

**New Jersey Department of Environmental Protection
Open Market Emissions Trading Program**

GUIDANCE DOCUMENT NO. 1

“HIERARCHIES OF QUANTIFICATION TECHNIQUES”

(May 25, 2000)

This guidance document sets forth the procedures to be used pursuant to N.J.A.C. 7:27-30.24(c)4, when developing a quantification protocol for a stationary source, to select the quantification technique(s) to be prescribed by the quantification protocol for measuring and quantifying actual emissions.

This document addresses the selection of a measurement and quantification technique for the following:

1. The determination of the quantity of actual VOC or NO_x emissions from a stationary source; and/or
2. The determination of the quantity of actual GHG emissions from a stationary source.

Part 1. The determination of the quantity of actual VOC or NO_x emissions from a stationary source

The following is general guidance for selecting a specific technique to be included in a protocol for determining the quantity of actual VOC or NO_x emissions from stationary sources:

1. If a Federal or State law, rule, permit, or order requires that the emissions source's emissions be monitored through a continuous emission monitoring system (CEMS), the determination shall be based on use of the CEMS data; and
2. If the emissions source is not required to have a CEMS, the determination shall be based on one of the techniques listed below. The list is a hierarchy, in which the first listed technique is the most preferred, and the technique listed last, the least preferred. For a given emission source, or category of emission sources, a protocol shall use the first listed technique which is required to be used for the emissions source pursuant to its permit; except that if a generator or user is in fact using or prefers to use a higher-listed technique (that is, a more preferred technique) to determine the source's emissions, the higher-listed technique shall be used:
 - i. An alternative monitoring methodology set forth in an alternative monitoring plan approved by the Department pursuant to N.J.A.C. 7:27- 19.18(b) or approved by

the EPA;

- ii. Source emission testing performed on the user or generator source, as applicable, in accordance with a protocol approved by the Department pursuant to N.J.A.C. 7:27B;
- iii. A material balance;
- iv. Source emission testing or other emission measurements conducted on similar emissions sources;
- v. Calculation using emission factors that differ from AP-42, which are designed to estimate emissions from the particular emissions source more accurately than AP-42;
- vi. Calculation using EPA emission factors from AP-42; and
- vii. For area sources only, an emission estimation model approved or published by the EPA.

Part 2. The determination of the quantity of actual GHG emissions from a stationary source

The following is general guidance for selecting a specific technique to be included in a protocol for determining the quantity of actual GHG emissions from stationary sources:

1. If a Federal or State law, rule, permit, or order requires that the emissions source's emissions be monitored through a continuous emission monitoring system (CEMS), determination shall be based on use of the CEMS data; and
2. If the GHG is an HFC, SF₆, CH₄, or CO₂ emitted from fuel combustion including fuel combustion associated with production of electricity used, and if the emissions source is not required to have a CEMS, the determination shall be based on one of the techniques listed below. The list is a hierarchy, in which the first listed technique is the most preferred, and the technique listed last, the least preferred. For a given emissions source, or category of emission sources, a protocol shall use the first listed technique which is required to be used for the emissions source pursuant to its permit; except that if a generator or user is in fact using or prefers to use a higher-listed technique (that is, a more preferred technique) to determine the source's emissions, the higher-listed technique below shall be used:
 - i. In the case of CO₂ emitted from fuel combustion, a balance of fuel and energy use, as converted to CO₂ emissions using the appropriate efficiencies of equipment and the emission coefficients by fuel type which are given below in Table A expressed

in pounds CO₂ per megawatt hour or in metric tons CO₂ per megawatt hour;

- ii. In the case of CO₂ emitted associated with electricity use, a balance energy use, as converted to CO₂ emissions using appropriate efficiencies of equipment and the most recent PJM average emission coefficient for electricity generation expressed in pounds CO₂ per megawatt hour or in metric tons CO₂ per megawatt hour. As of May 25, 2000, the most recent PJM average, using 1997 data, is given below in Table B. To obtain the most recent PJM average, access the EGRID database website address listed in footnote 4;
 - iii. Calculation using the recommended applicable emission factor described in Emissions Inventory Improvement Program (EIIP) Document Series Volume VIII, Estimating Greenhouse Gas Emissions (EPA 454R-97-004a-g), as amended and supplemented, incorporated herein by reference; a copy of this methodology may be obtained from the EPA website at www.epa.gov/ttn/chief/eiip/eiip_ghg.htm or by requesting a copy from the Department at the following address:

Department of Environmental Protection
Office of Air Quality Management
PO Box 418
Trenton, New Jersey 08625-0418
 - iv. Calculation using an AP-42 emission factor;
 - v. Predictive emissions monitoring;
 - vi. Manufacturer's estimate or data;
 - vii. Calculations using an industry council or organization emission factor;
 - viii. Departmentally approved source emissions testing performed during the reporting year;
 - xi. Departmentally approved source emissions testing performed during the prior year;
 - x. Source emissions testing not approved or supervised by the Department; or
 - xi. Engineering judgment; and
3. If the GHG is a PFC, N₂O, CH₄ produced as a by-product of combustion, or CO₂ emitted from a source other than fuel combustion, and if the emissions source is not required to have a CEMS, the determination shall be based on one of the techniques listed below. The list is a hierarchy in which the first listed technique is the most preferred, and the technique listed last, the least preferred. For a given emission source, or category of emission sources, a protocol shall use the first listed technique which is required to be

used for the emissions source pursuant to its permit; except that if a generator or user is in fact using or prefers to use a higher-listed technique (that is, a more preferred technique) to determine the source's emissions, the higher-listed technique shall be used:

- i. Calculation using the recommended applicable emission factor described in most recent USEPA/STAPPA/ALAPCO Emissions Inventory Improvement Program methodology for greenhouse gases incorporated herein by reference; a copy of this methodology may be obtained from the EPA website at www.epa.gov/tn/chief/eiip/eiip_ghg.htm;
- ii. Calculations using an AP-42 emission factor;
- iii. Predictive emissions monitoring;
- iv. Mass/material balance, coupled as necessary with appropriate emission factors and appropriate efficiencies of equipment;
- v. Manufacturer's estimate or data;
- vi. Calculations using an industry council or organization emission factor;
- vii. Departmentally approved source emissions testing performed during the reporting year;
- viii. Departmentally approved source emissions testing performed during the prior year;
- ix. Source emissions testing not approved or supervised by the Department; or
- x. Engineering judgment.

Table A
Emission Coefficients by Fuel Type¹

Fuel Type	Pounds CO₂ per unit volume or mass (1 ton = 2000 pounds)	Pounds CO₂ per million BTU
Aviation gasoline	18.355 per gallon	152.717
Distillate fuel (#1, #2, #4 fuel oil & diesel)	22.384 per gallon	161.386
Jet fuel	21.439 per gallon	159.690
Kerosene	21.537 per gallon	159.535
Liquified petroleum gas (LPG)	12.200 per gallon	138.846
Motor gasoline	19.641 per gallon	157.041
Residual fuel (#6 fuel oil)	26.033 per gallon	173.906
Methane	116.376 per 1000 cubic feet	115.258
Flare gas	133.759 per 1000 cubic feet	120.721
Natural gas (pipeline)	120.593 per 1000 cubic feet	117.080
Propane	12.669 per gallon	139.178
Anthracite coal	4933.804 per ton ²	227.400
Bituminous coal	4921.862 per ton	205.300
Subbituminous coal	3723.952 per ton	212.700
Lignite	2733.857 per ton	215.400
Wood and wood waste ³	3814 per ton	221.943
Municipal solid waste ³	1999 per ton	199.854

¹Source: DOE/EIA, Form EIA-1605 Voluntary Reporting of Greenhouse Gases, Instructions, 1997, Appendix B and Appendix C.

²Instead of the DOE/EIA coefficient, the coefficient given for anthracite coal for the “pounds CO₂ per unit mass” factor is derived from data provided in the STAPPA-ALAPCO-EPA report, “Emission Inventory Improvement Program, Vol. VIII, Chapter 1, “Methods for Estimating Carbon Dioxide Emissions from Combustion of Fossil Fuels,” Review Draft, ICF Inc., Washington, D.C., 1998.

³Net emissions likely to be less than direct emissions because all or part of the fuel is renewable; biofuels contain carbon that is part of the natural carbon cycle balance and will not add to atmospheric concentrations of CO₂.

Table B
PJM Average Emission Coefficient for Electricity Generation⁴

Energy Type	Pounds CO₂ per Megawatt hour (MWh)	Metric tons CO₂ per MWh
Electricity (PJM average)	1301.35	0.590

⁴1997 Emission & Generation Resources Integrated Database (EGRID), Version 1.1, USEPA, website address <http://www.epa.gov/acidrain/egrid/egrid.html>