A. **PURPOSE**:

Evidence that is in the form of powder, [rock-like] solid, or plant material is weighed as part of the general scheme of controlled substance analyses. Analysts need to evaluate materials within case submissions in order to determine if criteria weights found within Connecticut (CT) statutes will be exceeded. Cases submitted for federal prosecution will be evaluated based on federal weight criteria.

If the amount of evidence to be weighed, including the weight of the packaging material, does not meet or exceed criteria weight, the items (both evidence and packaging) can be obtained by directly measuring the mass of all evidentiary material. In the case of multiple items wherein all items are visually indistinguishable, taking a gross weight of the evidence and subtracting-out the weight of packaging material is acceptable.

Uncertainty measurement is considered for all cases where weights are taken and reported.

B. **RESPONSIBILITY**:

C. All Forensic Science Examiners (FSE) and analysts who determine weights for evidentiary material.

D. **EQUIPMENT:**

Mettler AT-261
Mettler PE 300
Mettler-Toledo AG
Denver Instrument TR-603d
Denver Instrument TR-603
Mettler-Toledo XS203S
Ohaus Discovery DV215CD
Other analytical balances assigned to the section
Troemner Masses (or other certified masses assigned to the section)

E. **DEFINITIONS**:

Net Weight: This is calculated for cases with multiple like items where a criteria weight may be exceeded. It is calculated as:

Net Weight = gross weight – (average weight of packaging x the number of packages)

Direct Weight: This is determined by weighing the item(s) without packaging.

Gross Weight: This is determined by weighing the item(s) with packaging.

Uncertainty of Measure: a parameter characterizing the dispersion of the values attributed to a measured quantity.

Criteria Weight: a weight of a controlled substance when reached or exceeded which may influence the penalty imposed during sentencing (State or Federal).

Dynamic Weight: a weigh container is placed on the balance and tared. The item to be weighed is placed directly on the weigh container (without removing it from the balance platform) and the weight is recorded. This represents one weighing event.

Static Weight: a weigh container is placed on the balance and tared. The container is removed from the balance, the item is added to the container and the combined are placed on the balance to obtain the weight. This represents two weighing events.

F. **SAFETY**:

Proper protective devices must be worn when handling drug evidence; this includes gloves and a lab coat. Items that are submitted to the CS section can contain a variety of substances some of which may be directly absorbed through the skin (including, but are not limited to PCP and LSD).

G. **PROCEDURE**:

Weights for case materials will be taken in the presence of a witness.

1. Controls:
    a. Balances are checked for accuracy according to GL policy.
    b. Masses are certified according to GL policy. These masses are used for the daily balance checks.
    c. Daily checks: each day a balance is used it is checked, at a minimum, with one mass. The check is logged into the balance log book for the specific balance used (see CS-5.4). The acceptable ranges for each certified mass are posted with the balances.
        i. The analyst should select a mass that is close to the approximate weight of the unknown(s) that is to be weighed. It is not unreasonable for an analyst to check several masses.
    d. The analyst will select a balance appropriate to the task being performed. The basis of this selection should include: range of the balance and relative weights of sample materials.
    e. It is preferred to use balances that capture data directly onto an electronic device so as to avoid transcription errors.
2. Balance Use:

a. Each balance has on/off and tare function keys.

b. An appropriately sized weigh boat is placed on the balance platform and is tared using the tare function key.

c. If there is drift (e.g., the instrument is unstable and will not zero or maintain a zero reading) and a simple fix can't be performed (e.g., airflow, abnormal vibrations), the analyst will not use the balance. A Lead Examiner/Supervisor or appropriate Deputy Director will be notified.

d. If the balance has been moved (either accidentally or deliberately), the instrument should be checked against certified masses. A low, medium, and high mass will be used. The instrument is acceptable if the measured masses are within the accepted ranges that are posted with each instrument. Balances should not be moved without prior authorization.

e. Balances should be cleaned after use and in-between samples, as needed. Ethanol or similar solvent can be used.

f. Analysts should not place any items directly on the weighing pan. A clean weigh paper or weigh boat should be used for each weighing measurement.

3. Sample Considerations:

a. Analyst determines the approach to the case weight based on the samples.

i. If a criteria weight will be reached, or exceeded, a direct weight needs to be performed. This can be a calculated net weight in the case of greater than six (6) like items. This can be a single (or several single) direct weights for cases with 1 to 5 like items. (See CS-5.1)

ii. Cases analyzed that contain suspected marihuana which have weights that approach or exceed 0.5 ounces, then direct weights (weight without packaging) need to be taken (see Public Act 11-71). Analysts should consult with the Lead Examiner/Supervisor or appropriate Deputy Director to determine if it is necessary to report marihuana submissions with direct weights when under 0.5 ounces. When this is done, it will be documented in the case notes.

iii. If a criteria weight won't be approached or exceeded, a gross weight (weight with packaging) can be taken. The analyst should ensure that the criteria weight won't be exceeded. In cases where samples have multiple bags of drugs, the analyst may need to ensure that the proper measurement is taken by performing a calculated net weight.

iv. For all multiple like-item submissions, the weight of any items that are analyzed will be determined and reported. If the item is reported with packaging, then any sub-items can be reported with packaging. If the item is reported without packaging (net weight) then any sub-items should be reported using the direct weight.

v. Uncertainty must also be taken into account when determining how to approach weighing the items in a case (see CS-5.1). Weight worksheets contain uncertainty determination sections and calculations (see CS-5.2 and 3).

vi. Uncertainty for each balance is evaluated and calculated as required. The calculations will be reviewed by the Deputy Director and the Quality Section prior to be being put in use.

vii. If a quantitation is required, a direct weight or calculated net weight will be reported. In some cases it may be necessary to combine several items and take a combined weight for the quantitation.

4. Method:

a. Direct Weight: a weighing container is placed on a balance and the balance is tared. The item (e.g., rock, powder, plant material) is placed in the tared container and the weight is recorded. This should be recorded with no fewer than 3 significant figures whenever possible.

b. Weight with packaging: a weigh container is placed on the balance and the balance is tared. The material is placed in the tared weigh container with the packaging and the weight is recorded. This should be recorded with no fewer than 3 significant figures whenever possible. When performing a weight with packaging, only the smallest packaging possible should be included. Do not include the evidence bag with the weight of the packaging.

> Example: If 6 zip-lockable bags of plant material are submitted in a paper bag, and the paper bag is found inside a plastic evidence bag, the weight of the evidence bag and the paper bag will not be included in the overall weight measurement.

c. Net Weight: a weigh container is placed on the balance and the balance is tared. Like-items are placed in the tared weigh container and the gross weight is recorded on the Net WEIGHT Worksheet (CS-5.2). Five (5) bags (items) are then randomly chosen and all weights are recorded on the same worksheet. Each bag is separately emptied, individually weighed using tared weigh containers, and the [empty bag] weights are recorded. If the [empty] bag weights do not vary by more than 25% from the average empty-bag weight, then the approximate net weight due to all the bags in the submission can be calculated.

i. Net Weight = Gross Weight – (average empty-bag weight x number of bags)

ii. When calculating direct weight all digits should be used in the calculations and the final result will have its digits appropriately truncated.

iii. If the empty-bag weights vary by more than 25% of the average empty-bag weight, more weights will need to be taken unless directed otherwise by a Lead Examiner/Supervisor or appropriate Deputy Director. Generally 5 additional empty-bag weights will be

obtained. If these are consistent and don't vary by more than 25% of the average empty-bag weight, then the average will be based on the 10 readings.

5. Reporting:

   a. In general weights should be reported to three (3) significant figures. Reported weights should be truncated and not rounded.

      Examples: 1025 grams should be reported as 1.02 kilograms

      0.1578 grams should be reported as 0.157 grams

   b. Uncertainty of Measure: When required, the uncertainty associated with measurements will be reported. When uncertainty is reported, the reported weight will be listed with the appropriate uncertainty and confidence interval.

H. **CALCULATIONS**:

1. Grams to ounces: divide the number of grams by 28.35
2. Ounces to pounds: divide the number of ounces by 16
3. Net Weight = gross weight – (average bag weight x number of packages)
4. 25% weight difference (for packaging) = ((highest value - lowest value)/highest value) x 100

I. **SOURCES OF ERROR:**

1. Failing to tare a balance or weigh boat before adding the sample.
2. Failing to clean the balance before use.
3. Failing to change the weigh boat/paper in-between samples.
4. Improper calculation of weights.
5. For gross weight determination, failing to subtract all of the packaging weights that were included in the gross weight.

J. **REFERENCES**:

1. State of Connecticut Controlled Substance Laws. State of Connecticut Department of Consumer Protection Controlled Drug Schedules, Violations & Penalties: (http://www.ct.gov/dcp/lib/dcp/pdf/drug_control_pdf/2010_cs_violation.pdf)
2. Federal Controlled Substance Trafficking Penalties http://www.justice.gov/dea/agency/penalties.htm

Rev. #	History
5	Changed title. General verbiage changes throughout document. Section B: Changed 'Variance' to 'Coefficient of Variation' and removed 'Average Deviation.' Section D: Made in-house validation of equipment optional, re-worded procedure that GL policy will be followed for equipment calibrations, and clarified responsibilities. Section E: corrected calculation equations. Changed definition of timeframe for accuracy check of equipment to refer to GL policy. Replaced supervisor with Lead Examiner. Clarified verbiage throughout document. The use of 'shalls' and 'shoulds' were re-evaluated and changed accordingly. Frequency of uncertainty calculations no longer specifically stated.