CHARACTERIZATION OF WASTE MATERIALS BY THE
VISUAL ESTIMATION METHOD
FOR USE BY SOLID WASTE PROCESSING FACILITIES

A. Purpose

The Department has developed the following method and Visual Estimation Form (Form) as guidance for licensed solid waste processing facilities to quantify by weight the recyclable and non-recyclable content of all loads of waste materials accepted for processing at the facility.

Characterization information obtained using the visual estimation method will be used in the licensee's demonstration that all wastes accepted at the facility have been recycled, reused or processed into fuel for combustion to the maximum extent practicable as required by law in 38 M.R.S.A. Chapter 1310-N, 5-A and the Solid Waste Management Rules, Chapter 409 Processing Facilities.

Unless otherwise specifically approved by the Department, the method described in this guidance and the forms provided shall be used to sample and to characterize by visual estimation all waste materials being delivered to the solid waste processing facility.

B. Processing Facilities Handling Sorted Loads

Processing facilities, other than C&D processing facilities, that receive well sorted loads (e.g. metal or tire processors) may wish to develop a form much less detailed than the Form included in this guidance. If a licensee chooses to develop and use an alternative visual survey method and/or form, it must be approved by the Department prior to use. If the material entering the facility is pre-sorted and scaled, that weight and nature of material (e.g. tires without rims) may simply be entered onto the form in the general information section. Percent estimations should be to the nearest whole % unit.

C. Sampling Occurrence and Frequency

The licensee may conduct this characterization by randomly choosing one loaded delivery vehicle or container, holding sorted or unsorted waste, arriving at the facility during each of 8 workdays each month. The specific sampling days must be scheduled so that all delivery days within a week are proportionately represented during the 12 month reporting period. In order to avoid introduction of sampling bias, the loads for characterization must not be chosen by hauler, source or the appearance of the load. The department recommends a choice based on the order of loads arriving at the scale e.g. the 3rd load arriving at the scale on any sampling day.

NOTE: Following this sampling plan a facility will visually characterize a total of 96 loads per year. Sampling Plans may be different from the schedule described above so long as it produces representative data based on a target of 100 loads characterized annually. Processing facilities handling waste of less variable nature than C&D may choose to characterize fewer loads (e.g. 1 or 2 loads per month) if doing so produces characterization data that adequately represents all the waste received by the facility.

D.   General Vehicle and Delivery Information

The person(s) conducting the visual characterization shall at a minimum, record the following general information onto the Form for each conveyance load delivered to the facility:

- Date, your site name, the estimator's name;
- The unique annual sample number for each load estimated;
- The name of the transporter;
- The state of origin for the waste;
- The type of generator of the waste;
- The nature (generating activity) of the material;
- The dimensions in feet of the conveyance (the truck or trailer or container carrying the load);
- The % of the conveyance filled with waste;
- Load volume in whole cubic yards;
- The scaled load weight.

E.   Waste Estimation Procedure

The method is designed to be used by two or more visual estimators working together to reconcile differing observations to produce a single completed form for each load of waste characterized. While it is possible to implement the method using a single estimator, the results are expected to be far more accurate if two or more estimators are used.

Facilities that accept sorted or unsorted loads shall estimate the percentage of each waste class and each specific component category within a class as identified on the Form, within a load. This estimate shall be made after the container is "tipped" on the tipping floor or a pad used for the purpose of load characterization and prior to any processing. The tipped material should be spread out to the degree needed to allow the estimators sufficient visual access to the load.

The steps in the visual estimation procedure follow:

1.   The estimators shall complete the general information in the top portion of the Form. The estimators shall then, using the % full load estimate and conveyance measurements, calculate the volume in cubic yards of the load to be characterized.

2.   In all cases, the estimators should use a copy of the Form to indicate the presence of each main material class in the load by circling each class present. Additionally, each main material class and specific material component shall be estimated to the nearest whole % unit with volumes present at less than 0.5% reported as 0.

3.   The main material classes listed on the Form and identified in each load shall be estimated as a % of the volume of the whole load. The % estimated for each main material class is then entered on the Form. The total of main material classes must equal 100%. If the total is not 100% re-examine the load and re-calculate for any misclassified or omitted material, if the total still is not 100%, adjust each estimated volume proportionately to equal 100%.

4.   The specific material component listed on the Form in each main material class shall be estimated as a % volume of each main material class. The % estimated for each

specific material component category is then entered on the Form under the 'ESTIMATE % OF CLASS' column.

5.   The % volume of each specific material component to be processed shall be estimated as a portion of the specific material component volume estimated in step 4. The % estimated for each specific material component is then entered on the Form under the 'MATERIAL TO BE PROCESSED' column.

6. The % volume of each specific material component that <u>will not</u> be processed shall be estimated a portion of the specific material component volume estimated in step 4. The % estimated for each specific material component is then entered on the Form under the 'MATERIAL TO BE BYPASSED OR NOT PROCESSED' column.

That completes the portion of the waste characterization that is accomplished in the field.

F.   <u>Data Analysis Procedure</u>

The Data Analysis Form (DAF) included with this guidance is available to licensees electronically. The total cubic yards of the load and estimations for the % of load for each class, the % of class for each specific material component, the % processed, and the % not processed are brought forward from the completed visual estimation form and entered on the DAF. Once that is done and when used with Microsoft Excel, the electronic DAF will self-calculate and enter automatically the conversions to cubic yards and weights in pounds.

The following are instructions on how data from visually estimated loads entering a facility can be analyzed.

1. Using the DAF provided by the Department or an approved alternative form enter in column B the estimated % volume of each main material class within each load selected at random for analysis. All volumes should be estimated to the nearest whole % unit with volumes present at less than 0.5% reported as 0.

2. Calculate the cubic yards for each Main Material Class by multiplying the total estimated cubic yards in the load by the estimated % of each Class. Enter the calculated cubic yards in column C of the DAF.

3. Enter the estimated % of Class for each specific material component in column E of the DAF.

4. Enter the estimated the % volume processed in column F and % volume not processed in column G, for each specific material component.

5. The cubic yards for each specific material component <u>processed</u> is calculated by multiplying the cubic yards in the main material class by the estimated % of class for each specific material component by the % processed. (column C x column E x column F)). Enter the cubic yards processed in column H of the DAF.

6. The cubic yards for each specific material components <u>not processed</u> is calculated by multiplying the cubic yards in the main material class by the estimated % of class for each specific material component by the % not processed (column C x column E x column G). Enter the cubic yards not processed in column I of the DAF.

7. The estimated cubic yards processed and not processed are converted to weight by multiplying them by the appropriate weight conversion factor contained in Table 1. Enter the calculated weight in pounds for each specific material component processed and not processed on the DAF.

G.   Material List and Definitions

The material list contains major headings that correspond to a list of main material classes most often present in loads of C&D waste received at processing facilities and of specific material component categories, identified by definition and/or by examples. The Department recommends that an estimator review this section and understand it well before beginning to characterize incoming loads at a processing facility.

General Rules:

1. A material should be classified according to a specific material component category if it fits the definition and/or is similar to the examples for that category.

2. If a material is not similar to any definition or examples listed or is unknown, it should go into the specific material component category that best fits within the "Other" main material class.

3. An intact or partially intact architectural component made up of two or more specific material components, such as a large piece of wood framed/plywood roof with shingles still fastened is measured by estimating the volume of each component present in significant quantity e.g. wood 80%, asphalt roofing 19%%, nails 1%. The estimated components are then classified under the appropriate defined category.

H.   Paper

1. Cardboard:

Includes:	**Does not include:**
Corrugated cardboard	
Paper bags	fiberboard
Kraft paper	plastic lined bags
Box board	bag contents

2. Waxed, contaminated or wet cardboard

3. All other paper: items not included above.

Includes:

Newspaper, office paper, plastic lined paper.

I.   Plastic

1. Film: film plastic used for packaging, construction and other uses

Includes:	Does not include:
Shrink wrap	rigid plastic
Bubble wrap	Styrofoam
Ag film	
Tyvek	
Bags	

2. Styrofoam: packaging material and insulation.

Includes:	Does not include:
Packaging peanuts & blocking	plastic film
Styrofoam sheets and pieces	rigid plastic
Foamed insulation	

3. Rigid plastic: any hard plastic container or object.

Includes:	Does not include
Plastic buckets	plastic film
Plastic pipes	Styrofoam
Plexiglas	
Corian	
Toys & plastic furniture	
Plastic architectural components	

4. Other plastic and non-rigid, non-film plastic: items not included above.

Includes:	Does not include:
Plastic strapping & rope	rigid plastic
Vinyl flooring	plastic film
Plastic lumber	styrofoam
Rubbermaid, etc containers	

J.   **Metal**

1. Appliances: discarded appliances of any color, often enamel coated.

Includes:	Does not include:
Washers and dryers	electronics
Water heaters	
Furnaces	
A/C units	
Toaster	

2. HVAC ducting: sheet metal tubing and ducting used for heating and cooling systems.

3. Ferrous and non-ferrous: any magnetic or non-magnetic metal.

Includes:	Does not include:
Iron or steel items	appliances
Empty paint cans	HVAC ducting
Uncoated wire	
Metal roofing	
Aluminum/steel/tin cans	
Brass/copper	

K.   Wood

1.   Lumber, engineered wood, wood products

Includes:	Does not include:
Dimensional lumber	treated wood
Painted or stained wood	
Plywood, OSB, Masonite	
Sawdust, woodchips	

2.   Treated wood

Includes:	Does not include:
Pressure treated wood	untreated wood
Creosote treated wood	
Utility poles	
"Penta" treated wood	

L.   Aggregate

1.   Soil, dirt, sand: nutrient rich decayed organic matter or fine pieces of mineral matter.

Includes:	Does not include:
Sod	
Gravel	hazardous contaminated soil
Non-hazardous contaminated soil	

2.   Rock, bricks and concrete

Includes:	Does not include:
Reinforced concrete	transite
Masonry tile	asbestos mastic coated concrete
Ceramic	Corian

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Porcelain
Glass

3. Asphalt paving: paving material mixed with aggregate

M. Roofing

1. Shingles and tar paper

Includes:	Does not include:
Asphalt shingles	wood, slate, tile shingles
Tar paper	flashing

2. Built-up roofing

N. Gypsum

1. Clean gypsum board.

Includes:

Clean sheetrock

2. Painted or contaminated gypsum board.

O. Organics

1. Brush, prunings, stumps, landclearing debris:

Includes:	Does not include:
Grass	soil
Leaves	sawdust
Trees	woodchips

P. Insulation

Insulation means any synthetic or natural fiber insulation used in walls, ceilings, and around ducting and pipes and ceiling tiles.

	Includes:	Does not include:
		polystyrene sheets or pieces
1.	Fiberglass all types	
	Faced or un-faced batts	
	Cellulose insulation	

2. Ceiling tiles

Q.   **Carpet**

1. Floor covering consisting of natural or synthetic fibers bonded to backing material

Includes:	Does not include:
Carpet	carpet padding
Artificial turf	
Indoor/outdoor carpet	
Door mats	

2. Carpet padding material used under flooring as insulation and padding.

Includes:	Does not include:
Plastic carpet padding	carpet
Thin foam padding	
Felt padding	

R.   **Other**

1. Trash

    Includes:

    Household waste
    Food and food containers
    Any unclassifiable waste

2. Electronics

    Includes:

    Brown goods
    Computers
    Radios

3. Bulky waste

    Includes:

    Mattresses
    Couches
    Textiles

4. Unacceptable waste

    Pool chemicals
    Waste oil
    Paint & thinners

Universal waste
Asbestos

TABLE 1.

Conversion factors* should be used when converting cubic yards of materials into weights for reporting purposes. Units for bulk density are pounds per cubic yard.

MATERIAL	BULK DENSITY
Corrugated, box board, kraft paper	53
Wet cardboard	106
Paper	364
Styrofoam	32
Rigid plastic	30
Non-bag film	35
Other plastic	50
Appliances	145
HVAC ducting	47
Ferrous and non-ferrous	225
Lumber, engineered wood, wood products	169
Treated wood	169
Dirt, sand, soil, gravel	950
Concrete, brick, porcelain	860
Glass	600
Asphalt pavement	773
Asphalt roofing material (all)	731
Clean gypsum board	467
Dirty/painted gypsum board	467
Organics	127
Ceiling tile	31
Insulation	17
Carpet	147
Carpet padding	62
Trash	417
Electronics	385

Bulky waste_____ 140

Unacceptable waste_____1500

* The sources for conversion factors are the California's visual characterization procedure and product manufacturers' data.