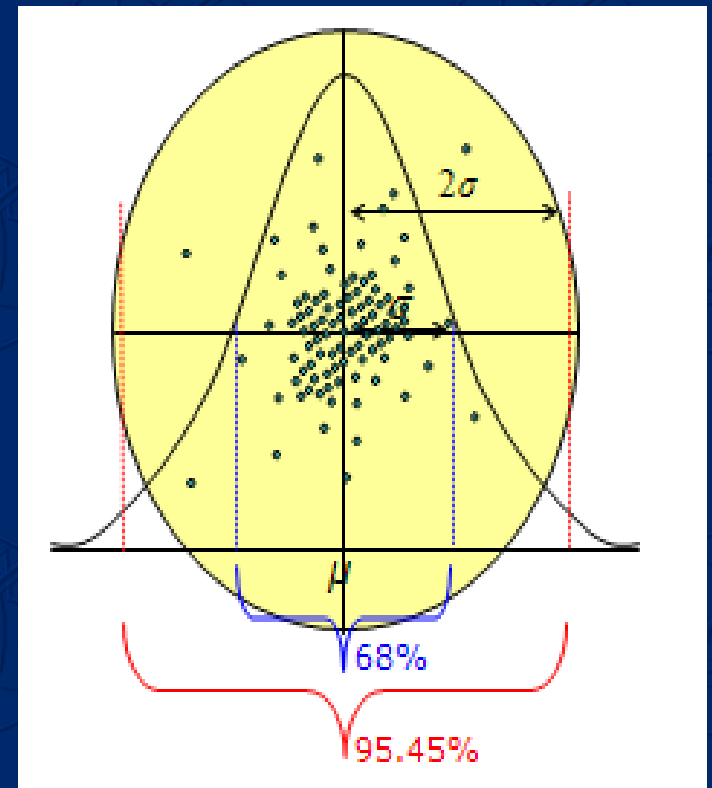
What is Uncertainty of Measurement?

- All measurements have some amount of variation expected within the measurement process.
- That variation has been calculated and will now be reported on the Certificate of Analysis, Certificate of Instrument Accuracy or an attachment along with the measured result.

2.44 ± 0.02 grams at a 95.45% level of confidence

If you counted the number of sugar granules in multiple teaspoons of sugar...

- 95.45% of the measurements would fall in the red range



Picture courtesy of Sandra Rodriguez-Cruz, DEA

Reporting Uncertainty of Measurement

- For cases analyzed or examined beginning on or after January 1, 2014, the estimated Uncertainty of Measurement (UoM) will be reported for the following measurements:
 - **Controlled Substances:** The weight of controlled substance evidence or the quantity (purity) of a controlled substance when reported as a weight fraction of the whole
 - **Toxicology:** The concentration of a drug in a toxicology sample, including values reported for blood alcohol
 - **Firearms:** The barrel length of a firearm and/or the overall length of a firearm for long guns for which the barrel or overall length has been altered
 - **Breath Alcohol Instrument Certifications:** The calibration of breath alcohol measurement instruments

How will the UoM be reported?

- The uncertainty will be reported with each result (listed on the previous slide).
- The level of confidence will be included.

Where will the UoM be reported?

- Controlled Substances and Firearms will be reported on the Certificate of Analysis.
- Toxicology will be reported on an attachment to the Certificate of Analysis.
- Breath Alcohol will be reported on the Certificate of Instrument Accuracy.

Sample UoM Reporting Language

Breath Alcohol Example

Certificate of Instrument Accuracy

Estimation of Uncertainty of Measurement:

$$0.020 \pm 0.004 \text{ g/210 L}$$

$$0.150 \pm 0.007 \text{ g/210 L}$$

$$0.080 \pm 0.004 \text{ g/210 L}$$

$$0.250 \pm 0.007 \text{ g/210 L}$$

The Uncertainty of Measurement is reported at the 99.73% level of confidence and a coverage factor of $k=3$. The estimation of the Uncertainty of Measurement is calculated for the Certification process only.

Firearms

Example Certificate of Analysis

Item 1 The barrel of this shotgun has been shortened to a length of $8 \frac{1}{2}$ inches $\pm \frac{3}{16}$ inch at a 95.45% level of confidence.

The stock has also been shortened making the overall length $12 \frac{1}{2}$ inches $\pm \frac{1}{8}$ inch at a 95.45% level of confidence.

Controlled Substances

Example Certificate of Analysis

- Item 1 12.25 ± 0.07 grams of powder, found to contain Cocaine Hydrochloride (Schedule II), 45 ± 9% pure.
- Item 2 The contents of two were analyzed separately and each was found to contain Marijuana; total net weight of the two: 65.30 ± 0.10 grams (2.303 ± 0.004 ounce) of plant material.

Measurement uncertainty of weight and purity measurements are reported at a 95.45% level of confidence.

Purity determinations will continue to be performed only when required by statute.

Toxicology – Implied Consent Example Attachment to the Certificate of Analysis

Attachment: Uncertainty of Measurement Statement

FS Lab #: C14-xxxxx

Blood Alcohol Content 0.080 ± 0.004 % by weight by volume

Measurement uncertainty is reported at a 95.45% level of confidence for all toxicological analyses except blood alcohol or ethanol which is reported at a 99.73% level of confidence.

Toxicology – Non-Implied Consent

Example Attachment to the Certificate of Analysis

Attachment: Uncertainty of Measurement Statement

FS Lab #: C14-xxxxx

TX1 Ethanol 0.050 ± 0.003 % by weight by volume
Fentanyl 0.0022 ± 0.0005 mg/L

Measurement uncertainty is reported at a 95.45% level of confidence for all toxicological analyses except blood alcohol or ethanol which is reported at a 99.73% level of confidence.

Application of UoM

- Reported UoM applies only to quantitative measurements
- It does not apply to qualitative results such as:
 - Identification of a controlled substance
 - Identification of ethanol or drug in a toxicology sample
 - Comparison of cartridge cases

Questions?

- Questions can be directed to:

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