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*Unofficial electronic compilation of the  
U.S. EPA Final Rule on Mandatory Reporting of Greenhouse Gases  
incorporated by reference in California's Regulation for the  
Mandatory Reporting of Greenhouse Gas Emissions*

### Unofficial Electronic Compilation

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*ARB's Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (title 17, California Code of Regulations (CCR), sections 95100-95157) incorporated by reference certain requirements promulgated by the United States Environmental Protection Agency (U.S. EPA) in its Final Rule on Mandatory Reporting of Greenhouse Gases (Title 40, Code of Federal Regulations (CFR), Part 98). Specifically, section 95100(c) of ARB's regulation incorporated those requirements promulgated by U.S. EPA as published in the Federal Register on October 30, 2009, July 12, 2010, September 22, 2010, October 28, 2010, November 30, 2010, December 17, 2010, and April 25, 2011.*

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**40 CFR Part 98**  
**Subpart MM**  
**Mandatory Reporting of Greenhouse Gases**

**PART 98—MANDATORY GREENHOUSE GAS REPORTING**

**Subpart MM—Suppliers of Petroleum Products**

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**§98.390 Definition of the source category.**

This source category consists of petroleum refineries and importers and exporters of petroleum products and natural gas liquids as listed in Table MM-1 of this subpart.

(a) A petroleum refinery for the purpose of this subpart is any facility engaged in producing petroleum products through the distillation of crude oil.

(b) A refiner is the owner or operator of a petroleum refinery.

(c) Importer has the same meaning given in §98.6 and includes any entity that imports petroleum products or natural gas liquids as listed in Table MM-1 of this subpart. Any blender or refiner of refined or semi-refined petroleum products shall be considered an importer if it otherwise satisfies the aforementioned definition.

(d) Exporter has the same meaning given in §98.6 and includes any entity that exports petroleum products or natural gas liquids as listed in Table MM-1 of this subpart. Any blender or refiner of refined or semi-refined petroleum products shall be considered an exporter if it otherwise satisfies the aforementioned definition.

**§98.391 Reporting threshold.**

Any supplier of petroleum products who meets the requirements of §98.2(a)(4) must report GHG emissions.

**§98.392 GHGs to report.**

Suppliers of petroleum products must report the CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each petroleum product and natural gas liquid produced, used as feedstock, imported, or exported during the calendar year. Additionally, refiners must report CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of any biomass co-processed with petroleum feedstocks.

**§98.393 Calculating GHG emissions.**

(a) Calculation for individual products produced, imported, or exported.

(1) Except as provided in paragraphs (h) and (i) of this section, any refiner, importer, or exporter shall calculate CO<sub>2</sub> emissions from each individual petroleum product and natural gas liquid using Equation MM-1 of this section.

$$CO_{2i} = \text{Product}_i * EF_i \quad (\text{Eq. MM-1})$$

Where:

CO<sub>2i</sub> = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each petroleum product or natural gas liquid "i" (metric tons).

Product<sub>i</sub> = Annual volume of product "i" produced, imported, or exported by the reporting party (barrels). For refiners, this volume only includes products ex refinery gate, and excludes products that entered the refinery but are not reported under §98.396(a)(1). For natural gas liquids, volumes shall reflect the individual components of the product as listed in Table MM-1 to subpart MM.

EF<sub>i</sub> = Product-specific CO<sub>2</sub> emission factor (metric tons CO<sub>2</sub> per barrel).

(2) In the event that an individual petroleum product is produced as a solid rather than liquid any refiner, importer, or exporter shall calculate CO<sub>2</sub> emissions using Equation MM-1 of this section, where:

CO<sub>2i</sub> = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each petroleum product "i" (metric tons).

Product<sub>i</sub> = Annual mass of product "i" produced, imported, or exported by the reporting party (metric tons). For refiners, this mass only includes products ex refinery gate.

EF<sub>i</sub> = Product-specific CO<sub>2</sub> emission factor (metric tons CO<sub>2</sub> per metric ton of product).

(b) Calculation for individual products that enter a refinery as a non-crude feedstock.

(1) Except as provided in paragraphs (h) and (i) of this section, any refiner shall calculate CO<sub>2</sub> emissions from each non-crude feedstock using Equation MM-2 of this section.

$$CO_{2j} = \text{Feedstock}_j * EF_j \quad (\text{Eq. MM-2})$$

Where:

CO<sub>2j</sub> = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each non-crude feedstock "j" (metric tons).

Feedstock<sub>j</sub> = Annual volume of a petroleum product or natural gas liquid "j" that enters the refinery to be further refined or otherwise used on site (barrels). For natural gas liquids, volumes shall reflect the individual components of the product as listed in table MM-1 of this subpart.

$EF_j$  = Feedstock-specific CO<sub>2</sub> emission factor (metric tons CO<sub>2</sub> per barrel).

(2) In the event that a non-crude feedstock enters a refinery as a solid rather than liquid, the refiner shall calculate CO<sub>2</sub> emissions using Equation MM-2 of this section.

Where:

$CO_{2j}$  = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each non-crude feedstock “j” (metric tons).

Feedstock<sub>j</sub> = Annual mass of a petroleum product “j” that enters the refinery to be further refined or otherwise used on site (metric tons).

$EF_j$  = Feedstock-specific CO<sub>2</sub> emission factor (metric tons CO<sub>2</sub> per metric ton of feedstock).

(c) Calculation for biomass co-processed with petroleum feedstocks.

(1) Refiners shall calculate CO<sub>2</sub> emissions from each type of biomass that enters a refinery and is co-processed with petroleum feedstocks using Equation MM-3 of this section.

$$CO_{2m} = Biomass_m * EF_m \quad \text{(Eq. MM-3)}$$

Where:

$CO_{2m}$  = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each type of biomass “m” (metric tons).

Biomass<sub>m</sub> = Annual volume of a specific type of biomass that enters the refinery and is co-processed with petroleum feedstocks to produce a petroleum product reported under paragraph (a) of this section (barrels).

$EF_m$  = Biomass-specific CO<sub>2</sub> emission factor (metric tons CO<sub>2</sub> per barrel).

(2) In the event that biomass enters a refinery as a solid rather than liquid and is co-processed with petroleum feedstocks, the refiner shall calculate CO<sub>2</sub> emissions from each type of biomass using Equation MM-3 of this section.

Where:

$CO_{2m}$  = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each type of biomass “m” (metric tons).

Biomass<sub>m</sub> = Total annual mass of a specific type of biomass that enters the refinery to be co-processed with petroleum feedstocks to produce a petroleum product reported under paragraph (a) of this section (metric tons).

$EF_m$  = Biomass-specific CO<sub>2</sub> emission factor (metric tons CO<sub>2</sub> per metric ton of biomass).

(d) Summary calculation for refinery products. Refiners shall calculate annual CO<sub>2</sub> emissions from all products using Equation MM-4 of this section.

$$CO_{2r} = \sum (CO_{2i}) - \sum (CO_{2j}) - \sum (CO_{2m}) \quad \text{(Eq. MM-4)}$$

Where:

- CO<sub>2r</sub> = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of all petroleum products and natural gas liquids (ex refinery gate) minus non-crude feedstocks and any biomass to be co-processed with petroleum feedstocks.
- CO<sub>2i</sub> = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each petroleum product or natural gas liquid “i” (metric tons).
- CO<sub>2j</sub> = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each non-crude feedstock “j” (metric tons).
- CO<sub>2m</sub> = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each type of biomass “m” (metric tons).

(e) Summary calculation for importer and exporter products. Importers and exporters shall calculate annual CO<sub>2</sub> emissions from all petroleum products and natural gas liquids imported or exported, respectively, using Equations MM-1 and MM-5 of this section.

$$CO_{2x} = \sum (CO_{2i}) \quad (\text{Eq. MM-5})$$

Where:

- CO<sub>2i</sub> = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each petroleum product or natural gas liquid “i” (metric tons).
- CO<sub>2x</sub> = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of all petroleum products and natural gas liquids.

(f) Emission factors for petroleum products and natural gas liquids. The emission factor (EF<sub>i,j</sub>) for each petroleum product and natural gas liquid shall be determined using either of the calculation methods described in paragraphs (f)(1) or (f)(2) of this section. The same calculation method must be used for the entire quantity of the product for the reporting year. For refiners, the quantity of a product that enters a refinery (i.e., a non-crude feedstock) is considered separate from the quantity of a product ex refinery gate.

(1) Calculation Method 1. To determine the emission factor (i.e., EF<sub>i</sub> in Equation MM-1) for solid products, multiply the default carbon share factor (i.e., percent carbon by mass) in column B of Table MM-1 to this subpart for the appropriate product by 44/12. For all other products, use the default CO<sub>2</sub> emission factor listed in column C of Table MM-1 of this subpart for the appropriate product.

(2) Calculation Method 2.

(i) For solid products, develop emission factors according to Equation MM-6 of this section using a value of 1 for density and direct measurements of carbon share according to methods set forth in §98.394(c). For all other products, develop emission factors according to Equation MM-6 of this section using direct measurements of density and carbon share according to methods set forth in §98.394(c).

$$EF_{i,j} = \text{Density} * \text{Carbon Share} * (44/12) \quad (\text{Eq. MM-6})$$

Where:

- EF<sub>ij</sub> = Emission factor of the petroleum product or natural gas liquid (metric tons CO<sub>2</sub> per barrel or per metric ton of product).
- Density = Density of the petroleum product or natural gas liquid (metric tons per barrel for non-solid products, 1 for solid products).
- Carbon share = Percent of total mass that carbon represents in the petroleum product or natural gas liquid, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).
- 44/12 = Conversion factor for carbon to carbon dioxide.
- (ii) If you use a standard method that involves gas chromatography to determine the percent mass of each component in a product, calculate the product's carbon share using Equation MM-7 of this section.

$$\text{Carbon Share} = \sum(\% \text{Composition}_{i\dots n} * \% \text{Mass}_{i\dots n}) \quad (\text{Eq. MM-7})$$

Where:

- Carbon Share = Percent of total mass that carbon represents in the petroleum product or natural gas liquid.
- %Composition<sub>i...n</sub> = Percent of total mass that each molecular component in the petroleum product or natural gas liquid represents as determined by the procedures in the selected standard method.
- %Mass<sub>i...n</sub> = Percent of total mass that carbon represents in each molecular component of the petroleum product or natural gas liquid.

(g) Emission factors for biomass co-processed with petroleum feedstocks. Refiners shall use the most appropriate default CO<sub>2</sub> emission factor (EF<sub>m</sub>) for biomass in Table MM-2 of this subpart to calculate CO<sub>2</sub> emissions in paragraph (c) of this section.

(h) Special procedures for blended biomass-based fuels. In the event that some portion of a petroleum product is biomass-based and was not derived by co-processing biomass and petroleum feedstocks together (i.e., the petroleum product was produced by blending a petroleum-based product with a biomass-based fuel), the reporting party shall calculate emissions for the petroleum product according to one of the methods in paragraphs (h)(1) through (h)(4) of this section, as appropriate.

(1) A reporter using Calculation Methodology 1 to determine the emission factor of a petroleum product shall calculate the CO<sub>2</sub> emissions associated with that product using Equation MM-8 of this section in place of Equation MM-1 of this section.

$$\text{CO}_{2i} = \text{Product}_i * \text{EF}_i * \% \text{Vol}_i \quad (\text{Eq. MM-8})$$

Where:

- CO<sub>2i</sub> = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each petroleum product "i" (metric tons).
- Product<sub>i</sub> = Annual volume of each petroleum product "i" produced, imported, or exported by the reporting party (barrels). For refiners, this volume only includes products ex refinery gate.
- EF<sub>i</sub> = Petroleum product-specific CO<sub>2</sub> emission factor (metric tons CO<sub>2</sub> per barrel) from Table MM-1 of this subpart.

$\%Vol_i$  = Percent volume of product “i” that is petroleum-based, not including any denaturant that may be present in any ethanol product, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

(2) A refinery using Calculation Methodology 1 of this subpart to determine the emission factor of a non-crude petroleum feedstock shall calculate the CO<sub>2</sub> emissions associated with that feedstock using Equation MM-9 of this section in place of Equation MM-2 of this section.

$$CO_{2j} = Feedstock_j * EF_j * \%Vol_j \quad (\text{Eq. MM-9})$$

Where:

$CO_{2j}$  = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each non-crude feedstock “j” (metric tons).

$Feedstock_j$  = Annual volume of each petroleum product “j” that enters the refinery as a feedstock to be further refined or otherwise used on site (barrels).

$EF_j$  = Non-crude petroleum feedstock-specific CO<sub>2</sub> emission factor (metric tons CO<sub>2</sub> per barrel).

$\%Vol_j$  = Percent volume of feedstock “j” that is petroleum-based, not including any denaturant that may be present in any ethanol product, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

(3) Calculation Method 2 procedure for products.

(i) A reporter using Calculation Methodology 2 of this subpart to determine the emission factor of a petroleum product that does not contain denatured ethanol must calculate the CO<sub>2</sub> emissions associated with that product using Equation MM-10 of this section in place of Equation MM-1 of this section.

$$CO_{2i} = (Product_i * EF_i) - (Product_i * EF_m * \%Vol_m) \quad (\text{Eq. MM-10})$$

Where:

$CO_{2i}$  = Annual CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of each product “i” (metric tons).

$Product_i$  = Annual volume of each petroleum product “i” produced, imported, or exported by the reporting party (barrels). For refiners, this volume only includes products ex refinery gate.

$EF_i$  = Product-specific CO<sub>2</sub> emission factor (metric tons CO<sub>2</sub> per barrel).

$EF_m$  = Default CO<sub>2</sub> emission factor from Table MM-2 of this subpart that most closely represents the component of product “i” that is biomass-based.

$\%Vol_m$  = Percent volume of petroleum product “i” that is biomass-based, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

(ii) In the event that a petroleum product contains denatured ethanol, importers and exporters must follow Calculation Method 1 procedures in paragraph (h)(1) of this section; and refineries must sample the petroleum portion of the blended biomass-based fuel prior to blending and calculate CO<sub>2</sub> emissions using Equation MM-10a of this section.

$$CO_{2i} = Product_p * EF_i \quad (\text{Eq. MM-10a})$$



Where:

- $CO_{2i}$  = Annual  $CO_2$  emissions that would result from the complete combustion or oxidation of each biomass-blended fuel "i" (metric tons).
- Product<sub>p</sub> = Annual volume of the petroleum based portion of each biomass blended fuel "i" produced by the refiner (barrels).
- EF<sub>i</sub> = Petroleum product-specific  $CO_2$  emission factor (metric tons  $CO_2$  per barrel).

(4) Calculation Method 2 procedures for non-crude feedstocks.

- (i) A refiner using Calculation Methodology 2 of this subpart to determine the emission factor of a non-crude petroleum feedstock that does not contain denatured ethanol must calculate the  $CO_2$  emissions associated with that feedstock using Equation MM-11 of this section in place of Equation MM-2 of this section.

$$CO_{2j} = (Feedstock_j * EF_j) - (Feedstock_i * EF_m * \%Vol_m) \quad (Eq. MM-11)$$

Where:

- $CO_{2j}$  = Annual  $CO_2$  emissions that would result from the complete combustion or oxidation of each non-crude feedstock "j" (metric tons).
- Feedstock<sub>j</sub> = Annual volume of each petroleum product "j" that enters the refinery to be further refined or otherwise used on site (barrels).
- EF<sub>j</sub> = Feedstock-specific  $CO_2$  emission factor (metric tons  $CO_2$  per barrel).
- EF<sub>m</sub> = Default  $CO_2$  emission factor from Table MM-2 of subpart MM that most closely represents the component of petroleum product "j" that is biomass-based.
- $\%Vol_m$  = Percent volume of non-crude feedstock "j" that is biomass-based, expressed as a fraction (e.g., 75% would be expressed as 0.75 in the above equation).

- (ii) In the event that a non-crude feedstock contains denatured ethanol, refiners must follow Calculation Method 1 procedures in paragraph (h)(2) of this section.

- (i) Optional procedures for blended products that do not contain biomass.

(1) In the event that a reporter produces, imports, or exports a blended product that does not include biomass, the reporter may calculate emissions for the blended product according to the method in paragraph (i)(2) of this section. In the event that a refiner receives a blended non-crude feedstock that does not include biomass, the refiner may calculate emission for the blended non-crude feedstock according to the method in paragraph (i)(3) of this section. The procedures in this section may be used only if all of the following criteria are met:

- (i) The reporter knows the relative proportion of each component of the blend (i.e., the mass or volume percentage).
- (ii) Each component of blended product "i" or blended non-crude feedstock "j" meets the strict definition of a product listed in Table MM-1 to subpart MM.
- (iii) The blended product or non-crude feedstock is not comprised entirely of natural gas liquids.
- (iv) The reporter uses Calculation Method 1.

(v) Solid components are blended only with other solid components.

(2) The reporter must calculate emissions for the blended product using Equation MM-12 of this section in place of Equation MM-1 of this section.

$$CO_{2i} = \sum \left[ \text{Blending Component}_{i...n} * EF_{i...n} \right] \quad (\text{Eq. MM-12})$$

Where:

- $CO_{2i}$  = Annual  $CO_2$  emissions that would result from the complete combustion or oxidation of a blended product “i” (metric tons).
- Blending Component $_{i...n}$  = Annual volume or mass of each blending component that is blended (barrels or metric tons).
- $EF_{i...n}$  =  $CO_2$  emission factors specific to each blending component (metric tons  $CO_2$  per barrel or per metric ton of product).
- n = Number of blending components blended into blended product “i”.

(3) For refineries, the reporter must calculate emissions for the blended non-crude feedstock using Equation MM-13 of this section in place of Equation MM-2 of this section.

$$CO_{2j} = \sum \left[ \text{Blending Component}_{i...n} * EF_{i...n} \right] \quad (\text{MM-13})$$

Where:

- $CO_{2j}$  = Annual  $CO_2$  emissions that would result from the complete combustion or oxidation of a blended non-crude feedstock “j” (metric tons).
- Blending Component $_{i...n}$  = Annual volume or mass of each blending component that is blended (barrels or metric tons).
- $EF_{i...n}$  =  $CO_2$  emission factors specific to each blending component (metric tons  $CO_2$  per barrel or per metric ton of product).
- n = Number of blending components blended into blended non-crude feedstock “j”.

(4) For refineries, if a blending component “k” used in paragraph (i)(2) of this section enters the refinery before blending as non-crude feedstock:

- (i) The emissions that would result from the complete combustion or oxidation of non-crude feedstock “k” must still be calculated separately using Equation MM-2 of this section and applied in Equation MM-4 of this section.
- (ii) The quantity of blending component “k” applied in Equation MM-12 of this section and the quantity of non-crude feedstock “k” applied in Equation MM-2 of this section must be determined using the same method or practice.

**§98.394 Monitoring and QA/QC requirements.**

(a) Determination of quantity.

(1) The quantity of petroleum products, natural gas liquids, and biomass, as well as the quantity of crude oil measured on site at a refinery shall be determined as follows:

(i) Where an appropriate standard method published by a consensus-based standards organization exists, such a method shall be used. Consensus-based standards organizations include, but are not limited to, the following: ASTM International, the American National Standards Institute (ANSI), the American Gas Association (AGA), the American Society of Mechanical Engineers (ASME), the American Petroleum Institute (API), and the North American Energy Standards Board (NAESB).

(ii) Where no appropriate standard method developed by a consensus-based standards organization exists, industry standard practices shall be followed.

(iii) For products that are liquid at 60 degrees Fahrenheit and one standard atmosphere, all measurements of quantity shall be temperature-adjusted and pressure-adjusted to these conditions. For all other products, reporters shall use appropriate standard conditions specified in the standard method; if temperature and pressure conditions are not specified in the standard method or if a reporter uses an industry standard practice to determine quantity, the reporter shall use appropriate standard conditions according to established industry practices.

(2) All measurement equipment (including, but not limited to, flow meters and tank gauges) used for compliance with this subpart shall be appropriate for the standard method or industry standard practice followed under paragraph (a)(1)(i) or (a)(1)(ii) of this section.

(3) The quantity of crude oil not measured on site at a refinery shall be determined according to one of the following methods. You may use an appropriate standard method published by a consensus-based standards organization or you may use an industry standard practice.

(b) Equipment Calibration.

(1) All measurement equipment shall be calibrated prior to its first use for reporting under this subpart, using an appropriate standard method published by a consensus based standards organization or according to the equipment manufacturer's directions.

(2) Measurement equipment shall be recalibrated at the minimum frequency specified by the standard method used or by the equipment manufacturer's directions.

(c) Procedures for Calculation Methodology 2 of this subpart.

(1) Reporting parties shall collect one sample of each petroleum product or natural gas liquid on any day of each calendar month of the reporting year in which the quantity of that product was measured in accordance with the requirements of this subpart. For example, if a given product was measured as entering the refinery continuously throughout the reporting year, twelve samples of that product shall be collected over the reporting year, one on any day of each calendar month of that year. If a given product was only measured from April 15 through June 10 of the reporting year, a refiner would collect three samples during that year, one during each of the calendar months of April, May and June on a day when the product was measured as either entering or exiting the refinery. Each sample shall be collected using an appropriate standard method published by a consensus-based standards organization.

(2) Mixing and handling of samples shall be performed using an appropriate standard method published by a consensus-based standards organization.

(3) Density measurement.

(i) For all products that are not solid, reporters shall test for density using an appropriate standard method published by a consensus-based standards organization.

(ii) The density value for a given petroleum product shall be generated by either making a physical composite of all of the samples collected for the reporting year and testing that single sample or by measuring the individual samples throughout the year and defining the representative density value for the sample set by numerical means, i.e., a mathematical composite. If a physical composite is chosen as the option to obtain the density value, the reporter shall submit each of the individual samples collected during the reporting year to the laboratory responsible for generating the composite sample.

(iii) For physical composites, the reporter shall handle the individual samples and the laboratory shall mix them in accordance with an appropriate standard method published by a consensus-based standards organization.

(iv) All measurements of density shall be temperature-adjusted and pressure-adjusted to the conditions assumed for determining the quantities of the product reported under this subpart.

(4) Carbon share measurement.

(i) Reporters shall test for carbon share using an appropriate standard method published by a consensus-based standards organization.

(ii) If a standard method that involves gas chromatography is used to determine the percent mass of each component in a product, the molecular formula for each component shall be obtained from the information provided in the standard method and the atomic mass of each element in a given molecular component shall be obtained from the periodic table of the elements.

(iii) The carbon share value for a given petroleum product shall be generated by either making a physical composite of all of the samples collected for the reporting year and testing that single sample or by measuring the individual samples throughout the year and defining the representative carbon share value for the sample set by numerical means, i.e., a mathematical composite. If a physical composite is chosen as the option to obtain the carbon share value, the reporter shall submit each of the individual samples collected during the reporting year to the laboratory responsible for generating the composite sample.

(iv) For physical composites, the reporter shall handle the individual samples and the laboratory shall mix them in accordance with an appropriate standard method published by a consensus-based standards organization.

(d) Measurement of API gravity and sulfur content of crude oil.

(1) A representative sample or multiple representative samples of each batch of crude oil shall be taken according to one of the following methods. You may use an appropriate standard method published by a consensus-based standards organization or you may use an industry standard practice.

(2) Samples shall be handled according to one of the following methods. You may use an appropriate standard method published by a consensus-based standards organization or you may use an industry standard practice.

(3) API gravity shall be measured according to one of the following methods. You may use an appropriate standard method published by a consensus-based standards

organization or you may use an industry standard practice. The weighted average API gravity for each batch shall be calculated by multiplying the volume associated with each representative sample by the API gravity, adding these values for all the samples, and then dividing that total value by the volume of the batch.

(4) Sulfur content shall be measured according to one of the following methods. You may use an appropriate standard method published by a consensus-based standards organization or you may use an industry standard practice. The weighted average sulfur content for each batch shall be calculated by multiplying the volume associated with each representative sample by the sulfur content, adding these values for all the samples, and then dividing that total value by the volume of the batch.

(5) All measurements shall be temperature-adjusted and pressure-adjusted to the conditions assumed for determining the quantities of crude oil reported under this subpart.

**§98.395 Procedures for estimating missing data.**

(a) Determination of quantity. Whenever the quality assurance procedures in §98.394(a) cannot be followed to measure the quantity of one or more petroleum products, natural gas liquids, types of biomass, feedstocks, or crude oil batches during any period (e.g., if a meter malfunctions), the following missing data procedures shall be used:

(1) For quantities of a product that are purchased or sold, a period of missing data shall be substituted using a reporter's established procedures for billing purposes in that period as agreed to by the party selling or purchasing the product.

(2) For quantities of a product that are not purchased or sold but of which the custody is transferred, a period of missing data shall be substituted using a reporter's established procedures for tracking purposes in that period as agreed to by the party involved in custody transfer of the product.

(b) Determination of emission factor. Whenever any of the procedures in §98.394(c) cannot be followed to develop an emission factor for any reason, Calculation Methodology 1 of this subpart must be used in place of Calculation Methodology 2 of this subpart for the entire reporting year.

(c) Determination of API gravity and sulfur content of crude oil. For missing data on sulfur content or API gravity, the substitute data value shall be the arithmetic average of the quality-assured values of API gravity or sulfur content in the batch preceding and the batch immediately following the missing data incident. If no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured values for API gravity and sulfur content obtained from the batch after the missing data period.

**§98.396 Data reporting requirements.**

In addition to the information required by §98.3(c), the following requirements apply:

(a) Refiners shall report the following information for each facility:

(1) For each petroleum product or natural gas liquid listed in table MM-1 of this subpart that enters the refinery to be further refined or otherwise used on site, report the annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, quantity shall reflect the individual components of the product.

(2) For each petroleum product or natural gas liquid listed in Table MM-1 of this subpart that enters the refinery to be further refined or otherwise used on site, report the annual

quantity in metric tons or barrels. For natural gas liquids, quantity shall reflect the individual components of the product.

(3) For each feedstock reported in paragraph (a)(2) of this section that was produced by blending a petroleum-based product with a biomass-based product, report the percent of the volume reported in paragraph (a)(2) of this section that is petroleum-based (excluding any denaturant that may be present in any ethanol product).

(4) Each standard method or other industry standard practice used to measure each quantity reported in paragraph (a)(1) of this section.

(5) For each petroleum product and natural gas liquid (ex refinery gate) listed in Table MM-1 of this subpart, report the annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, quantity shall reflect the individual components of the product. Petroleum products and natural gas liquids that enter the refinery, but are not reported in (a)(1), shall not be reported under this paragraph.

(6) For each petroleum product and natural gas liquid (ex refinery gate) listed in Table MM-1 of this subpart, report the annual quantity in metric tons or barrels. For natural gas liquids, quantity shall reflect the individual components of the product. Petroleum products and natural gas liquids that enter the refinery, but are not reported in (a)(2), shall not be reported under this paragraph.

(7) For each product reported in paragraph (a)(6) of this section that was produced by blending a petroleum-based product with a biomass-based product, report the percent of the volume reported in paragraph (a)(6) of this section that is petroleum-based (excluding any denaturant that may be present in any ethanol product).

(8) Each standard method or other industry standard practice used to measure each quantity reported in paragraph (a)(5) of this section.

(9) For every feedstock reported in paragraph (a)(2) of this section for which Calculation Methodology 2 of this subpart was used to determine an emissions factor, report:

- (i) The number of samples collected according to §98.394(c)
- (ii) The sampling standard method used.
- (iii) The carbon share test results in percent mass.
- (iv) The standard method used to test carbon share.
- (v) The calculated CO<sub>2</sub> emissions factor in metric tons.

(10) For every non-solid feedstock reported in paragraph (a)(2) of this section for which Calculation Methodology 2 of this subpart was used to determine an emissions factor, report:

- (i) The density test results in metric tons per barrel.
- (ii) The standard method used to test density.

(11) For every petroleum product and natural gas liquid reported in paragraph (a)(6) of this section for which Calculation Methodology 2 of this subpart was used to determine an emissions factor, report:

- (i) The number of samples collected according to §98.394(c).
- (ii) The sampling standard method used.
- (iii) The carbon share test results in percent mass.

- (iv) The standard method used to test carbon share.
  - (v) The calculated CO<sub>2</sub> emissions factor in metric tons CO<sub>2</sub> per barrel or per metric ton of product.
- (12) For every non-solid petroleum product and natural gas liquid reported in paragraph (a)(6) for which Calculation Method 2 was used to determine an emissions factor, report:
- (i) The density test results in metric tons per barrel.
  - (ii) The standard method used to test density.
- (13) For each specific type of biomass that enters the refinery to be co-processed with petroleum feedstocks to produce a petroleum product reported in paragraph (a)(6) of this section, report the annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used.
- (14) For each specific type of biomass that enters the refinery to be co-processed with petroleum feedstocks to produce a petroleum product reported in paragraph (a)(6) of this section, report the annual quantity in metric tons or barrels.
- (15) Each standard method or other industry standard practice used to measure each quantity reported in paragraph (a)(13) of this section.
- (16) The CO<sub>2</sub> emissions in metric tons that would result from the complete combustion or oxidation of each petroleum product and natural gas liquid (ex refinery gate) reported in paragraph (a)(6) of this section that were calculated according to §98.393(a) or (h).
- (17) The CO<sub>2</sub> emissions in metric tons that would result from the complete combustion or oxidation of each feedstock reported in paragraph (a)(2) of this section that were calculated according to §98.393(b) or (h).
- (18) The CO<sub>2</sub> emissions in metric tons that would result from the complete combustion or oxidation of each type of biomass feedstock co-processed with petroleum feedstocks reported in paragraph (a)(13) of this section, calculated according to §98.393(c).
- (19) The sum of CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of all products, calculated according to §98.393(d).
- (20) All of the following information for all crude oil feedstocks used at the refinery:
- (i) Batch volume in barrels.
  - (ii) Weighted average API gravity representing the batch at the point of entry at the refinery.
  - (iii) Weighted average sulfur content representing the batch at the point of entry at the refinery.
  - (iv) Country of origin, of the batch, if known and data in paragraphs (a)(20)(v) and (a)(20)(vi) of this section are unknown.
  - (v) EIA crude stream code and crude stream name of the batch, if known.
  - (vi) Generic name for the crude stream and the appropriate EIA two-letter country or state and production area code of the batch, if known and no appropriate EIA crude stream code exists.
- (21) The quantity of bulk NGLs in metric tons or barrels received for processing during the reporting year.

(22) Volume of crude oil in barrels that you injected into a crude oil supply or reservoir. A volume of crude oil that entered the refinery, but was not reported in paragraphs (a)(2) or (a)(20), shall not be reported under this paragraph.

(23) Special provisions for 2010. For reporting year 2010 only, a refiner that knows the information under a specific tier of the batch definition in 40 CFR 98.398, but does not have the necessary data collection and management in place to readily report this information, can use the next most appropriate tier of the batch definition for reporting batch information under paragraph 98.396(a)(20).

(b) In addition to the information required by §98.3(c), each importer shall report all of the following information at the corporate level:

(1) For each petroleum product and natural gas liquid listed in Table MM-1 of this subpart, report the annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, quantity shall reflect the individual components of the product.

(2) For each petroleum product and natural gas liquid listed in Table MM-1 of this subpart, report the annual quantity in metric tons or barrels. For natural gas liquids, quantity shall reflect the individual components of the product as listed in Table MM-1 of this subpart.

(3) For each product reported in paragraph (b)(2) of this section that was produced by blending a petroleum-based product with a biomass-based product, report the percent of the volume reported in paragraph (b)(2) of this section that is petroleum-based (excluding any denaturant that may be present in any ethanol product).

(4) Each standard method or other industry standard practice used to measure each quantity reported in paragraph (b)(1) of this section.

(5) For each product reported in paragraph (b)(2) of this section for which Calculation Methodology 2 of this subpart used was used to determine an emissions factor, report:

- (i) The number of samples collected according to §98.394(c)
- (ii) The sampling standard method used.
- (iii) The carbon share test results in percent mass.
- (iv) The standard method used to test carbon share.
- (v) The calculated CO<sub>2</sub> emissions factor in metric tons CO<sub>2</sub> per barrel or per metric ton of product.

(6) For each non-solid product reported in paragraph (b)(2) of this section for which Calculation Methodology 2 of this subpart was used to determine an emissions factor, report:

- (i) The density test results in metric tons per barrel.
- (ii) The standard method used to test density.

(7) The CO<sub>2</sub> emissions in metric tons that would result from the complete combustion or oxidation of each imported petroleum product and natural gas liquid reported in paragraph (b)(2) of this section, calculated according to §98.393(a).

(8) The sum of CO<sub>2</sub> emissions that would result from the complete combustion oxidation of all imported products, calculated according to §98.393(e).

(c) In addition to the information required by §98.3(c), each exporter shall report all of the following information at the corporate level:



- (1) For each petroleum product and natural gas liquid listed in Table MM-1 of this subpart, report the annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, quantity shall reflect the individual components of the product.
  - (2) For each petroleum product and natural gas liquid listed in Table MM-1 of this subpart, report the annual quantity in metric tons or barrels. For natural gas liquids, quantity shall reflect the individual components of the product.
  - (3) For each product reported in paragraph (c)(2) of this section that was produced by blending a petroleum-based product with a biomass-based product, report the percent of the volume reported in paragraph (c)(2) of this section that is petroleum based (excluding any denaturant that may be present in any ethanol product).
  - (4) Each standard method or other industry standard practice used to measure each quantity reported in paragraph (c)(1) of this section.
  - (5) For each product reported in paragraph (c)(2) of this section for which Calculation Methodology 2 of this subpart was used to determine an emissions factor, report:
    - (i) The number of samples collected according to §98.394(c).
    - (ii) The sampling standard method used.
    - (iii) The carbon share test results in percent mass.
    - (iv) The standard method used to test carbon share.
    - (v) The calculated CO<sub>2</sub> emissions factor in metric tons CO<sub>2</sub> per barrel or per metric ton of product.
  - (6) For each non-solid product reported in paragraph (c)(2) of this section for which Calculation Methodology 2 of this subpart used was used to determine an emissions factor, report:
    - (i) The density test results in metric tons per barrel.
    - (ii) The standard method used to test density.
  - (7) The CO<sub>2</sub> emissions in metric tons that would result from the complete combustion or oxidation of for each exported petroleum product and natural gas liquid reported in paragraph (c)(2) of this section, calculated according to §98.393(a).
  - (8) The sum of CO<sub>2</sub> emissions that would result from the complete combustion or oxidation of all exported products, calculated according to §98.393(e).
- (d) Blended non-crude feedstock and products.
- (1) Refineries, exporters, and importers must report the following information for each blended product and non-crude feedstock where emissions were calculated according to §98.393(i):
    - (i) Volume or mass of each blending component.
    - (ii) The CO<sub>2</sub> emissions in metric tons that would result from the complete combustion or oxidation of each blended non-crude feedstock or product, using Equation MM-12 or Equation MM-13 of this section.
    - (iii) Whether it is a blended non-crude feedstock or a blended product.
  - (2) For a product that enters the refinery to be further refined or otherwise used on site that is a blended non-crude feedstock, refiners must meet the reporting requirements of

paragraphs (a)(1) and (a)(2) of this section by reflecting the individual components of the blended non-crude feedstock.

(3) For a product that is produced, imported, or exported that is a blended product, refiners, importers, and exporters must meet the reporting requirements of paragraphs (a)(5), (a)(6), (b)(1), (b)(2), (c)(1), and (c)(2) of this section, as applicable, by reflecting the individual components of the blended product.

#### **§98.397 Records that must be retained.**

(a) All reporters shall retain copies of all reports submitted to EPA under §98.396. In addition, all reporters shall maintain sufficient records to support information contained in those reports, including but not limited to information on the characteristics of their feedstocks and products.

(b) Reporters shall maintain records to support quantities that are reported under this subpart, including records documenting any estimations of missing data and the number of calendar days in the reporting year for which substitute data procedures were followed. For all reported quantities of petroleum products, natural gas liquids, and biomass, as well as crude oil quantities measured on site at a refinery, reporters shall maintain metering, gauging, and other records normally maintained in the course of business to document product and feedstock flows including the date of initial calibration and the frequency of recalibration for the measurement equipment used.

(c) Reporters shall retain laboratory reports, calculations and worksheets used to estimate the CO<sub>2</sub> emissions of the quantities of petroleum products, natural gas liquids, biomass, and feedstocks reported under this subpart.

(d) Reporters shall maintain laboratory reports, calculations and worksheets used in the measurement of density and carbon share for any petroleum product or natural gas liquid for which CO<sub>2</sub> emissions were calculated using Calculation Methodology 2.

(e) Estimates of missing data shall be documented and records maintained showing the calculations.

(f) Reporters described in this subpart shall also retain all records described in §98.3(g).

#### **§98.398 Definitions.**

Except as specified in this section, all terms used in this subpart have the same meaning given in the Clean Air Act and subpart A of this part.

Batch means either a volume of crude oil that enters a refinery or the components of such volume (e.g., the volumes of different crude streams that are blended together and then delivered to a refinery). The batch volume is the first appropriate tier in the following list:

- (1) Up to an annual volume of a type of crude oil identified by an EIA crude stream code, if the EIA crude stream code is known.
- (2) Up to an annual volume of a type of crude oil identified by a generic name for the crude stream and an appropriate EIA two-letter country or state and production area code, if the generic name and EIA two-letter code are known but no appropriate EIA crude stream code exists.
- (3) Up to a calendar month of crude oil volume from a single known foreign country of origin if the crude stream name is unknown.
- (4) Up to a calendar month of crude oil volume from the United States if the crude stream name and production area are unknown.
- (5) Up to a calendar month of crude oil volume if the country of origin is unknown.

**Table MM-1 of Subpart MM—Default Factors for Petroleum Products and Natural Gas Liquids<sup>1,2</sup>**

<b>Products</b>	<b>Column A: Density (metric tons/bbl)</b>	<b>Column B: Carbon Share (% of mass)</b>	<b>Column C: Emission Factor (metric tons CO<sub>2</sub>/bbl)</b>
<b>Finished Motor Gasoline</b>			
Conventional - Summer			
Regular	0.1181	86.66	0.3753
Midgrade	0.1183	86.63	0.3758
Premium	0.1185	86.61	0.3763
Conventional - Winter			
Regular	0.1155	86.50	0.3663
Midgrade	0.1161	86.55	0.3684
Premium	0.1167	86.59	0.3705
Reformulated - Summer			
Regular	0.1167	86.13	0.3686
Midgrade	0.1165	86.07	0.3677
Premium	0.1164	86.00	0.3670
Reformulated - Winter			
Regular	0.1165	86.05	0.3676
Midgrade	0.1165	86.06	0.3676
Premium	0.1166	86.06	0.3679
Gasoline—Other	0.1185	86.61	0.3763
<b>Blendstocks</b>			
CBOB—Summer			
Regular	0.1181	86.66	0.3753
Midgrade	0.1183	86.63	0.3758
Premium	0.1185	86.61	0.3763
CBOB—Winter			
Regular	0.1155	86.50	0.3663
Midgrade	0.1161	86.55	0.3684
Premium	0.1167	86.59	0.3705
RBOB—Summer			
Regular	0.1167	86.13	0.3686
Midgrade	0.1165	86.07	0.3677
Premium	0.1164	86.00	0.3670
RBOB—Winter			
Regular	0.1165	86.05	0.3676
Midgrade	0.1165	86.06	0.3676
Premium	0.1166	86.06	0.3679
Blendstocks—Other	0.1185	86.61	0.3763
<b>Oxygenates</b>			
Methanol	0.1268	37.48	0.1743
GTBA	0.1257	64.82	0.2988
MTBE	0.1181	68.13	0.2950
ETBE	0.1182	70.53	0.3057
TAME	0.1229	70.53	0.3178
DIPE	0.1156	70.53	0.2990
<b>Distillate Fuel Oil</b>			
Distillate No. 1			
Ultra Low Sulfur	0.1346	86.40	0.4264
Low Sulfur	0.1346	86.40	0.4264

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**Table MM-1 of Subpart MM—Default Factors for Petroleum Products and Natural Gas Liquids<sup>1,2</sup>**

<b>Products</b>	<b>Column A: Density (metric tons/bbl)</b>	<b>Column B: Carbon Share (% of mass)</b>	<b>Column C: Emission Factor (metric tons CO<sub>2</sub>/bbl)</b>
High Sulfur	0.1346	86.40	0.4264
Distillate No. 2			
Ultra Low Sulfur	0.1342	87.30	0.4296
Low Sulfur	0.1342	87.30	0.4296
High Sulfur	0.1342	87.30	0.4296
Distillate Fuel Oil No. 4	0.1452	86.47	0.4604
Residual Fuel Oil No. 5 (Navy Special)	0.1365	85.67	0.4288
Residual Fuel Oil No. 6 (a.k.a. Bunker C)	0.1528	84.67	0.4744
Kerosene-Type Jet Fuel	0.1294	86.30	0.4095
Kerosene	0.1346	86.40	0.4264
Diesel—Other	0.1452	86.47	0.4604
<b>Petrochemical Feedstocks</b>			
Naphthas (< 401°F)	0.1158	84.11	0.3571
Other Oils (> 401°F)	0.1390	87.30	0.4450
<b>Unfinished Oils</b>			
Heavy Gas Oils	0.1476	85.80	0.4643
Residuum	0.1622	85.70	0.5097
<b>Other Petroleum Products and Natural Gas Liquids</b>			
Aviation Gasoline	0.1120	85.00	0.3490
Special Naphthas	0.1222	84.76	0.3798
Lubricants	0.1428	85.80	0.4492
Waxes	0.1285	85.30	0.4019
Petroleum Coke	0.1818	92.28	0.6151
Asphalt and Road Oil	0.1634	83.47	0.5001
Still Gas	0.1405	77.70	0.4003
Ethane	0.0866	79.89	0.2537
Ethylene	0.0903	85.63	0.2835
Propane	0.0784	81.71	0.2349
Propylene	0.0803	85.63	0.2521
Butane	0.0911	82.66	0.2761
Butylene	0.0935	85.63	0.2936
Isobutane	0.0876	82.66	0.2655
Isobutylene	0.0936	85.63	0.2939
Pentanes Plus	0.1055	83.63	0.3235
Miscellaneous Products	0.1380	85.49	0.4326

1. In the case of products blended with some portion of biomass-based fuel, the carbon share in Table MM-1 of this subpart represents only the petroleum-based components.
2. Products that are derived entirely from biomass should not be reported, but products that were derived from both biomass and a petroleum product (i.e., co-processed) should be reported as the petroleum product that it most closely represents.

**Table MM-2 of Subpart MM—Default Factors for Biomass-Based Fuels and Biomass**

<b>Biomass-Based Fuel and Biomass</b>	<b>Column A: Density (metric tons/bbl)</b>	<b>Column B: Carbon Share (% of mass)</b>	<b>Column C: Emission Factor (metric tons CO<sub>2</sub>/bbl)</b>
Ethanol (100%)	0.1267	52.14	0.2422
Biodiesel (100%, methyl ester)	0.1396	77.30	0.3957
Rendered Animal Fat	0.1333	76.19	0.3724
Vegetable Oil	0.1460	76.77	0.4110