Appendix A

Table A-1 Reporting Thresholds and Reporting Requirements

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
C—General Stationary Fuel Combustion Sources (§ 98.30). See ICR section 4(b)(i).			
D—Electricity Generation (§98.40)	25,000 metric tons; all facilities subject to the Acid Rain Program or CAIR	All facilities	See reporting requirements for stationary combustion
E—Adipic Acid Production (§98.50)	All in	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) Annual N2O emissions from adipic acid production in metric tons. (b) Annual adipic acid production capacity (in metric tons). (c) Annual adipic acid production, in units of metric tons of adipic acid produced. (d) Number of facility operating hours in calendar year. (e) Emission rate factor used (lb N2O/ton adipic acid). (f) Abatement technology used (if applicable). (g) Abatement technology efficiency (percent destruction). (h) Abatement utilization factor (percent of time that abatement system is operating).

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
F—Aluminum Production (§98.60)	All in	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) Annual aluminum production in metric tons. (b) Type of smelter technology used. (c) The following PFC-specific information on an annual basis: (1) Perfluoromethane emissions and perfluoroethane emissions from anode effects in all prebake and all Søderberg electolysis cells combined. (2) Anode effect minutes per cell-day, anode effect frequency (AE/cell-day), anode effect duration (minutes). (3) Smelter-specific slope coefficient and the last date when the smelter-specific-slope coefficient was measured. (d) Method used to measure the frequency and duration of anode effects. (e) The following CO2-specific information for prebake cells on an annual basis: (1) Total anode consumption. (2) Total CO2 emissions from the smelter. (f) The following CO2-specific information for Søderberg cells on an annual basis: (1) Total paste consumption. (2) Total CO2 emissions from the smelter. (g) Smelter-specific inputs to the CO2 process equations (e.g., levels of sulfur and ash) that were used in the calculation, on an annual basis. (h) Exact data elements required will vary depending on smelter technology (e.g., point-feed prebake or Søderberg).
G—Ammonia Manufacturing (§98.70)	All in	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) Annual CO2 emissions from ammonia manufacturing process (metric tons); (b) Total quantity of feedstock consumed for ammonia manufacturing; and (c) Monthly analyses of carbon content for each feedstock used in ammonia manufacturing (kg carbon/kg of feedstock).

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
H—Cement Production (§98.80)	All in	Fuel combustion at kilns and any other Stationary combustion unit	See reporting requirements for stationary combustion
		Production	(a) The total combined CO2 emissions from all kilns at the facility (in metric tons). (b) Annual clinker production (tons). (c) Number of kilns. (d) Annual CKD production (in metric tons). (e) Total annual fraction of CKD recycled to the kilns (as a percentage). (f) Annual weighted average carbonate composition (by carbonate). (g) Annual weighted average fraction of calcination achieved (for each carbonate, percent). (h) Site-specific emission factor (metric tons CO2/metric ton clinker produced). (i) Organic carbon content of the raw material (percent). (j) Annual consumption of raw material (metric tons) (k) Facilities that use CEMS must also comply with the data reporting requirements specified in §98.36(d)(iv).
I—Electronics Manufacturing (§98.90)	Production capacity Semiconductors: 1,078 m2 silicon MEMs: 4,358 m2 silicon LCDs: 235,737 m2 LCD PVs: 728,014 m2 PV-Cell	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) Emissions of each GHG emitted from all plasma etching processes, all chamber cleaning, all chemical vapor deposition processes, and all heat transfer fluid use, respectively. (b) The method, mass of input F-GHG gases, and emission factors used for estimating F-GHG emissions. (c) Production in terms of substrate surface area (e.g., silicon, PV-cell, LCD). (d) Factors used for gas process utilization and by-product formation, and the source and uncertainty for each factor. (e) The verified DRE and its uncertainty for each abatement device used, if you have verified the DRE pursuant to §98.94(c). (f) Fraction of each gas fed into each process type with abatement devices. (g) Description of abatement devices, including the number of devices of each manufacturer and model. (h) For heat transfer fluid emissions, inputs in the mass-balance equation. (i) Example calculations for F-GHG, N2O, and heat transfer fluid emissions. (j) Estimate of the overall uncertainty in the emissions estimate.
J—Ethanol Production (§98.100)	25,000 metric tons C02e/year	Onsite stationary combustion	See reporting requirements for stationary combustion
		Onsite landfills	See reporting requirements for landfills
		Onsite wastewater treatment	See reporting requirements for wastewater treatment

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
K—Ferroalloy Production (§98.110)	25,000 metric tons C02e/year	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) Annual CO2 emissions from each electric arc furnace used for ferroalloy production, in metric tons and the method used to estimate these emissions. (b) Annual CH4 emissions from each electric arc furnaces used for the production of any ferroalloy listed in Table K-1 of this subpart. (c) Facility ferroalloy product production capacity (metric tons). (d) Annual facility production quantity for each ferroalloy product (metric tons). (d) Number of facility operating hours in calendar year. (f) If you use the carbon balance procedure, report for each carbon-containing input and output material consumed or used (other than fuel), the information specified in paragraphs (g)(1)and (2) of this section. (1) Annual material quantity (in metric tons). (2) Annual average of the monthly carbon content determinations for each material and the method used for the determination (e.g., supplier provided information, analyses of representative samples you collected).

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
L—Fluorinated Greenhouse Gas Production (§98.120)	25,000 metric tons C02e/year	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) For each production process at the facility, report: (1) Total mass of fluorinated GHG produced in metric tons, by chemical; (2) Total mass of reactant fed into the production process in metric tons, by chemical; (3) Total mass of each reactant permanently removed from production process in metric tons, by chemical; (4) Total mass of fluorinated GHG product removed from production process and destroyed, (5) Mass of each by-product generated; (6) Mass of each by-product destroyed at the facility; (7) Mass of each by-product recaptured and sent off-site for destruction; (8) Mass of each by-product recaptured for other purposes; (9) Mass of each fluorinated GHG emitted. (b) Where missing data have been estimated pursuant to §98.125, report: (1) Reason the data were missing, length of time the data were missing, method used to estimate the missing data, & estimates of those data. (2) Where the missing data have been estimated pursuant to §98.125(a)(3), report the rationale for the methods used to estimate the missing data & why the methods specified in §98.125(a)(1) and (a)(2) would lead to a significant under- or overestimate of the parameter(s). (c) For each fluorinated GHG production facility that destroys fluorinated GHGs, report results of annual fluorinated GHG conc. measurements at outlet of destruction device, including: (1) Flow rate of fluorinated GHG being fed into destruction device in kg/hr. (2) Concentration (mass fraction) of fluorinated GHG at outlet of destruction device. (3) Flow rate at outlet of destruction device in kg/hr. (4) Emission rate calculated from paragraphs(c)(2)&(c)(3) of this section in kg/hr. (d) A fluorinated GHG production facility that destroys fluorinated GHGs shall submit a one-time report containing the following information: (1) Destruction efficiency (DE) of each destruction unit. (2) Test methods used to determine the destruction efficiency. (3) Methods used to record the mass of fluorinated GHG destroyed. (4) Chemical identity of fluor. GHG(s) used in performance test conducted to determine DE. (5) Name of all applicable federal or state regs that may apply to destruction process. (6) If any process changes affect unit destruction efficiency or methods used to record mass of fluorinated GHG destroyed, a revised report must be submitted to reflect the changes. The revised report must be submitted to EPA within 60 days of the change.
M—Food Processing (§98.130)	25,000 metric tons C02e/year	Onsite stationary combustion	See reporting requirements for stationary combustion
		Onsite landfills	See reporting requirements for landfills
		Onsite wastewater treatment	See reporting requirements for wastewater treatment

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
N—Glass Production (§98.140)	25,000 metric tons C02e/year	Stationary combustion	See reporting requirements for stationary combustion
		Production	For each continuous glass melting furnace, retain: (a) Annual process emissions of CO2, in metric tons/yr. (b) Annual quantity of each carbonate-based raw material charged, in metric tons/yr. (c) Annual quantity of glass produced, in metric tons/yr. (d) If process CO2 emissions are calculated based on data provided by the raw material supplier according to §98.143(a)(1), the carbonate-based mineral mass fraction (as percent) for each carbonate-based raw material charged to a continuous glass melting furnace.
O—HCFC-22 Production and HFC-23 Destruction (§98.150)	All in	Stationary combustion	See reporting requirements for stationary combustion.
		Production facilities	(a) For each HCFC-22 production facility, report: (1) The mass of HCFC-22 produced in metric tons. (2) The mass of reactants fed into the process in metric tons of reactant. (3) The mass (in metric tons) of materials other than HCFC-22 and HFC-23 (i.e., unreacted reactants, HCl and other by-products) that occur in more than trace concentrations and that are permanently removed from the process. (4) The method for tracking startups, shutdowns, and malfunctions and HFC-23 generation/emissions during these events. (5) The names and addresses of facilities to which any HFC-23 was sent for destruction, and the quantities of HFC-23 (metric tons) sent to each. (6) The total mass of the HFC-23 generated in metric tons. (7) The mass of any HFC-23 packaged for sale in metric tons. (8) The mass of any HFC-23 sent off site for destruction in metric tons. (9) The mass of HFC-23 emitted in metric tons. (10) The mass of HFC-23 emitted from equipment leaks in metric tons. (11) The mass of HFC-23 emitted from process vents in metric tons. (b) Where missing data have been estimated pursuant to §98.155, the designated representative of the HCFC-22 production facility or HCF-23 destruction facility shall report the reason the data were missing, the length of time the data were missing, the method used to estimate the missing data, and the estimates of those data. (1) Where the missing data have been estimated pursuant to §98.155(a)(3), the designated representative shall also report the rationale for the methods used to estimate the missing data and why the methods specified in §98.155(a)(1) and (2) would probably lead to a significant under- or overestimate of the parameter(s).

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
O—HCFC-22 Production and HFC-23 Destruction (§98.150) (Cont.)	(1) If HFC-23 destruction facility is also an HCFC-22 production facility: all in (2) If HFC-23 destruction facility is not also an HCFC-22 prodcution facility: 25,000 metric tons C02e/year	HFC-23 destruction facilities	Report the following: (1) The mass of HFC-23 fed into the thermal oxidizer. (2) The mass of HFC-23 destroyed. (3) The mass of HFC-23 emitted from the thermal oxidizer. Report the results of the facility's annual HFC-23 concentration measurements at the outlet of the destruction device, including: (1) The flow rate of HFC-23 being fed into the destruction device in kg/hr, (2) The concentration (mass fraction) of HFC-23 at the outlet of the destruction device, (3) The flow rate at the outlet of the destruction device in kg/hr, and (4) The emission rate calculated from (c)(2) and (3) in kg/hr. Destruction facility shall also submit a one-time report including: (1) The destruction unit's destruction efficiency (DE), (2) The methods used to determine the unit's destruction efficiency, (3) The methods used to record the mass of HFC-23 destroyed, (4) The name of other relevant federal or state regulations that may apply to the destruction process, and (5) If any changes are made that affect HFC-23 destruction efficiency or the methods used to record volume destroyed, then these changes must be reflected in a revision to this report. The revised report must be submitted to EPA within 60 days of the change.
P—Hydrogen Production (§98.160)	25,000 metric tons C02e/year	Stationary combustion	See reporting requirements for stationary combustion
		Production	For each process unit, report: (a) Facilities that use CEMS must comply with the procedures specified in §98.36(a)(1)(iv). (b) Annual total consumption of feedstock for hydrogen production; annual total of hydrogen produced; and annual total of ammonia produced, if applicable. (c) Monthly analyses of carbon content for each feedstock used in hydrogen production (kg carbon/kg of feedstock).

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
Q—Iron & Steel Production (§98.170)	25,000 metric tons C02e/year	Stationary combustion	See reporting requirements for stationary combustion
		Production	Report the following information for coke pushing and for each taconite indurating furnace; basic oxygen furnace; non-recovery coke oven battery; sinter process; EAF; argon-oxygen decarburization vessel; and direct reduction furnace, as applicable: (a) Annual CO2 emissions by calendar quarters; (b) Annual total for all process inputs and outputs when the carbon balance is used for specific processes by calendar quarters (short tons); (c) Annual production quantity (in metric tons) for taconite pellets, coke, sinter, iron, and raw steel by calendar quarters; (d) Production capacity (in tons per year) for the production of taconite pellets, coke, sinter, iron, and raw steel; (e) Annual operating hours for taconite furnaces, coke oven batteries, sinter production, blast furnaces, direct reduced iron furnaces, and electric arc furnaces; and (f) Site-specific emission factor for all process units for which the site-specific emission factor approach is used. (g) Facilities using CEMs must follow reporting requirements in §98.36(d)(iv)
R—Lead Production (§98.180)	25,000 metric tons C02e/year	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) Total annual CO2 emissions from each smelting furnace operated at your facility for lead production (metric tons and the method used to estimate emissions). (b) Facility lead product production capacity (metric tons). (c) Annual facility production quantity (metric tons). (d) Number of facility operating hours in calendar year. (e) For each carbon-containing input material consumed or used (other than fuel), report: (1) Annual material quantity (in metric tons); and (2) Annual weighted average carbon content determined for material and the method used for the determination (e.g., supplier provided information, analyses of representative samples you collected).
S—Lime Manufacturing (§98.190)	All in	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) For each lime kiln, record: (1) Annual CO2 process emissions; (2) Annual lime production (in metric tons); (3) Annual lime production capacity (in metric tons) per facility; (4) All monthly emission factors, and; (5) Number of operating hours in calendar year (b) Facilities that use CEMS must also comply with the recordkeeping requirements specified in §98.37.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
T—Magnesium Production (§98.200)	25,000 metric tons C02e/year	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) Total GHG emissions for your facility by gas in metric tons and CO2e; (b) Type of production process (e.g., primary, secondary, die casting); (c) Magnesium production amount in metric tons for each process type; (d) Cover gas flow rate and composition; (e) Amount of CO2 used as a carrier gas during the reporting period; (f) For any missing data, you must report the length of time the data were missing, the method used to estimate emissions in their absence, and the quantity of emissions thereby estimated; (g) The facility's cover gas usage rate; and (h) If applicable, an explanation of any change greater than 30 percent in the facility's cover gas usage rate (e.g., installation of new melt protection technology or leak discovered in the cover gas delivery system that resulted in increased consumption). (i) A description of any new melt protection technologies adopted to account for reduced GHG emissions in any given year.
U—Misc. Uses of Carbonate (§ 98.210)		Production	(a) Annual CO2 emissions from miscellaneous carbonate use (in metric tons); (b) Annual carbonate consumption (by carbonate type in tons); (c) Annual fraction calcinations ; and (d) Average annual mass fraction of carbonate-based mineral in carbonate-based raw material by carbonate type.
V—Nitric Acid Production (§98.220)	All in	Stationary combustion	See reporting requirements for stationary combustion
		Production	For each nitric acid production line, report annual N2O process emissions and (a) Annual nitric acid production capacity (metric tons); (b) Annual nitric acid production (metric tons); (c) Number of operating hours in the calendar year (hours); (d) Emission factor(s) used (lb N2O/ton of nitric acid produced); (e) Type of nitric acid process used; (f) Abatement technology used (if applicable); (g) Abatement utilization factor (percent of time that abatement system is operating); and (h) Abatement technology efficiency.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
W—Oil & Natural Gas Systems (§98.230)	25,000 metric tons C02e/year	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) Annual emissions reported separately for each of the operations listed in (a)(1) through (6) of this paragraph. Within each operation, emissions from each source type must be reported in the aggregate. For example, an underground natural gas storage facility with multiple reciprocating compressors must report emissions from all reciprocating compressors as an aggregate number. (1) Offshore petroleum and natural gas production facilities. (2) Onshore natural gas processing facilities. (3) Onshore natural gas transmission compression facilities. (4) Underground natural gas storage facilities. (5) Liquefied natural gas storage facilities. (6) Liquefied natural gas import and export facilities. (b) Emissions reported separately for standby equipment. (c) Emissions calculated for these sources shall assume no CO2 capture and transfer offsite. (d) Activity data for each aggregated source type level for which emissions are being reported. (e) Engineering estimate of total component count. (f) Total number of compressors and average operating hours per year for compressors for each operation listed in paragraphs (a)(1) through (6) of this section. (g) Minimum, maximum and average throughput for each operation listed in paragraphs (a)(1) through (6) of this section. (h) Specification of the type of any control device used, including flares, for any source type listed in 98.232(a). (i) For offshore petroleum and natural gas production facilities, the number of connected wells, and whether they are producing oil, gas, or both. (j) Detection and measurement instruments used.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
X—Petrochemical Production (§98.240)	All in	Stationary combustion	See reporting requirements for stationary combustion
		Onsite wastewater treatment	See reporting requirements for onsite wastewater treatment
		Production	(a) Facilities using the mass balance methodology in §98.243(a)(2) must report the information specified in paragraphs (a)(1) through (9) of this section for each type of petrochemical produced, reported by process unit. (1) Identification of the petrochemical process. (2) Annual CO2 emissions calculated using Equation X-4 of this subpart. (3) Methods used to determine feedstock and product flows and carbon contents. (4) Number of actual and substitute data points for each measured parameter. (5) Annual quantity of each feedstock consumed. (6) Annual quantity of each product and byproduct produced, including all products from integrated processes that are part of the petrochemical production source category. (7) Each carbon content measurement for each feedstock, product, and byproduct. (8) All calculations, measurements, equipment calibrations, certifications, and other information used to assess the uncertainty in emission estimates and the underlying volumetric flow rates, mass flow rates, and carbon contents of feedstocks and products. (9) Identification of any combustion units that burned process off-gas. (b) Each facility that uses CEMS to determine emissions from process vents must report the verification data specified in §98.36(d)(1)(iv).

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
Y—Petroleum Refineries (§98.250)	All in	Stationary combustion	See reporting requirements for stationary combustion
		Non-merchant hydrogen production	See reporting requirements for hydrogen production
		Onsite landfills	See reporting requirements for landfills
		Onsite wastewater treatment	See reporting requirements for onsite wastewater treatment
		Catalytic cracking units, traditional fluid coking units, catalytic reforming units, sulfur recovery plants, sour gas sent off-site for sulfur recovery operations, on-site sulfur recovery plants, and coke calcining units	(1) The unit ID number (if applicable); (2) A description of the type of unit (fluid catalytic cracking unit, thermal catalytic cracking unit, traditional fluid coking unit, catalytic reforming unit, sulfur recovery plant, or coke calcining unit); (3) Maximum rated throughput of the unit, in bbl/stream day, metric tons sulfur produced/stream day, or metric tons coke calcined/stream day, as applicable; (4) The calculated CO2, CH4, and N2O annual emissions for each unit, expressed in metric tons of each pollutant emitted; and (5) A description of the method used to calculate the CO2 emissions for each unit (e.g., reference section and equation number).
		Fluid coking units of the flexicoking type	(1) The unit ID number (if applicable); (2) A description of the type of unit; (3) Maximum rated throughput of the unit, in bbl/stream day; (4) Indicate whether the GHG emissions from the low heat value gas are accounted for in subpart C of this part or §98.253(c); and (5) If the GHG emissions for the low heat value gas are calculated at the flexicoking unit, also report the calculated annual CO2, CH4, and N2O emissions for each unit, expressed in metric tons of each pollutant emitted.
		Asphalt blowing operations	(1) The unit ID number (if applicable); (2) The quantity of asphalt blown; (3) The type of control device used to reduce methane (and other organic) emissions from the unit; and (4) The calculated annual CO2, CH4, and N2O emissions for each unit, expressed in metric tons of each pollutant emitted.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
Y—Petroleum Refineries (§98.250) (Cont.)	All in	All other process vents subject to §98.253(j)	(1) The vent ID number (if applicable); (2) The unit or operation associated with the emissions; (3) The type of control device used to reduce methane (and other organic) emissions from the unit, if applicable; and (4) The calculated annual CO2, CH4, and N2O emissions for each unit, expressed in metric tons of each pollutant emitted.
		Equipment leaks, storage tanks, uncontrolled blowdown systems, delayed coking units, and loading operations	(1) The total quantity (in million bbl) of crude oil plus the quantity of intermediate products received from off-site that are processed at the facility in the reporting year. (2) The method used to calculate equipment leak emissions and the calculated, cumulative CH4 emissions (in metric tons of each pollutant emitted) for all equipment leak sources; (3) The cumulative annual CH4 emissions (in metric tons of each pollutant emitted) for all storage tanks, except for those used to process unstabilized crude oil; (4) The quantity of unstabilized crude oil received during the calendar year and the cumulative CH4 emissions (in metric tons of each pollutant emitted) for storage tanks used to process unstabilized crude oil; (5) The cumulative annual CH4 emissions (in metric tons of each pollutant emitted) for uncontrolled blowdown systems. (6) The total number of delayed coking units at the facility, the number of delayed coking drums per unit, the dimensions and annual number of coke-cutting cycles for each drum, and the cumulative annual CH4 emissions (in metric tons of each pollutant emitted) for delayed coking units. (7) The quantity and types of materials loaded that have an equilibrium vapor-phase concentration of methane of 0.5 volume percent or greater, and the type of vessels in which the material is loaded. (8) The type of control system used to reduce emissions from the loading of material with an equilibrium vapor-phase concentration of methane of 0.5 volume percent or greater, if any. (9) The cumulative annual CH4 emissions (in metric tons of each pollutant emitted) for loading operations.
		Overall Facility	If you have a CEMS that measures CO2 emissions but that is not required to be used for reporting GHG emissions under this subpart (i.e., a CO2 CEMS on a process heater stack but the combustion emissions are calculated based on the fuel gas consumption), you must identify the emission source that has the CEMS and report the CO2 emissions as measured by the CEMS for that emissions source.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
Z—Phosphoric Acid Production (§98.260)	All in	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) Annual phosphoric acid production by origin of the phosphate rock (in metric tons); (b) Annual phosphoric acid production by concentration of phosphoric acid produced (metric tons). (c) Annual phosphoric acid production capacity; (d) Annual arithmetic average percent inorganic carbon in phosphate rock from batch records; (e) Annual average phosphate rock consumption from monthly measurement records (in metric tons).
AA—Pulp and Paper Manufacturing (§98.270)	25,000 metric tons C02e/year	Stationary combustion	See reporting requirements for stationary combustion
		Onsite landfills	See reporting requirements for landfills
		Onsite wastewater treatment	See reporting requirements for onsite wastewater treatment
		Production	(a) Annual emissions of CO2, biogenic CO2, CH4, and N2O presented by calendar quarter; (b) Total consumption of all biomass fuels by calendar quarter; (c) Total annual quantity of spent liquor solids fired at the facility by calendar quarter; (d) Total annual steam purchases; and (e) Total annual quantities of makeup chemicals (carbonates) used.
BB—Silicon Carbide Production (§98.280)	All in	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) Annual CO2 and CH4 emissions from all silicon carbide production processes combined (in metric tons); (b) Annual production of silicon carbide (in metric tons); (c) Annual capacity of silicon carbide production (in metric tons); (d) Annual operating hours; and (e) Quarterly facility-specific emission factors.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
CC—Soda Ash Manufacturing (§98.290)	All in	Fuel combustion at each kiln and from each stationary combustion unit	See reporting requirements for stationary combustion
		For each soda ash manufacturing line	(a) Annual CO2 process emissions (metric tons); (b) Number of soda ash manufacturing lines; (c) Annual soda ash production (metric tons) and annual soda ash production capacity; (d) Annual consumption of trona from monthly measurements (metric tons); (e) Fractional purity (i.e., inorganic carbon content) of trona or soda ash (by daily measurements and by monthly average) depending on the components used in Equation CC-2 or CC-3 of this subpart); and (f) Number of operating hours in calendar year.
DD—Sulfur Hexafluoride (SF6) from Electrical Equipment (§98.300)	17,820 lbs (7,838 kg) (Total nameplate capacity of SF6 and PFC containing equipment in the system)	Electric power system	Report the following information for each electric power system, by chemical: (a) Nameplate capacity of equipment containing SF6 and nameplate capacity of equipment containing each PFC: (1) Existing as of the beginning of the year. (2) New during the year. (3) Retired during the year. (b) Transmission miles (length of lines carrying voltages at or above 34.5 kV). (c) SF6 and PFC sales and purchases. (d) SF6 and PFC sent off site for destruction. (e) SF6 and PFC sent off site to be recycled. (f) SF6 and PFC returned from off site after recycling. (g) SF6 and PFC stored in containers at the beginning and end of the year. (h) SF6 and PFC with or inside new equipment purchased in the year. (i) SF6 and PFC with or inside equipment sold to other entities. (j) SF6 and PFC returned to suppliers.
EE—Titanium Dioxide Production (§98.310)	All in	Stationary combustion	See reporting requirements for stationary combustion
		Production	For each titanium dioxide production line: (a) Annual CO2 emissions (metric tons); (b) Annual consumption of calcined petroleum coke (metric tons); (c) Annual production of titanium dioxide (metric tons); (e) Annual production capacity of titanium dioxide (metric tons); and (f) Annual operating hours for each titanium dioxide process line.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
FF—Underground Coal Mines (§98.320)	All active underground coal mines for which CH4 from the ventilation system is sampled quarterly by MSHA (or on a more frequent basis)	Stationary combustion	See reporting requirements for stationary combustion
		Production	(a) Quarterly volumetric flow rate measurement results for all ventilation systems, including date and location of measurement. (b) Quarterly CH4 concentration measurement results for all ventilation systems, including date and location of measurement. (c) Quarterly CEMS volumetric flow data used to calculate CH4 liberated from degasification systems (summed from daily data). (d) Quarterly CEMS CH4 concentration data used to calculate CH4 liberated from degasification systems (average from daily data). (e) Quarterly CH4 destruction at ventilation and degasification systems. (f) Dates in reporting period where active ventilation of mining operations is taking place. (g) Dates in reporting period when continuous monitoring equipment is not properly functioning. (h) Quarterly averages of temperatures and pressures at the time and at the conditions for which all measurements are made. (i) Quarterly CH4 liberated from each ventilation well or shaft, and from each degasification system (this includes degasification systems deployed before, during, or after mining operations are conducted in a mine area). (j) Quarterly CH4 emissions (net) from each ventilation well or shaft, and from each degasification system (this includes degasification systems deployed before, during, or after mining operations are conducted in a mine area). (k) Quarterly CO2 emissions from onsite destruction of coal mine gas CH4, where the gas is not a fuel input for energy generation or use.
GG—Zinc Production (§98.330)	25,000 metric tons C02e/year	Stationary combustion	See reporting requirements for stationary combustion
		Production	For each Waelz kiln or electrothermic furnace: (a) Annual CO2 emissions in metric tons, and the method used to estimate emissions. (b) Annual zinc product production capacity (in metric tons). (c) Total number of Waelz kilns and electrothermic furnaces at the facility. (d) Number of facility operating hours in calendar year. (e) If you use the carbon input procedure, report for each carbon-containing input material consumed or used (other than fuel) report: (1) Annual material quantity (in metric tons); and (2) Annual average of the monthly carbon content determinations for each material and the method used for the determination (e.g., supplier provided information, analyses of representative samples you collected).

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
HH—Landfills (§98.340)	25,000 metric tons C02e/year of generation	Stationary combustion	See reporting requirements for stationary combustion
		Production (As required by related source methodology)	(a) Waste disposal for each year of landfilling. (b) Method for estimating waste disposal. (c) Waste composition, if available, in percentage categorized as (1) municipal, (2) construction and demolition, (3) biosolids or biological sludges, (4) industrial, inorganic, (5) industrial, organic, (6) other, or more refined categories, such as those for which k rates are available in Table HH-1 of this subpart. (d) Method for estimating waste composition. (e) Fraction of CH4 in landfill gas based on measured values if the landfill has a gas collection system or a default. (f) Oxidation fraction used in the calculations. (g) Degradable organic carbon (DOC) used in the calculations. (h) Decay rate (k) used in the calculations. (i) Fraction of DOC dissimilated used in the calculations.(j) Methane correction factor used in the calculations. (k) Annual methane generation and methane emissions (metric tons/year) according to the methodologies in §98.343(c)(1) through (3). Landfills with gas collection system must separately report methane generation and emissions according to the methodologies in §98.343(c)(3)(i) and (ii) and indicate which values are calculated using the methodologies in §98.343(c)(ii). (l) Landfill design capacity. (m) Estimated year of landfill closure. (n) Total volumetric flow of landfill gas for landfills with gas collection systems. (o) CH4 concentration of landfill gas for landfills with gas collection systems. (p) Monthly average temperature at which flow is measured for landfills with gas collection systems. (q) Monthly average pressure at which flow is measured for landfills with gas collection systems. (r) Destruction efficiency used for landfills with gas collection systems. (s) Methane destruction for landfills with gas collection systems (total annual, metric tons/year). (t) Estimated gas collection system efficiency for landfills with gas collection systems. (u) Methodology for estimating gas collection system efficiency for landfills with gas collection systems. (v) Cover system description. (w) Number of wells in gas collection system. (x) Acreage and quantity of waste covered by intermediate cap. (y) Acreage and quantity of waste covered by final cap. (z) Total CH4 generation from landfills. (aa) Total CH4 emissions from landfills.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
II—Wastewater (§98.350)	N/A	Stationary combustion	See reporting requirements for stationary combustion
		Production (As required by related source methodology)	(a) Type of wastewater treatment system. (b) Percent of wastewater treated at each system component. (c) COD. (d) Influent flow rate. (e) B_0. (f) MCF. (g) Methane emissions. (h) Type of oil/water separator (petroleum refineries). (i) Emissions factor for the type of separator (petroleum refineries). (j) Carbon fraction in NMVOC (petroleum refineries). (k) CO2 emissions (petroleum refineries). (l) Total volumetric flow of digester gas (facilities with anaerobic digesters). (m) CH4 concentration of digester gas (facilities with anaerobic digesters). (n) Temperature at which flow is measured (facilities with anaerobic digesters). (o) Pressure at which flow is measured (facilities with anaerobic digesters). (p) Destruction efficiency used (facilities with anaerobic digesters). (q) Methane destruction (facilities with anaerobic digesters). (r) Fugitive methane (facilities with anaerobic digesters).

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
JJ—Manure Management (§98.360)	25,000 metric tons C02e/year of generation	Stationary combustion	See reporting requirements for stationary combustion
		Production (As required by related source methodology)	For each management system component, report the following: (a) Type(s) of manure management system. (b) Animal population (by animal type). (c) Monthly total volatile solids content of excreted manure. (d) Percent of manure handled in each manure management system component. (e) B_0 value used. (f) Methane conversion factor used. (g) Average animal mass (for each type of animal). (h) Monthly nitrogen content of excreted manure. (i) N2O emission factor selected. (j) CH4 emissions. (k) N2O emissions. (l) Total annual volumetric biogas flow (for systems with digesters). (m) Average annual CH4 concentration (for systems with digesters). (n) Temperature at which gas flow is measured (for systems with digesters). (o) Pressure at which gas flow is measured (for systems with digesters). (p) Destruction efficiency used (for systems with digesters). (q) Methane destruction (for systems with digesters). (r) Methane generation from the digesters.
KK—Suppliers of Coal (§98.370)	All in	Coal mine owner or operator	For each coal mine: (1) The name and MSHA ID number of the mine. (2) The name of the operating company. (3) Annual CO2 emissions. (4) By rank, the total annual quantity in tons of coal produced. (5) The annual weighted carbon content of the coal as calculated according to §98.373. (6) If Method 1 was used to determine CO2 mass emissions, you must report daily mass fraction of carbon in coal measured by ultimate analysis and daily amount of coal supplied. (7) If Method 2 was used to determine CO2 mass emissions, you must report: (i) All of the data used to construct the carbon vs. Btu/lb correlation graph; (ii) Slope of the correlation line; and (iii) The R-squared (R^2) value of the correlation. (8) If Method 3 was used to determine CO2 mass emissions, you must report daily GCV of coal measured by proximate analysis and daily amount of coal supplied.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
KK—Suppliers of Coal (§98.370) (Cont.)	All in	Coal importers	Report the following information at the corporate level: (1) The total annual quantity in tons of coal imported into the U.S. by the importer, by rank, and country of origin. (2) Annual CO2 emissions. (3) The annual weighted carbon content of the coal as calculated according to §98.373. (4) If Method 1 was used to determine CO2 mass emissions, you must report mass fraction of carbon in coal per shipment measured by ultimate analysis and amount of coal supplied per shipment. (5) If Method 2 was used to determine CO2 mass emissions, you must report: (i) All of the data used to construct the carbon vs. Btu/lb correlation graph; (ii) Slope of the correlation line; and (iii) The R-squared (R2) value of the correlation. (6) If Method 3 was used to determine CO2 mass emissions, you must report GCV in coal per shipment measured by proximate analysis and amount of coal supplied per shipment.
		Coal exporters	Report the following information at the corporate level: (1) The total annual quantity in tons of coal exported from the U.S. by rank and by coal producing company and mine. (2) Annual CO2 emissions. (3) The annual weighted carbon content of the coal as calculated according to §98.373. (4) If Method 1 was used to determine CO2 mass emissions, you must report mass fraction of carbon in coal per shipment measured by ultimate analysis and amount of coal supplied per shipment. (5) If Method 2 was used to determine CO2 mass emissions, you must report: (i) All of the data used to construct the carbon vs. Btu/lb correlation graph; (ii) Slope of the correlation line; and (iii) The R-sqaured (R^2) value of the correlation. (6) If Method 3 was used to determine CO2 mass emissions, you must report GCV in coal per shipment measured by proximate analysis and amount of coal supplied per shipment.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
KK—Suppliers of Coal (§98.370) (Cont.)	All in	Waste coal reclaimers	Report the following information for each reclamation facility: (1) By rank, the total annual quantity in tons of waste coal produced. (2) Mine and state of origin if waste coal is reclaimed from mines that are no longer operating. (3) Annual CO2 emissions. (4) The annual weighted carbon content of the coal as calculated according to §98.373. (5) If Method 1 was used to determine CO2 mass emissions, you must report mass fraction of carbon in coal per shipment measured by ultimate analysis and amount of coal supplied per shipment. (6) If Method 2 was used to determine CO2 mass emissions, you must report: (i) All of the data used to construct the carbon vs. Btu/lb correlation graph; (ii) Slope of the correlation line; and (iii) The R-squared (R^2) value of the correlation. (7) If Method 3 was used to determine CO2 mass emissions, you must report GCV in coal per shipment measured by proximate analysis and amount of coal supplied per shipment.
LL—Suppliers of Coal-based Liquid Fuels (§98.380)	All in	Producers	(1) The total annual volume of each coal-based liquid supplied to the economy (in standard barrels). (2) The total annual CO2 emissions in metric tons associated with each coal-based liquid supplied to the economy, calculated according to §98.383(a).
		Importers	(1) The total annual volume of each imported coal-based liquid (in standard barrels). (2) The total annual CO2 emissions in metric tons associated with each imported coal-based liquid, calculated according to §98.383(a).
		Exporters	(1) The total annual volume of each exported coal-based liquid (in standard barrels). (2) The total annual CO2 emissions in metric tons associated with each exported coal-based liquid, calculated according to §98.383(a).

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
MM—Suppliers of Petroleum Products (§98.390)	All in	Refiners	(1) CO2 emissions in metric tons for each petroleum product and natural gas liquid (ex refinery gate), calculated according to §98.393(a) or (g). (2) CO2 emissions in metric tons for each petroleum product or natural gas liquid that enters the refinery annually as a feedstock to be further refined or otherwise used onsite, calculated according to §98.393(b) or (g). (3) CO2 emissions in metric tons from each type of biomass feedstock co-processed with petroleum feedstocks, calculated according to §98.393(c). (4) The total sum of CO2 emissions from all products, calculated according to §98.393(d). (5) The total volume of each petroleum product and natural gas liquid associated with the CO2 emissions reported in paragraphs (1) and (2), seperately, and the volume of the biomass-based component of each petroleum product reported in this paragraph that was produced by blending a petroleum-based product with a biomass-based product. If a determination cannot be made whether the material is a petroleum product or a natural gas liquid, it shall be reported as a petroleum product. (6) The total volume of any biomass co-processed with a petroleum product associated with the CO2 emissions reported in paragraph (3). (7) The measured density and/or mass carbon share for any petroleum product or natural gas liquid for which CO2 emissions were calculated using Calculation Methodology 2 of this subpart, along with the selected method from §98.394(c) and the calculated EF. (8) The total volume of each distillate fuel oil product or feedstock reported in paragraph (5) that contains less than 15 ppm sulfur content and is free from marker solvent yellow 124 and dye solvent red 164. (9) All of the following information for all crude oil feedstocks used at the refinery: (i) Batch volume (in standard barrels). (ii) API gravity of the batch. (iii) Sulfur content of the batch. (iv) Country of origin of the batch.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
MM—Suppliers of Petroleum Products (§98.390) (Cont.)	All in	Importers	Report the following information at the corporate level: (1) CO2 emissions in metric tons for each imported petroleum product and natural gas liquid, calculated according to §98.393(a). (2) Total sum of CO2 emissions, calculated according to §98.393(e). (3) The total volume of each imported petroleum product and natural gas liquid associated with the CO2 emissions reported in paragraph (1) of this section as well as the volume of the biomass-based component of each petroleum product reported in this paragraph that was produced by blending a petroleum-based product with a biomass-based product. If you cannot determine whether the material is a petroleum product or a natural gas liquid, you shall report it as a petroleum product. (4) The measured density and/or mass carbon share for any imported petroleum product or natural gas liquid for which CO2 emissions were calculated using Calculation Methodology 2 of this subpart, along with the selected method from §98.394(c) and the calculated EF. (5) The total volume of each distillate fuel oil product reported in paragraph (1) of this section that co dye solvent red 164.
		Exporters	Report the following information at the corporate level: (1) CO2 emissions in metric tons for each exported petroleum product and natural gas liquid, calculated according to §98.393(a). (2) Total sum of CO2 emissions, calculated according to §98.393(e). (3) The total volume of each exported petroleum product and natural gas liquid associated with the CO2 emissions reported in paragraph (1) of this section as well as the volume of the biomass-based component of each petroleum product reported in this paragraph that was produced by blending a petroleum-based product with a biomass-based product. If you cannot determine whether the material is a petroleum product or a natural gas liquid, you shall report it as a petroleum product. (4) The measured density and/or mass carbon share for any petroleum product or natural gas liquid for which CO2 emissions were calculated using Calculation Methodology 2 of this section, along with the selected method from §98.394(c) and the calculated EF. (5) The total volume of each distillate fuel oil product reported in paragraph (1) that contains less tha dye solvent red 164.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
NN—Suppliers of Natural Gas and Natural Gas Liquids (§98.400)	All in	Natural gas processing plants	(1) The total annual quantity in barrels of NGLs produced for sale or delivery on behalf of others in the following categories: propane, natural butane, ethane, and isobutane, and all other bulk NGLs as a single category; and (2) The total annual CO2 mass emissions associated with the volumes in paragraph (1) and calculated in accordance with §98.403.
		Local distribution companies	(1) The total annual volume in Mcf of natural gas received by the local distribution company for redelivery to end users on the local distribution company's distribution system. (2) The total annual CO2 mass emissions associated with the volumes in paragraph (1) and calculated in accordance with §98.403. (3) The total natural gas volumes received for redelivery to downstream gas transmission pipelines and other local distribution companies. (4) The name and EPA and EIA identification code of each individual covered facility, and the name and EIA identification code of any other end-user for which the local gas distribution company delivered greater than or equal to 460,000 Mcf during the calendar year, and the total natural gas volumes actually delivered to each of these end-users. (5) The annual volume in Mcf of natural gas delivered by the local distribution company to each of the following end-use categories. For definitions of these categories, refer to EIA Form 176 and Instructions. (i) residential consumers. (ii) commercial consumers. (iii) industrial consumers. (iv) electricity generating facilities. (6) The total annual CO2 mass emissions associated with the volumes in paragraph (5) and calculated in accordance with §98.403.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
OO—Suppliers of Industrial Greenhouse Gases (§98.410)	All in	Fluorinated GHG or nitrous oxide production facility	(1) Total mass in metric tons of each fluorinated GHG or nitrous oxide produced at that facility. (2) Total mass in metric tons of each fluorinated GHG or nitrous oxide transformed at that facility. (3) Total mass in metric tons of each fluorinated GHG destroyed at that facility. (4) Total mass in metric tons of any fluorinated GHG or nitrous oxide sent to another facility for transformation. (5) Total mass in metric tons of any fluorinated GHG sent to another facility for destruction. (6) Total mass in metric tons of each reactant fed into the production process. (7) Total mass in metric tons of each non-GHG reactant and by-product permanently removed from the process. (8) Mass of used product added back into the production process (e.g., for reclamation). (9) Names and addresses of facilities to which any nitrous oxide or fluorinated GHGs were sent for transformation, and the quantities (metric tons) of nitrous oxide and of each fluorinated GHG that were sent to each for transformation. (10) Names and addresses of facilities to which any fluorinated GHGs were sent for destruction, and the quantities (metric tons) of nitrous oxide and of each fluorinated GHG that were sent to each for destruction. (11) Where missing data have been estimated pursuant to §98.415, the reason the data were missing, the length of time the data were missing, the method used to estimate the missing data, and the estimates of those data. Where the missing data have been estimated pursuant to §98.415(a)(3), the report shall explain the rationale for the methods used to estimate the missing data and why the methods specified in §98.415(a)(1) and (a)(2) would lead to a significant under- or overestimate of the parameters.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
OO—Suppliers of Industrial Greenhouse Gases (§98.410) (Cont.)	25,000 metric tons C02e/year	Fluorinated GHG production facilities that destroy fluorinated GHGs	(a) Report the results of the annual fluorinated GHG concentration measurements at the outlet of the destruction device, including: (1) Flow rate of fluorinated GHG being fed into the destruction device in kg/hr. (2) Concentration (mass fraction) of fluorinated GHG at the outlet of the destruction device. (3) Flow rate at the outlet of the destruction device in kg/hr. (4) Emission rate calculated from (a)(2) and (a)(3) in kg/hr. (b) A fluorinated GHG production facility that destroys fluorinated GHGs shall submit a one-time report containing the following information: (1) Destruction efficiency (DE) of each destruction unit. (2) Test method used to determine the destruction efficiency. (3) Methods used to record the mass of fluorinated GHG destroyed. (4) Chemical identity of the fluorinated GHG(s) used in the performance test conducted to determine DE. (5) Name of all applicable federal or state regulations that may apply to the destruction process. (6) If any process changes affect unit destruction efficiency or the methods used to record mass of fluorinated GHG destroyed, then a revised report must be submitted to reflect the changes. The revised report must be submitted to EPA within 60 days of the change.
		Bulk importers of fluorinated GHGs or nitrous oxide	With the exception of transhipments and heels, bulk importers must submit an annual report that summarizes their imports at the corporate level. For each import report: (1) Total mass in metric tons of nitrous oxide and each fluorinated GHG imported in bulk. (2) Total mass in metric tons of nitrous oxide and each fluorinated GHG imported in bulk and sold or transferred to persons other than the importer for use in processes resulting in the transformation or destruction of the chemical. (3) Date on which the fluorinated GHGs or nitrous oxide were imported. (4) Port of entry through which the fluorinated GHGs or nitrous oxide passed. (5) Country from which the imported fluorinated GHGs or nitrous oxide were imported. (6) Commodity code of the fluorinated GHGs or nitrous oxide shipped. (7) Importer number for the shipment. (8) If applicable, the names and addresses of the persons and facilities to which the nitrous oxide or fluorinated GHGs were sold or transferred for transformation, and the quantities (metric tons) of nitrous oxide and of each fluorinated GHG that were sold or transferred to each facility for transforma (9) If applicable, the names and addresses of the persons and facilities to which the nitrous oxide or fl (metric tons) of nitrous oxide and of each fluorinated GHG that were sold or transferred to each facility for destruction.

Subpart	Reporting Threshold[1]	Source Category	Reporting and Verification
OO—Suppliers of Industrial Greenhouse Gases (§98.410) (Cont.)	25,000 metric tons C02e/year	Bulk exporter of fluorinated GHGs or N2O	With the exception of transhipments and heels, bulk exporters must submit an annual report that summarizes their imports at the corporate level. For each export report: (1) Total mass in metric tons of nitrous oxide and each fluorinated GHG exported in bulk. (2) Names and addresses of the exporter and the recipient of the exports; (3) Exporter's Employee Identification Number; (4) Quantity exported by chemical in metric tons of chemical; (5) Commodity code of the fluorinated GHGs and nitrous oxide shipped; (6) Date on which, and the port from which, fluorinated GHGs and nitrous oxide were exported from the United States or its territories; and (7) Country to which the fluorinated GHGs or nitrous oxide were exported.
PP—Suppliers of Carbon Dioxide (§98.420)	All in	Production	(a) Each facility with production process units or CO2 production wells must report the following information: (1) Total annual mass in metric tons and the weighted average composition of the CO2 stream captured, extracted, or transferred in either gas, liquid, or solid forms. (2) Annual quantities in metric tons transferred to the following end use applications by end-use, if known: (i) Food and beverage. (ii) Industrial and municipal water/wastewater treatment. (iii) Metal fabrication, including welding and cutting. (iv) Greenhouse uses for plant growth. (v) Fumigants (e.g., grain storage) and herbicides. (vi) Pulp and paper. (vii) Cleaning and solvent use. (viii) Fire fighting. (ix) Transportation and storage of explosives. (x) Enhanced oil and natural gas recovery. (xi) Long-term storage (sequestration). (xii) Research and development.
		Importers and exporters	(b) CO2 importers and exporters must report the information in paragraphs (a)(1) and (2) at the corporate level.

[1] Many facilities that would be affected by the proposed rule emit GHGs from multiple sources. The facility must assess every source category that could potentially apply to each when determining if a threshold has been exceeded. If the threshold is exceed for any source category, the facility must report emissions from all source categories, including those source categories that do not exceed the applicable threshold.

Table A-2 Recordkeepings Requirements

Subpart	Source Category	Recordkeeping (5 years unless otherwise noted)
C—General Stationary Fuel Combustion Sources (§ 98.30). See ICR section 4(b)(i).		
D—Electricity Generation (§98.40)	All facilities	See recordkeeping requirements for stationary combustion
E—Adipic Acid Production (§98.50)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Annual N2O emissions from adipic acid production in metric tons; (b) Annual adipic acid production capacity (in metric tons); (c) Annual adipic acid production, in units of metric tons of adipic acid produced; (d) Number of facility operating hours in calendar year; (e) Measurements, records and calculations used to determine the annual production rate; and (f) Emission rate factor used and supporting test or calculation information including the annual emission rate factor determination report specified in §98.54(c). This report must be available upon request.
F—Aluminum Production (§98.60)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Monthly aluminum production in metric tons. (b) Type of smelter technology used. (c) The following PFC-specific information on a monthly basis: (1) Perfluoromethane and perfluoroethane emissions from anode effects in each prebake and Søderberg electolysis cells. (2) Anode effect minutes per cell-day, anode effect frequency (AE/cell-day), anode effect duration (minutes) from each prebake and Søderberg eletolysis cells. (3) Smelter-specific slope coefficient and the last date when the smelter-specific-slope coefficient was measured. (d) Method used to measure the frequency and duration of anode effects. (e) The following CO2-specific information for prebake cells on an annual basis: (1) Total anode consumption. (2) Total CO2 emissions from the smelter. (f) The following CO2-specific information for Søderberg cells on an annual basis: (1) Total paste consumption. (2) Total CO2 emissions from the smelter. (g) Smelter-specific inputs to the CO2 process equations (e.g., levels of sulfur and ash) that were used in the calculation, on an annual basis. (h) Exact data elements required will vary depending on smelter technology (e.g., point-feed prebake or Søderberg).
G—Ammonia Manufacturing (§98.70)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Method used for determining quantity of feedstock used. (b) Monthly analyses of carbon content for each feedstock used in ammonia manufacturing.

Subpart	Source Category	Recordkeeping (5 years unless otherwise noted)
H—Cement Production (§98.80)	Fuel combustion at kilns and any other Stationary combustion unit	See recordkeeping requirements for stationary combustion
	Production	(a) Monthly carbonate consumption. (b) Monthly clinker production (tons). (c) Monthly CKD production (in metric tons). (d) Total annual fraction of CKD recycled to the kiln (as a percentage). (e) Monthly analysis of carbonate composition in clinker (by carbonate). (f) Monthly analysis of fraction of calcination achieved for CKD and each carbonate. (g) Monthly cement production. (h) Documentation of calculated site-specific clinker emission factor. (i) Facilities that use CEMS must also comply with the recordkeeping requirements specified in §98.37.
I—Electronics Manufacturing (§98.90)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Data used to estimate emissions including all spreadsheets and copies of calculations used to estimate emissions. (b) Documentation for the values used for GHG utilization rates and by-product emission factors, including documentation that these were measured using the the International SEMATECH Manufacturing Initiative's Guideline for Environmental Characterization of Semiconductor Process Equipment. (c) The date and results of the initial and any subsequent tests of emission control device DRE, including the following information: (1) Dated certification, by the technician who made the measurement, that the dilution factor was determined using the tracer method. (2) Dated certification, by the technician who made the measurement, that the DRE was calculated using the formula given in §98.94(c)(1)(iv). (3) Documentation of the measured flows, concentrations and calculations used to calculate DF, relative precision (ε), and DRE. (d) The date and results of the initial and any subsequent tests to determine process tool gas utilization and by-product formation factors
J—Ethanol Production (§98.100)	Onsite stationary combustion	See recordkeeping requirements for stationary combustion
	Onsite landfills	See recordkeeping requirements for landfills
	Onsite wastewater treatment	See recordkeeping requirements for wastewater treatment

Subpart	Source Category	Recordkeeping (5 years unless otherwise noted)
K—Ferroalloy Production (§98.110)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Monthly facility production quantity for each ferroalloy product (in metric tons). (b) Number of facility operating hours each month. (c) If you use the carbon balance procedure, record for each carbon-containing input and output material consumed or used (other than fuel), the information specified in paragraphs (c)(1) and (2) of this section. (1) Monthly material quantity (in metric tons); and (2) Monthly average carbon content determined for material and records of the supplier provided information or analyses used for the determination. (d) You must keep records that include a detailed explanation of how company records of measurements are used to estimate the carbon input input and output to each electric arc furnace. You also must document the procedures used to ensure the accuracy of the measurements of materials fed, charged, or placed in an affected unit including, but not limited to, calibration of weighing equipment and other measurement devices. The estimated accuracy of measurements made with these devices must also be recorded, and the technical basis for these estimates must be provided. (e) If you are required to calculate CH4 emissions for the electric arc furnace as specified in §98.113(c), you must maintain records of the total amount of each alloy product produced for the specified reporting period, and the appropriate alloy-product specific emission factor used to calculate CH4 emissions.
L—Fluorinated Greenhouse Gas Production (§98.120)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a)(1) Dated records of the data used to estimate the data reported under §§98.123 and 98.126 of this subpart, and (a)(2) Dated records documenting the initial and periodic calibration of the gas chromatographs, weigh scales, flowmeters, and volumetric and density measures used to measure the quantities reported under this subpart, including the industry standards or manufacturer directions used for calibration pursuant to §98.124(g) and (h). (b) In addition to the data required by paragraph (a) of this section, the designated representative of a fluorinated GHG production facility that destroys fluorinated GHGs shall keep records of test reports and other information documenting the facility's one-time destruction efficiency report and annual destruction device outlet reports in §98.126(c) and (d).
M—Food Processing (§98.130)	Onsite stationary combustion	See recordkeeping requirements for stationary combustion
	Onsite landfills	See recordkeeping requirements for landfills
	Onsite wastewater treatment	See recordkeeping requirements for wastewater treatment
N—Glass Production (§98.140)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Total number of continuous glass melting furnaces. (b) Monthly glass production rate for each continuous glass melting furnace. (c) Monthly amount of each carbonate-based raw material charged to each continuous glass melting furnace. (d) If process CO2 emissions are calculated using data provided by the raw material supplier, retain: (1) Data on carbonate-based mineral mass fractions provided by the raw material supplier. (2) Results of all tests used to verify the carbonate-based mineral mass fraction for each carbonate-based raw material charged to a continuous glass melting furnace. (e) All other documentation used to support the reported GHG emissions.

Subpart	Source Category	Recordkeeping (5 years unless otherwise noted)
O—HCFC-22 Production and HFC-23 Destruction (§98.150)	HCFC-22 Production Facility	(1) The data used to estimate HFC-23 emissions. (2) Records documenting the initial and periodic calibration of the gas chromatographs, weigh scales, volumetric and density measurements, and and flowmeters used to measure the quantities reported under this rule, including the industry standards or manufacturer directions used for calibration pursuant to §98.154 (o) and (p).
	HFC-23 Destruction Facility	(1) Records documenting their one-time and annual reports in §98.156(c), (d), and (e). (2) Records documenting the initial and periodic calibration of the gas chromatographs, weigh scales, volumetric and density measurements, and flowmeters used to measure the quantities reported under this subpart, including the industry standards or manufacturer directions used for calibration pursuant to §98.154(o) and (p).
P—Hydrogen Production (§98.160)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) For all CEMS, compliance with the CEMS recordkeeping requirements in §93.37. (b) Monthly analyses of carbon content for each feedstock used in hydrogen production.
Q—Iron & Steel Production (§98.170)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Annual CO2 emissions as measured or determined for each calendar quarter; (b) Monthly total for all process inputs and outputs for each calendar quarter when the carbon balance is used for specific processes; (c) Monthly analyses of carbon content for each calendar quarter when the carbon balance is used for specific processes; (d) Site-specific emission factor for all process units for which the site-specific emission factor approach is used; (e) Annual production quantity for taconite pellets, coke, sinter, iron, and raw steel with records for each calendar quarter; and (f) Facilities must keep records that include a detailed explanation of how company records or measurements are used to determine all sources of carbon input and output and the metric tons of coal charged to the coke ovens (e.g., weigh belts, a combination of measuring volume and bulk density). The owner or operator also must document the procedures used to ensure the accuracy of the measurements of fuel usage including, but not limited to, calibration of weighing equipment, fuel flow meters, coal usage including, but not limited to, calibration of weighing equipment and other measurement devices. The estimated accuracy of measurements made with these devices must also be recorded, and the technical basis for these estimates must be provided.
R—Lead Production (§98.180)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Monthly facility production quantity for each lead product (in metric tons). (b) Number of facility operating hours each month. (c) For each carbon-containing input material consumed or used (other than fuel) record: (1) Monthly material quantity (in metric tons); and (2) Monthly average carbon content determined for material and records of the supplier provided information or analyses used for the determination. (d) You must keep records that include a detailed explanation of how company records of measurements are used to estimate the carbon input to each smelting furnace. You also must document the procedures used to ensure the accuracy of the measurements of materials fed, charged, or placed in an affected unit including, but not limited to, calibration of weighing equipment and other measurement devices. The estimated accuracy of measurements made with these devices must also be recorded, and the technical basis for these estimates must be provided.

Subpart	Source Category	Recordkeeping (5 years unless otherwise noted)
S—Lime Manufacturing (§98.190)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	For each lime kiln: (1) Annual calcined by-products/waste products (by lime type summed from monthly data. (2) Lime production (by lime type) per month (metric tons). (3) Calculation of emission factors. (4) Results of chemical composition analysis (by lime product) per month. (5) Monthly correction factors for by-products/waste products for each kiln.
T—Magnesium Production (§98.200)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Check-out and weigh-in sheets and procedures for cylinders; (b) Accuracy certifications and calibration records for scales; (c) Residual gas amounts in cylinders sent back to suppliers; and (d) Invoices for gas purchases and sales.
U—Misc. Uses of Carbonate (§98.210)	Production	(a) Records of monthly carbonate consumption (by carbonate type). You must also document the procedures used to ensure the accuracy of monthly carbonate consumption. (b) Annual chemical analysis of mass fraction of carbonate-based mineral in carbonate-based raw material by carbonate type. (c) You must keep a record of all carbonate purchases and deliveries.
V—Nitric Acid Production (§98.220)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	For each nitric acid production line: (a) Records of significant changes to process; (b) Annual test reports of N2O emissions; and (c) Calculations of the site-specific emissions factor.
W—Oil & Natural Gas Systems (§98.230)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Dates on which measurements were conducted. (b) Results of all emissions detected, whether quantification was made pursuant to §98.234(k) and measurements. (c) Calibration reports for detection and measurement instruments used. (d) Inputs and outputs of calculations or emissions computer model runs used for engineering estimation of emissions.
X—Petrochemical Production (§98.240)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Onsite wastewater treatment	See recordkeeping requirements for onsite wastewater treatment
	Production	(a) The CEMS recordkeeping requirements in §98.37, if you operate a CEMS on process vents. (b) Results of feedstock or product composition determinations conducted in accordance with §98.243(a)(2)(iv). (c) Start and end times and calculated carbon contents for time periods when off-specification product is produced, if you comply with the alternative methodology in §98.243(a)(2)(iv) for determining carbon content of feedstock or product.

Subpart	Source Category	Recordkeeping (5 years unless otherwise noted)
Y—Petroleum Refineries (§98.250)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Non-merchant hydrogen production	See recordkeeping requirements for hydrogren production
	Onsite landfills	See recordkeeping requirements for landfills
	Onsite wastewater treatment	See recordkeeping requirements for onsite wastewater treatment
	Production	Retain records of all parameters monitored under §98.255 (Procedures for estimating missing data)
Z—Phosphoric Acid Production (§98.260)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	For each wet-process phosphoric acid production facility: (a) Total annual CO2 emissions from all wet-process phosphoric acid process lines (in metric tons); (b) Phosphoric acid production (by origin of the phosphate rock) and concentration; (c) Phosphoric acid production capacity (in metric tons/year); (d) Number of wet-process phosphoric acid process lines; (e) Monthly phosphate rock consumption (by origin of phosphate rock); (f) Measurements of percent inorganic carbon in phosphate rock for each batch consumed for phosphoric acid production; (g) Records of all phosphate rock purchases and/or deliveries (if vertically integrated with a mine); and (h) Documentation of the procedures used to ensure the accuracy of monthly phosphate rock consumption
AA—Pulp and Paper Manufacturing (§98.270)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) GHG emission estimates (including separate estimates of biogenic CO2) by calendar quarter for each emissions source listed under §98.270(b) of this subpart; (b) Monthly total consumption of all biomass fuels for each biomass combustion unit; (c) Monthly analyses of spent pulping liquor HHV for each chemical recovery furnace at kraft and soda facilities; (d) Monthly analyses of spent pulping liquor carbon content for each chemical recovery combustion unit at a sulfite or semichemical pulp facility; (e) Monthly quantities of spent liquor solids fired in each chemical recovery furnace and chemical recovery combustion unit; (f) Monthly and annual steam purchases; (g) Monthly and annual steam production for each biomass combustion unit; (h) Monthly quantities of makeup chemicals used
BB—Silicon Carbide Production (§98.280)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Annual consumption of petroleum coke (in metric tons); (b) Quarterly analyses of carbon content for consumed coke (averaged to an annual basis); and (c) Quarterly facility-specific emission factor calculations.
CC—Soda Ash Manufacturing (§98.290)	Fuel combustion at each kiln and from each stationary combustion unit	See recordkeeping requirements for stationary combustion
	For each soda ash manufacturing line	(a) Monthly production of soda ash (metric tons); (b) Monthly consumption of trona (metric tons); (c) Daily analyses for inorganic carbon content of trona or soda ash (as fractional purity), depending on the components used in Equation CC-2 or CC-3 of this subpart; and (d) Number of operating hours in calendar year.

Subpart	Source Category	Recordkeeping (5 years unless otherwise noted)
DD—Sulfur Hexafluoride (SF6) from Electrical Equipment (§98.300)	Electric power system	Retain records of the information reported and listed in §98.306.
EE—Titanium Dioxide Production (§98.310)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Monthly production of titanium dioxide (metric tons); (b) Production capacity of titanium dioxide (metric tons); (c) Records of all calcined petroleum coke purchases; (d) Records of monthly calcined petroleum coke consumption (metric tons); and (e) Annual operating hours for each titanium dioxide process line.
FF—Underground Coal Mines (§98.320)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Calibration records for all monitoring equipment. (b) Records of gas sales. (c) Logbooks of parameter measurements. (d) Laboratory analyses of samples.
GG—Zinc Production (§98.330)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	(a) Monthly facility production quantity for each zinc product (in metric tons). (b) Number of facility operating hours each month. (c) Annual production quantity for each zinc product (in metric tons). (d) If you use the carbon input procedure, record for each carbon-containing input material consumed or used (other than fuel), the information specified in paragraphs (d)(1) and (2) of this section. (1) Monthly material quantity (in metric tons). (2) Monthly average carbon content determined for material and records of the supplier provided information or analyses used for the determination. (e) You must keep records that include a detailed explanation of how company records of measurements are used to estimate the carbon input to each Waelz kiln or electrothermic furnace, as applicable to your facility. You also must document the procedures used to ensure the accuracy of the measurements of materials fed, charged, or placed in an affected unit including, but not limited to, calibration of weighing equipment and other measurement devices. The estimated accuracy of measurements made with these devices must also be recorded, and the technical basis for these estimates must be provided.
HH—Landfills (§98.340)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	Calibration records for all monitoring equipment
II—Wastewater (§98.350)	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	Calibration records for all monitoring equipment.

Subpart	Source Category	Recordkeeping (5 years unless otherwise noted)
JJ—Manure Management	Stationary combustion	See recordkeeping requirements for stationary combustion
	Production	Calibration records for all monitoring equipment.
KK—Suppliers of Coal (§98.370)	All facilities	(a) A complete record of all measured parameters used in the reporting of fuel quantities, including all sample results and documentation to support quantities that are reported under this part. (b) Records documenting all calculations of missing data. (c) Calculations and worksheets used to estimate the CO2 emissions. (d) Calibration records of any instruments used onsite and calibration records of scales or other equipment used to weigh coal.
LL—Suppliers of Coal-based Liquid Fuels (§98.380)	All facilities	Reporters shall retain copies of all reports submitted to EPA. Reporters shall maintain records to support volumes that are reported under this part, including records documenting any calculation of substitute measured data. Reporters shall also retain calculations and worksheets used to estimate the CO2 equivalent of the volumes reported under this part. These records shall be retained for five (5) years similar to 40 CFR part 80 fuels compliance reporting program.
MM—Suppliers of Petroleum Products (§98.390)	All facilities	(a) Any reporter described in §98.391 shall retain copies of all reports submitted to EPA under §98.396. In addition, any reporter under this subpart 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 volumes that are reported under this part, including records documenting any estimations of missing metered data. For all volumes of petroleum products, natural gas liquids, biomass, and feedstocks, reporters shall maintain meter and other records normally maintained in the course of business to document product and feedstock flows. (c) Reporters shall also retain laboratory reports, calculations and worksheets used to estimate the CO2 emissions of the volumes reported under this part. (d) Estimates of missing data shall be documented and records maintained showing the calculations. (e) Reporters described in this subpart shall also retain all records described in §98.3(g).
NN—Suppliers of Natural Gas and Natural Gas Liquids (§98.400)	All facilities	(a) Records of all daily meter readings and documentation to support volumes of natural gas and NGLs that are reported under this part. (b) Records documenting any estimates of missing metered data. (c) Calculations and worksheets used to estimate CO2 emissions for the volumes reported under this part. (d) Records related to the large end-users identified in §98.406(b)(4). (e) Records relating to measured Btu content or carbon content.

Subpart	Source Category	Recordkeeping (5 years unless otherwise noted)
OO—Suppliers of Industrial Greenhouse Gases (§98.410)	Fluroinated GHG production facility	(a) Fluorinated GHG production facility shall retain the following records: (1) Dated records of the data used to estimate the data reported under §98.416, and (2) Records documenting the initial and periodic calibration of the gas chromatographs, weigh scales, flowmeters, and volumetric and density measures used to measure the quantities reported under this subpart, including the industry standards or manufacturer directions used for calibration pursuant to §98.414(j) and (k). (b) In addition to the data required by paragraph (a) of this section, fluorinated GHG production facility that destroys fluorinated GHGs shall keep records of test reports and other information documenting the facility's one-time destruction efficiency report and annual destruction device outlet reports in §98.416(b) and (c).
	Bulk importer of fluorinated GHGs or N2O	(1) A copy of the bill of lading for the import; (2) The invoice for the import; and (3) The U.S. Customs entry form.
	Bulk exporter of fluorinated GHGs or N2O	(1) A copy of the bill of lading for the export; and (2) The invoice for the import
	Facilities that import containers with a fluorinated GHG or N2O heel	Keep records of the amount brought into the US that document that the residual amount in each shipment is less than 10% of the volume of container and will: (1) Remain in the container and be included in a future shipment; (2) Be recovered and transformed; or (3) Be recovered and destroyed.
PP—Suppliers of Carbon Dioxide (§98.420)	Facility containing production process units	Quarterly records of captured and transferred CO2 streams and composition.
	CO2 production well facility	Quarterly records of the mass flow of the extracted and transferred CO2 stream and composition.
	Facilities that import or export CO2	Quarterly records of the mass flow and composition of CO2 streams imported or exported.

Appendix B

Table B-1 Calculating GHG Emissions

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
C—General Stationary Fuel Combustion Sources (§ 98.30)	Stationary fuel combustion	CO2 - Tier 1	N/A - default emissions factor	Calculate annually using: mass or volume of fuel combusted (from company records)	Tier 1 used for any unit with a max rated heat input capacity of 250 mmBtu/hr or less. May also be used to calculate the biogenic CO2 emissions from a unit of any size that combusts wood, wood waste, or other solid biomass-derived fuels.
		CO2 - Tier 2	N/A - default emissions factor	Calculate annually using: mass or volume of fuel combusted, high heat value of fuel for measurement period, number of required heat content measurements (frequency of measurements depends on fuel; see 98.34(c) for requirements) For municipal solid waste (MSW) combustion, calculate annually using: total mass of steam generated by MSW combustion during the reporting period and ratio of design heat input to its design rated steam output	Tier 2 used for any unit with a max rated heat input capacity of 250 mmBtu/hr or less
		CO2 - Tier 3	N/A	Calculate annually for solid, liquid, and gaseous fuels using: fuel carbon content & quantity (volume or mass) of fuel combusted (determined at same frequency of high heat value measurements see 98.35(d) for requirements); determine carbon content monthly, but for other gaseous fuels (e.g., refinery gas, process gas, etc.), daily sampling and analysis is required to determine carbon content & molecular weight of the fuel Note: For natural gas combustion, CO2 mass emissions are calculated only for those months in which natural gas is combusted during the reporting year. For the combustion of other gaseous fuels (e.g., refinery gas, process gas), CO2 mass emissions are calculated only for those days on which the gaseous fuel is combusted during the reporting year	Tier 3 used for any affected unit size combusting any type of fuel
		CO2 - Tier 4	N/A - CEMS required	Calculate annually. If CO2 conc measured on a wet basis: hourly average of CO2 conc & stack gas volumetric flow rate. If measured on a dry basis must also use the hourly moisture % in stack gas to correct the measurement; sum hourly emissions over entire calander year for annual emissions Note: An oxygen (O2) monitor may be used in lieu of a CO2 monitor to determine the hourly CO2 concentrations if the effluent gas stream monitored by the CEMS consists solely of combustion products, and if only fuels that are listed in Table 1 in section 3.3.5 of appendix F to part 75 are combusted in the unit(s).	Tier 4 may be used for a unit of any size, combusting any type of fuel; must be used if unit has a maximum rated heat input capacity greater than 250 mmBtu/hr, or if unit combusts MSW & has maximum capacity greater than 250 tons per day of MSW. Additional conditions under which Tier 4 must be used are specified in the rule.
		CH4, N2O	N/A - default emissions factor	Calculate annually using: mass or volume of the fuel combusted (from company records); high heat value (measured or default) For MSW combustion, calculate annually using: total mass of steam generated by MSW combustion during the reporting year and ratio of the boiler's design heat input to its design rated steam output	

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
C—General Stationary Fuel Combustion Sources (§ 98.30) (Cont.)	Unit w/ sorbent injection	CO2	N/A	Calculate annually using: limestore or other sorbent used in report year	Used if unit is: fluidized bed boiler; equipped with a wet flue gas desulfurization system; or uses other acid gas emission controls with sorbent injection. Calc used only if GHG emissions from sorbent are not monitored by CEMS
	Fuel(s) combusted = biomass	CO2	N/A - CEMS optional	Calculate annually using: If Tier 4 is not used and there is no MSW: mass or volume of fuel per year. If CEMS or Tier 4 is used, and there is no MSW: hourly volume of CO2 emitted (calculated with inputs: hourly CO2 conc, hourly stack gas volumetric flow rate, source operating time); total quantity of fossil fuel combusted in report year; and gross calorific value of fuel. If there is MSW: quarterly determination of relative proportions of biogenic and non-biogenic CO2; use the same inputs as for other biomass fuel types.	If facility doesn't use CEMS and if the biogenic fuel consists of wood and/or wood waste and/or other biomass-derived solid fuels (no MSW), use Tier 1 methodology
D—Electricity Generation (§ 98.40)	Electric generating units (EGUs) - calculate annual CO2, N2O, CH4 emissions using methods in subpart C				
E—Adipic Acid Production (§ 98.50)	Stationary Combustion unit that uses a carbon-based fuel - calculate CO2, NO2, CH4 emissions using requirements of subpart C				
	Production	N2O	facility-specific (ss) emission factor, calculated annually (annual performance test, 3 test runs of 1 hour each) using N2O concentration, volumetric flow rate of effluent gas, and production rate (can be determined through sales records, or through direct measurement using flow meters or weigh scales)	Calculate annually using: total adipic acid production at the facility	Must conduct a new performance test whenever the production rate is changed by more than 10%

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
F—Aluminum Production (§ 98.60)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Production	CF4	N/A	Anode effect minutes per cell-day (measured monthly), total Al production (measured monthly), slope coefficient (measured at least every 36 months)	Calculate emissions from anode effects from each Prebake and Søderberg electolysis cell
		C2F6	N/A	CF4 emissions from aluminum production (calculated monthly)	
	Anode consumption	CO2	N/A	(1) For prebake cells - calculate annually using: total Al production, net prebaked anode consumption, sulfur and ash content in baked anodes; (2) For Søderberg cells - calculate annually using: total Al production, paste consumption, emissions of cyclohexane soluble matter, binder content of paste, sulfur, ash, and hydrogen content in pitch, sulfur and ash content in calcined coke, carbon in skimmed dust from Søderberg.	Note: there are emission calculations for prebake cell and for Søderberg cells
	Anoke baking of Prebake cells	CO2 from pitch volatiles	N/A	Calculate annually using: initial weight and hydrogen content of green anodes, baked anode production, waste tar collected	
		CO2 from bake furnace packing material	N/A	Calculate annually using: packing coke consumption, baked anode production, sulfur and ash content in packing coke. Frequency of measurement for each parameter is not specified at this time.	
G—Ammonia Manufacturing (§ 98.70)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Different fuels used for combustion and feedstock (i.e. fuel combustion has not been accounted for in feedstock emissions calculations) or the combustion emissions exhausted through a stack				
	CO2 collected and used onsite or transferred offsite - calculate CO2 emissions using requirements for suppliers of CO2 (subpart PP)				
	Production	CO2	N/A - CEMS optional (if use CEMS, calculate CO2 emissions using Tier 4 Calculation Methodology of subpart C)	Calculate annually using: volume/mass and carbon content of gaseous/liquid/solid feedstock (measured continuously using a flow meter) used in a month. For liquid and solid feed stock also use CO2 captured or recovered for use in urea or production in calculation. All inputs are calculated monthly.	Emissions from gaseous, liquid, and solid fuel and/or feedstock are calculated separately (using similar formulas) and then added together
H—Cement Production (§ 98.80)	Fuel combustion at kilns and any other stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	If CEMS used to measure process-related emissions from facility - calculate CO2 emissions using Tier 4 Calculation Methodology of subpart C				
	Clinker production	CO2	ss emission factor; calculated using CaO & MgO content of Clinker, non-carbonate CaO & MgO content of Clinker (calculated monthly)	Calculate annually using: quantity of clinker production (measured monthly), plant specific fraction of calcined material in cement kiln dust (CKD) not recycled to the kiln (measured quarterly) and quantity CKD discarded (measured quarerly). Note: A default factor of 1.0 (assumes that 100% of all carbonates in CKD is calcined) may be used in place of the ss factor	Total annual CO2 emissions = sum of annual CO2 emissions from the production of each clinker and emissions from raw materials
	Raw materials		N/A	Organic carbon content of raw material (determined monthly by an off-site laboratory analysis) and annual amount of raw materials used.	

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
I—Electronics Manufacturing (§ 98.90)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Etching and chamber cleaning	F-GHG	N/A - default emissions factor	Calculate annually using: gas consumption, process utilization rate for gas, fraction of input gas used in process w/abatement devices, fraction of input gas destroyed in abatement devices connected to process. Must also calculated by-product gas emissions using inputs: kg gas created as a by-product in process per kg of input gas consumed in process, gas consumption, fraction of gas used in process w/abatement devices, fraction of gas destroyed in abatement devices connected to process	F-GHG reported depends on product type (see Table 1 in this subpart); facilities w/abatement devices must verify the destruction or reoval efficiency of the equipment Total annual emissions = sum of input and by-product emissions from each etch process and each cleaning process.
		NO2	N/A	Calculate annually using: consumption of N2O	
	Facilities that use heat transfer fluids	F-GHG	N/A	Calculate annually using: inventory of heat transfer fluid (HTF) at end of previous reporting period, net purchases of HTF, total nameplate capacity of installed HTF equipment & retired HTF equip, inventory of HTF at end of period, amount HTF recovered and sent offsite. When consumption of gases is estimated by monitoring changes in container mass & inventories use inputs: inventory of gas stored in cylinders at the beginning & end of year, acquisitions of gas during year, disbursement of gas during period.	
J—Ethanol Production (§ 98.100)	Onsite stationary combustion - calculate CO2, N20, and CH4 emissions according to the requirements of subpart C				
	Onsite landfills - calculate CH4 emissions according to the requirements for landfills (subpart HH)				
	Onsite wastewater treatment - calculate CO2 and CH4 emissions according to the requirements for wastewater treatment (subpart II)				
K—Ferroalloy Production (§ 98.110)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	If CEMS used to measure CO2 emissions for electric arc furnace subject to GHG reporting - calculate emissions according to requirements of subpart C				
	Electric arc furnace (EAF) - ferroally production	CO2	N/A	Calculate annually using: mass & carbon content of reducing agent, carbon electrode consumed in EAF, ore, flux material, alloy product, and non-product outgoing material. Determine mass of each solid carbon-containing input & output material monthly by direct measurement or calculations using process operating information. Determine average carbon content of each input and output material monthly using info from supplier or analysis of a representative sample. For each input material for which the carbon content is not provided by your material supplier, carbon content of the material must be analyzed by independent certified laboratory annually.	Calculate emissions from each EAF separately and sum to find total CO2 emissions
	EAF - ferrosilicon or silicon metals production	CH4	N/A - default emissions factor	Calculate annually using: mass of alloy product produced in electric arc furnace	Calculate emissions from each EAF separately and sum to find total CH4 emissions

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
L—Fluorinated Greenhouse Gas Production (§98.120)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Production	Fluorinated GHGs (mass)	N/A	Calculate monthly using: total mass of each fluorinated GHG emitted from the production process (estimated daily using: mass of fluor GHG produced, mass of reactant that is consumed in process, concentration (mass fraction) of fluor GHG product in destroyed wastes, mass of wastes removed from the process and destroyed, and yield loss related to byproducts.) The total mass of the reactant consumed in process is estimated daily using: mass of reactant fed into the production process and mass of reactant permanently removed from the production process. The total mass of the wastes removed from the process and destroyed is estimated using: mass of wastes removed from the process and fed into the destruction device and Destruction Efficiency of the destruction device (fraction). Yield loss related to byproduct for production is calculated daily using the mass of byproduct generated by production process. If by-product is responsible for yield loss in production process and occurs in any process stream in more than trace concentrations, the mass of by-product generated is calculated daily using: concentration (mass fraction) and mass flow of the byproduct stream. If by-product is responsible for yield loss, is a fluorinated GHG, occurs in any process stream in more than trace concentrations, and is not completely recaptured or completely destroyed, the mass of by-product emitted is calculated daily using: mass of by-product generated, concentration (mass fraction) of by-product in stream of destroyed wastes and in stream of recaptural material, mass of wastes removed from production process and destroyed, mass removed from production process, number of streams of destroyed waste, and number of streams of recaptured materials.	
M—Food Processing (§ 98.130)	Onsite stationary combustion - calculate CO2, N20, and CH4 emissions according to the requirements of subpart C				
	Onsite landfills - calculate CH4 emissions according to the requirements for landfills (subpart HH)				
	Onsite wastewater treatment - calculate CH4 emissions according to the requirements for wastewater treatment (subpart II)				
N—Glass Production (§ 98.140)	Stationary combustion unit - fuel combustion at each continuous glass melting furnace and at any other on-site stationary fuel combustion unit - calculate CO2, N2O, and CH4 emissions according to				
	If CEMS used to measure CO2 emissions - calculate emissions according to requirements of subpart C				
	Production	CO2	N/A - default emissions factor	Calculate annually using: number of carbonate-based raw materials charged to furnace, mass fraction of carbonate-based mineral in carbonate-based raw material (from supplier or use default value), mass of carbonate-based raw material charged to furnace, fraction of calcination achieved for carboate-based raw material (calculate or use default value).	Calculate emissions from each continuous glass melting furance separately and sum to determine total emissions

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
O—HCFC-22 Production and HFC-23 Destruction (§ 98.150)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions using requirements in subpart C				
	HCFC-22 production processes and HFC-23 destruction processes	HFC-23 (mass)	N/A	Calculate annually using: mass HFC-23 emitted from equipment leaks (calculated annually using emissions tests that measure: fraction HFC-23 by weight in the stream(s) in the equipment, number of hours in year during which equipment contained HFC-23, applicable leak rate for each source of equipment type and service, number of sources of equipment type and service with screening values less than 10,000 ppmv as determined according to §98.154(h)), mass HFC-23 emitted from process vents (calculated monthly using: HFC-23 emission rate from the process vents during the period of the most recent emissions test (emissions test conducted annually), HCFC-22 production rate during the period and during the most recent test), and mass HFC-23 emitted from thermal oxidizer (calculated annually using: mass HFC-23 fed into destruction device (measured daily) & destruction efficiency of the destruction device)	All HCFC-22 production facilities shall account for HFC-23 generation and emissions that occur as a result of startups, shutdowns, and malfunctions, either recording HFC-23 generation and emissions during these events, or documenting that these events do not result in significant HFC-23 generation and/or emissions.
	Facilities that don't use a thermal oxidizer or have a thermal oxidizer that is not directly connected to the HCFC-22 production equipment	HFC-23 (mass)	N/A	Calculate annually using: mass HFC-23 generated annually , mass HFC-23 packaged for sale annually (measured daily), mass HFC-23 sent off-site for destruction (measured daily), mass HFC-23 destroyed on-site	See next two row for methods used to calculate the mass of HFC-23 generated annually
	Facility measures mass flow of combined stream (HFC-23 + other product)	total mass of HFC-23 generated	N/A	Calculate annually using: fraction HFC-23 by weight in HFC-23/other product stream (measured daily), mass flow of HFC-23/other product stream (measured continuously using a flow meter), number of conc & flow measurements for the year	This is NOT a GHG calculation, these calculations are used to find the mass of HFC-23 generated annually, which are used in the calculation for HFC-23 (mass) emissions for facilities that do not use a thermal oxidizer
	Facility measures production of only the other product (either HCFC-22 or HCl)		N/A	Calculate annually using: fraction of HFC-23 and of HCFC-22 by weight in HCFC-22/HFC-23 stream (measured daily), mass of HCFC-22 produced (measured daily using inputs: mass HCFC-22 coming out of production process (measured daily), mass of HCFC-22 added to production process upstream, (measured daily)), number of conc & mass measurement periods for the year	
	HFC-23 destruction facilities	HFC-23 (mass)	N/A	Calculate annually using: mass HFC-23 fed into destruction device (measured daily) & mass of HFC-23 destroyed (calculated using inputs: mass HFC-23 fed into destruction device (measured daily) & destruction efficiency of the destruction device)	Estimates of the mass of HFC-23 destroyed must account for any temporary reductions in the destruction efficiency that result from any startups, shutdowns, or malfunctions of the destruction device
P—Hydrogen Production (§ 98.160)	Combustion of fuels in each hydrogen production unit and any other stationary combustion units - calculate CO2, NO2, & CH4 emissions using requirements in subpart C				
	CO2 collected and used onsite or transferred offsite - calculate CO2 emissions using requirements for suppliers of CO2 (subpart PP)				
	If CEMS used to measure CO2 mass emissions - calculate CO2 emissions using Tier 4 Calculation Methodology of subpart C				
	Production	CO2	N/A - CEMS optional (if used see requirements in subpart C)	Calculate annually using: mass/volume of gaseous/liquid feedstock (measured continuously using a flow meter) and solid feedstock (obtained from company records) and carbon content in feedstock (monthly).	

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
Q—Iron & Steel Production (§ 98.170)	Stationary combustion unit - calculate CO2, CH4, and NO2 emissions according to requirements of subpart C. Stationary combustion units include, but are not limited to, by-product recovery coke				
	If CEMS used to measure CO2 emissions - calculate emissions according to requirements of subpart C				
	Taconite indurating furnaces	CO2 - Carbon balance	N/A	Calculate annually using: mass/volume & carbon content (CC) of solid/liquid/gaseous fuel combusted, mass & CC of greenball (taconite) pellets fed to the furnace & fired pellets produced by the furnace (all inputs measured monthly)	For each process input and output other than fuels, sample each process input and output weekly and prepare a monthly composite sample for carbon analysis (analysis performed by certified, independent lab). Calculate the mass emissions rate of CO2 in each calendar month for each process. The calculations are based on the monthly mass of inputs and outputs to each process and the respective weight fraction of carbon. If facility has a process input or output that contains carbon that is not included in the equations, account for the carbon and mass rate of that process input or output in your calculations.
	Basic oxygen process furnaces		N/A	Calculate annually using: mass & carbon content (CC) of molten iron, ferrous scrap, flux materials, and carbonaceous materials charged to furnace; mass & CC of molten steel & slag produced by furnace (all inputs measured monthly)	
	Non-recovery coke oven batteries		N/A	Calculate annually using: mass & carbon content of coal charged to the battery & coke produced by the battery (all inputs measured monthly)	
	Sinter processes		N/A	Calculate annually using: volume & carbon content (CC) of gaseous fuel combusted; mass & CC of sinter feed material and of sinter pellets produced (all inputs measured monthly)	
	Electric arc furances (EAFs)		N/A	Calculate annually using: mass of direct reduced iron, carbon content (CC) of molten iron, mass & avrg CC of ferrous scrap, flux materials, and carbonaceous materials charged to furace, mass & avrg CC of carbon electrode consumed and of molten steel & slag produced by furance (all inputs measured monthly)	
	Argon-oxygen decarburization vessels		N/A	Calculate annually using: mass of molten steel charged to the vessel carbon content (CC) of molten steel before decarburization and avrg CC of molten steel after decarburization	
	Direct reduction furnaces		N/A	Calculate annually using: volume & avrg carbon content (CC) of gaseous fuel, mass & CC of iron ore/iron ore pellets fed to the furnace, mass & CC of carbonaceous materials and other materials charged to the furnace; mass & CC of iron & non-metallic materials produced (all inputs measured monthly)	

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
Q—Iron & Steel Production (§ 98.170) (Cont.)	Coke pushing process	CO2 - ss emission factor	ss emission factor, calculate annually using a performance test that measures: CO2 conc, volumetric flow rate (either the feed rate of materials into the process or the production rate during the test), and moisture % in stack gas. Conduct annual performance test for 9 hours or 9 complete production cycles; measure inputs hourly.	Calculate annually using total amount of feed or production for reporting period.	For the furnace exhaust from basic oxygen furnaces, EAFs, argon-oxygen decarburization vessels, and direct reduction furnaces, sample furnace exhaust for at 9 complete production cycles that start furnace is being charged and end after steel or iron and slag have been tapped. For EAFs that produce both carbon steel and stainless or specialty (low carbon) steel, develop an emission factor for the production of both types of steel. For taconite indurating furnaces, non-recovery coke batteries, and sinter processes, sample for at least 9 hours. Conduct new performance test & calculate new ss EF if any changes at the facility alter the energy efficiency/carbon content of fuel or feed by more than 10%
R—Lead Production (§ 98.180)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	If CEMS used to measure CO2 emissions - calculate emissions according to requirements of subpart C				
	Production	CO2	N/A	Caclulate annually using: mass and carbon content of: lead ore charged to the smelting furnace, lead scrap charged to the furnace, flux materials, carbonaceous materials, and any other materials charged to the furnace. All inputs are measured monthly. Determine the carbon content of all inputs listed above using information provided by your material supplier. If not provided by supplier, the carbon content must be analyzed by an independent certified laboratory each month using test methods (and their QA/QC procedures) in §98.7 of subpart A.	Calculate emissions from each smelting furance separately and sum to determine total emissions
S—Lime Manufacturing (§ 98.190)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	If CEMS used to measure CO2 emissions - calculate emissions according to requirements of subpart C				
	Production	CO2	ss emission factor, calculated annually using: CaO and MgO content (determined by an off-site lab every month)	Calculate annually using: correction factor for byproduct/waste products (calculate monthly using: weight of lime kiln dust (LKD) not recycled to kiln, weight of LKD produced at kiln, fraction of original carbonate in LKD, fraction of calcination of original carbonate in LKD); weight/mass of lime; number of lime types produced at kiln. All inputs measured monthly.	Calculate emissions and ss emission factor for each kiln based on the type of lime produced at the kiln, sum emissions from each kiln to determine total emissions

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
T—Magnesium Production (§ 98.200)	Onsite combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Production	SF6, HFC-134a, FK 5-1-12, CO2, other fluorinated GHGs	N/A	Option 1: Measure by monitoring changes in container masses and inventories, calculate annually using: inventory of cover gas or carrier gas stored in cylinders or other containers at beginning & end of period, acquisitions of cover gas or carrier gas, disbursements of cover gas or carrier gas to sources or locations outside the facility. Option 2: Measure by monitoring changes in mass of indiv containers as their contents are used, calculate annually using: mass of contents of cylinder at beginning & end of period.	
U—Misc. Uses of Carbonate (§ 98.210)	Production	CO2	N/A - default emissions factor	Calculate annually using: mass of carbonate consumed (can be determined from purchase records or by direct weight measurement using the same plant instruments used for accounting purposes), [*Comment: This information is requried in the data reporting requirements but not in the GHG emissions calculation section]* ~~,~~ fraction calcination achieved (can calculate annually based on sampling & analysis by certified lab or use default of 1.0)	
V—Nitric Acid Production (§ 98.220)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Production	N2O	ss emission factor, calculated annually for each nitric acid production line using: N20 concentration, flow rate of effluent gas, production rate (performance test, 3 test runs of 1 hour each)	Calculate annually for each nitric acid production line using: total production rate for the year, destruction factor of N2O abatement technology (percent of N2O removed from air stream), and abatement factor of N2O abatement technology (percent of year that abatement technology was used)	Must conduct a new performance test whenever the production rate is changed by more than 10%
W—Oil & Natural Gas Systems (§ 98.230)	Stationary combustion unit - calculate CO2, NO2, CH4 emissions using requirements in subpart C				
	Process facilities	CH4 and CO2 volumetric fugitive emissions		Calculate using: natural gas volumetric fugitive emissions at standard conditions (calculated differently depending on the source, see source categories below) and mole % of GHG in the natural gas (mole % is the annual average mole % for each facility and is specific to the source category)	Equation A
		CH4 and CO2 mass fugitive emissions		Calculate using: GHG volumetric fugitive emissions at standard conditions (from equation A), density of GHG	Equation B
	Acid gas removal vent stacks	Fugitive emissions	N/A	Calculate annually using: natural gas feed temperature, pressure, and flow rate; acid gas content of feed natural gas and outlet natural gas; unit operating hours, exit temperature of natural gas; solvent pressure, temperature, circulation rate, and weight. Note: if the acid gas removal unit is capturing CO2 and transferring it offsite calculate emissions using requirements for industrial greenhouse gas suppliers (subpart OO)	Use simulation software package to calculate emissions

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
W—Oil & Natural Gas Systems (§ 98.230) (Cont.)	Natural gas driven pneumatic pump	Natural gas fugitive emissions	N/A	Calculate annually using: natural gas driven pneumatic pump gas emission (from manufacturer), volume of liquid pumped annually. If manufactured data not available conduct one time measurement using high volume sampler or calibrated bag for each pump.	Use volumetric natural gas fugitive emissions to calculate CH4 & CO2 volumetric & mass fugitive emissions (see equations A & B above)
	Natural gas driven pneumatic manual valve actuator	Natural gas fugitive emissions	N/A	Calculate annually using: natural gas driven pnematic valve actuator natural gas emission (provided by manufacturer) and number of times the pneumatic device was actuated in a way that vented natural gas to the atmosphere through the	Use volumetric natural gas fugitive emissions to calculate CH4 & CO2 volumetric & mass fugitive emissions (see
	Natural gas driven pneumatic valve bleed device	Natural gas fugitive emissions	N/A	Calculate annually using: pneumatic device bleed rate (from manufacturer); if manufacturing data not available conduct one time measurement using high volume sampler or calibrated bag for each pneumatic device	Use volumetric natural gas fugitive emissions to calculate CH4 & CO2 volumetric & mass fugitive emissions (see equations A & B above)
	Blowdown vent stacks		N/A	Calculate annually using: number of blowdowns for equipment in year, volume of blowdown equipment chambers; use equation B above to determine nautral gas volumetric fugitive emissions	
	Dehydrator vent	Fugitive emissions	N/A	Calculate annually using: feed natural gas flow rate & water content, outlet natural gas water content, absorbent circulation rate, use of stripping natural gas and of flash tank separator, wet natural gas temperature, pressure, and composition	Use simulation software package to calculate emissions
	Flare stack	Fugitive emissions	N/A	Calculate annually. GHG emissions: volume of natural gas sent to flare stack, % natural gas combusted by flare, conc of GHG in flare gas (quarterly sample taken from flow velocity measuring device), conc of natural gas hydrocarbon constituents. GHG volumetric fugitive emissions: natural gas volumetric fugitive emissions at actual conditions, temperature, pressure.	Use volumetric fugitive emissions to calculate CH4 & CO2 mass fugitive emissions (see equation B above)
	Storage tank	CH4 and CO2 volumetric fugitive emissions	N/A	Calculate annually using: mole percent of a particular GHG in the hydrocarbon vapors and hydrocarbon vapor volumetric fugitive emissions at standard conditions. Calculate hydrocarbon vapor volumetric fugitive emissions at actual conditions using: storage tank total annual throughput and measured hydrocarbon vapor emissions rate per throughput (measured using test period of one complete production cycle). Use this number, temperature at actual emission conditions, and absolute pressure at ambient conditions to convert to emissions at standard condition.	Use volumetric fugitive emissions to calculate CH4 & CO2 mass fugitive emissions (see equation B above)
	Compressor wet seal degassing vents	Natural gas fugitive emissions	N/A	Calculate annually using volume of natural gas sent to vent from velocity measurement in §98.234 (j) using manufacturer's manual for the specific meter used to measure velocity. Use this number, temperature at actual emission conditions, and absolute pressure at ambient conditions to convert to emissions at standard condition.	Use volumetric natural gas fugitive emissions to calculate CH4 & CO2 volumetric & mass fugitive emissions (see equations A & B above)

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
X—Petrochemical Production (§ 98.240)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	CO2 captured - calculate CO2 emissions using requirements for suppliers of CO2 (subpart PP)				
	Onsite wastewater treatment - calculate CH4 emissions according to the requirements for wastewater treatment (subpart II)				
	Petrochemical process	CO2 - Mass balance	N/A - CEMS optional (if use CEMS, calculate CO2 emissions using Tier 4 Calculation Methodology of subpart C)	Calculate weekly using: mass/volume and carbon content of: solid, liquid & gaseous feedstock introduced & solid, liquid & gaseous product produced [solid feedstock take grab samples weekly or composite samples analyzed weekly; measure volume of gaseous & liquid feedstock & product continuously with flow meter; alternatively facility can demonstrate to administrator that average conc is always > 99.5% by submitted data, calcs & other supporting info to administrator, if approved facility may assume carbon content = 100%)	
Y—Petroleum Refineries (§ 98.250)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Sour gas sent off-site for sulfur recovery operations - calculate CO2 emissions according to requirements for on-site sulfur recovery plants in this subpart				
	On-site landfills - calculate CH4 emissions according to the requirements for landfills (subpart HH)				
	On-site wastewater treatment - calculate CH4 and CO2 emissions according to the requirements for wastewater treatment (subpart II)				
	Non-merchant hydrogen production - calculate CO2 and CH4 emissions according to the requirements for hydrogen production (subpart P)				
	If CEMS used to measure CO2 emissions for flares, catalytic cracking units, fluid coking units, or coke calcining units - calculate emissions according to requirements of subpart C				
	Flares - calculate CH4 and NO2 emissions according to requirements of subpart C				
	Flares	CO2	N/A - default emissions factor	Calculate annually using: volume of flare gas combusted during normal operations (from company records), higher heating value for refinery fuel or flare gas (from company records), number of start-up, shutdown, and malfunction events during the reporting year, volume of flare gas combusted during a start-up, shutdown, or malfunctions (from engineering calculations), average carbon content of the gaseous fuel, from the fuel analysis results or engineering calculations for the shutdown/malfunction event	If facility has a continuous flow monitor, high heating value monitor, or carbon content monitor on the flare or if facility measures these parameters daily must use these values when calculating CO2 emissions
		CH4, N2O	N/A	Calculate emissions according to the requirements of subpart C	
	Catalytic cracking units & traditional fluid coking units	CO2	N/A	Calculate annually using: volumetric flow rate of exhaust gas, hourly avrg % CO2 concentration in exhaust gas stream, hourly avrg % CO concentration in exhaust gas stream Note: If facility doesn't continuously monitor flow rate of exhaust gas, must calculate using flow rate of air to unit, flow rate of O2 enriched air to unit, O2 conc. in gas stream inlet to unit, hourly average % O2, CO, & CO2 in exhaust gas stream from unit. If using post-combustion device calculate emissions using method for combustion sources and report separately	If a CO boiler or other post-combustion device is used, calculate the GHG emissions from the fuel fired to the CO boiler or post-combustion device according to the requirements of subpart C
		CH4, N2O	N/A - default emissions factor	Calculate annually using: emission rate of CO2 from coke burn-off	

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
Y—Petroleum Refineries (§ 98.250) (Cont.)	Catalytic reforming units	CO2	N/A	Calculate annually using: quantity of coke burn-off per regeneration cycle, number of regeneration cycles in calendar year, site-specific fraction carbon content of produced coke (use default value if ss is unavailable)	Facilities can also calculate emissions using methods for catalytic cracking units & traditional fluid coking units
		CH4, N2O	N/A - default emissions factor	Calculate annually using: emission rate of CO2 from calcinating reforming units	
	On-site sulfur recovery plants	CO2	N/A - CEMS optional (if use CEMS, calculate CO2 emissions using requirements of subpart C)	Calculate annually using: flow rate of sour gas feed, mole fraction of carbon in the sour gas to the sulfur recovery plant (use default factor or develop ss factor)	If facility has a continuous flow and/or carbon content monitor on the sour gas feed to the sulfur recovery plant, must use the measured flow rates when the monitor is operational to calculate the sour gas flow rate and/or carbon content value
	Coke calcining units	CO2	N/A	Calculate annually using: mass of green coke fed to unit, mass of marketable petroleum coke produced by unit, and mass of petroleum coke dust collected in the dust collection system of unit (all from facility records); avrg mass fraction carbon content of green coke and avrg mass fraction carbon content of marketable petroleum coke produced by unit	Calculate the CO2 emissions for any auxiliary fuel fired to the calcining unit using the applicable methods according to requirements of subpart C
		CH4, N2O	N/A - default emissions factor	Calculate annually using: CO2 emissions from coke calcining unit	
	Uncontrolled asphalt blowing operations	CH4	N/A - default emissions factor	Calculate annually using: quantity of asphalt blown	Must use emission factor from facility specific test data, if available
	Controlled asphalt blowing	CO2	N/A - default emissions factor	Calculate annually using: quantity of asphalt blown	Only calculate CO2 emissions if they are not included in flare emissions
	Delayed coking unit - subsequent openings of vessel	CH4	N/A	Calculate annually using: total number of vessel openings, height/diameter of coking unit vessel	Calculate CH4 emissions from depressurization of coking unit vessel to atmosphere using method for "all other process vents"
	All other process vents	CO2, N20, CH4	N/A	Calculate annually using: number of venting events per year, flow rate of process vent, venting time (hours per event)	Used also for catalytic reforming unit depressurization and purge vents when methane is used as purge gas
	Uncontrolled blowdown systems	CH4	N/A - default emissions factor	Calculate annually using: quantity of crude oil, quantity of intermediate off-site products processed at the facility	Facilities also have the option of the method used for other process vents (§ 98.253(j))

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
Y—Petroleum Refineries (§ 98.250) (Cont.)	Equipment leaks	CH4	N/A	Calculate using either (1) or (2) below: (1) Use process-specific methane composition data (from measurement data or process knowledge) and any of the emission estimation procedures provided in the Protocol for Equuipiment Leak Emissions Estimates (EPA-453/R-95-017, NTIS PB96-175401). (2) Calculate annually using: number of atmospheric crude oil distillation columns; number of catalytic cracking units, coking units (delayed or fluid), hydrocracking, and full-range distillation columns (including depropanizer and debutanizer distillation columns); number of hydrotreating/hydrorefining units, catalytic reforming units, and visbreaking units at the facility; and the total number of hydrogen plants and fuel gas systems at the facility	
	Storage tanks - do not process unstabilized crude oil	CH4	N/A - default emissions factor	Calculate annually using: quantity of crude oil, quantity of intermediate products received from off-site that are processed at the facility	Facilities can also use tank-specific methane data and the TANKS model to estimate CH4 emissions
	Storage tanks - process unstabilized crude oil	CH4	N/A	Calculate annually using: quantity of unstabilized crude oil received at the facility, presure differential, mole fraction of CH4 in vent gas from facility measurements (if available)	Facilities can also calculate CH4 emissions from the storage of unstabilized crude oil using either tank-specific methane composition data (from measurement data or product knowledge) and direct measurement of the gas generation rate
	Crude oil, intermediate, or product loading operations	CH4	N/A	Calculate annually using: product-specific vapor-phase methane composition data	If equilibrium vapor-phase CH4 conc. Is less than 0.5 volume %, report zero CH4 emissions
Z—Phosphoric Acid Production (§ 98.260)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	If CEMS used to measure CO2 emissions - calculate emissions according to requirements of subpart C				
	Production	CO2	N/A	Calculate annually using: inorganic carbon content of the batch of phosphate rock used (measured monthly), mass of phosphate consumed (measured monthly), and number of months during which the process line operates	Calculate emissions from each wet-process phosphoric acid prod line separately and sum to get total emissions

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
AA—Pulp and Paper Manufacturing (§ 98.270)	On-site stationary fuel combustion units (boilers, gas turbines, thermal oxiders, and other sources) - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Onsite landfills - calculate CH4 emissions according to the requirements for landfills (subpart HH)				
	Onsite wastewater treatment - calculate CH4 emissions according to the requirements for wastewater treatment (subpart II)				
	Chemical recovery furnace located at a kraft or soda facility	Fossil-fuel based CO2 - direct measurement using Teir 1 methodology for stationary combustion sources in subpart C			
		Fossil-fuel based CH4, N20 - direct measurement of fossil fuels consumed, default HHV, and default emissions factors and convert to metric tons of CO2 equivalent according to			
		Biogenic CO2, CH4, N20	N/A - default emissions factor	Calculate annually using: mass of spent liquor solids combusted (measured monthly), high heat value of the spent liquor solids for the month (site-specific)	CH4 and N2O emissions must be calculated as the sum of emissions from combustion of fossil fuels and combustion of biomass in spent liquor solids.
	Chemical recovery combustion unit located at a sulfite or stand-alone semichemical facility	CO2 emissions from fossil fuels - Direct measurement of fossil fuels consumed and default emissions factors according to the Tier 1 methodology for stationary combustion			
		CH4 and N20 from fossil fuels - Direct measurement of fossil fuels consumed, default HHV, and default emissions factors and convert to metric tons of CO2 equivalent according			
		Biogenic CO2	N/A	Calculate annually using: mass of spent liquor solids (measured monthly), carbon content of spent liquor solids (from monthly fuel analysis results)	
		Biomass CH4, N20 - calculate emissions using equation used for kraft facilities and default factors in Table AA-1 and convert the CH4 or N2O emissions to metric tons of CO2			
	Lime kiln located at kraft or soda facility	CO2 emissions from fossil fuels - Direct measurement of fossil fuels consumed and default HHV and default emissions factors, according to the Tier 1 methodology for stationary			
		CH4 and N20 from fossil fuels - Direct measurement of fossil fuels consumed, default HHV, and default emissions factors and convert to metric tons of CO2 equivalent according			
		Biogenic CO2 - calculate emissions from conversion of CaCO3 to CaO as part of the chemical recovery furnace biogenic CO2 estimates			
	Makeup chemical use	CO2	N/A	Calculate annually using: make-up quantity of CaCO3 and of Na2CO3 used	
BB—Silicon Carbide Production (§ 98.280)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	If CEMS used to measure CO2 emissions - calculate CO2 emissions using Tier 4 Calculation Methodology of subpart C				
	Production	CO2	ss emission factor calculated quarterly using: carbon content (CC) of petcoke for the quarter based on reports from the supplier or by quarterly measurement of the CC by off-site lab	Calculate annually using: petcoke consumption (measured quarterly)	
		CH4	N/A - default emissions factor	Calculate annually using: petcoke consumption (measured quarterly), and number of quarters.	
CC—Soda Ash Manufacturing (§ 98.290)	Fuel combustion at each kiln and from each stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	If CEMS used to measure CO2 emissions - calculate CO2 emissions using Tier 4 Calculation Methodology of subpart C				
	Production	CO2	N/A	Calculate annually using: inorganic carbon content (measured daily) and mass (measured monthly) of trona input OR of soda ash output ratio to ton of CO2 emitted for each ton of trona OR natural soda ash produced	Calculate emissions from each calciner (kiln) separately and sum to get total emissions

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
DD—Sulfur Hexafluoride (SF6) from Electrical Equipment (§98.300)	Electric power system	SF6, PFC	N/A	Calculate annually using: change in SF6/PFC inventory, purchased SF6/PFC, disbursements of SF6/PFC, change in total nameplate capacity of equipment	
EE—Titanium Dioxide Production (§ 98.310)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Production	CO2	N/A	(a) If CEMS used to measure CO2 emissions, calculate CO2 emissions using Tier 4 Calculation Methodology of subpart C. (b) Calculate annually using: calcined petcoke consumption (measured monthly).	Calculate emissions from each chloride process line separately and sum to get total emissions
FF—Underground Coal Mines (§ 98.320)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Ventilation well or shaft	CH4	N/A	Calculate quarterly using: volumetric flow rate (average daily), CH4 concentration, temperature, and pressure of ventillation gas during active ventilation of mining operations	Sum emissions from mine ventilation systems, degasification systems, and onsite combustion to get total CH4 emissions. If CH4 is destroyed, must use amount of CH4 collected for destruction and destruction efficiency of destruction equipment to calculate quantity of CH4
	Degasification system	CH4	N/A	Calculate quarterly using: volumetric flow rate (average daily), CH4 concentration, temperature, and pressure of ventillation gas for the days in the quarter when the degasificatgion system is in operation and the continuous monitoring equipment is properly functioning.	
	Degasification or ventilation system with on-site coal mine gas CH4 destruction	CO2	N/A	Calculate quarterly using: CH4 destroyed	
GG—Zinc Production (§ 98.330)	Stationary combustion unit - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Production	CO2	N/A	(a) If CEMS used to measure CO2 emissions, calculate emissions according to requirements of subpart C. (b) Calculate annually using: mass and carbon content of: zinc bearing material charged to the furnace, flux materials, carbon electrode consumed, and carbonaceous materials. All inputs calculated monthly. If carbon content of input above is not provided by material supplier, carbon content must be analyzed by independent certified laboratory each month using test methods (and QA/QC procedures) in §98.7 of subpart A.	Calculate emissions for each individual Waelz kiln or electrothermic furnace and sum to get total emissions

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
HH—Landfills (§ 98.340)	Stationary combustion - calculate CO2 emissions from the combustion of fuels in stationary combustion devices, including devices that combust landfill gas with other fuels (also include fuels used in				
	Modeled CH4 generation	CH4	N/A	Calculate annually using: quantity of waste disposed in the landfill in year X (Wx) from facility records, CH4 generation potential (metric tons CH4/metric ton waste), degradable organic carbon (fraction (metric tons C/metric ton waste)), fraction of DOC dissimilated, fraction by volume of CH4 in landfill gas. The annual quantity of each type of waste disposed must be calculated as the sum of the daily quantities of waste (of that type) disposed. For both MSW and industrial landfills, you may use the bulk waste parameters for a portion of your waste materials when using the material-specific modeling approach for mixed waste streams that cannot be designated to a specific material type. (1) For industrial landfills, Wx in reporting years must be determined by direct mass measurement of waste entering the landfill using industrial scales. For previous years where data are unavailable on waste disposal quantities, estimate using: average waste disposal factor (calculated using quantity of waste placed in the industrial landfill and quantity of product produced in years for which disposal and production data are available) and production quantity for facility. (2) For years prior to reporting for which waste disposal quantities are not readily available for MSW landfills, Wx shall be estimated using the estimated population served by the landfill in each year, the values for national average per capita waste disposal and fraction of generated waste disposed of in solid waste disposal sites found in Table HH-2.	This is not an emissions calculation. The annual modeled CH4 generation is used to calculate CH4 emissions for the three landfill categories below For years when material-specific waste quantity data are available, and for industrial waste landfills, calculate each waste quantity type & sum CH4 generation rates for all waste types to calculate the total modeled methane generation rate for the landfill.
	Landfills with gas collection systems	CH4	N/A	Calculate the quantity of CH4 destroyed: Calculate annually using: quantity of CH4 recovered (calculate annually using: daily average volumetric flow rate, daily average CH4 concentration of landfill gas, density of CH4, and temperature and pressure at which flow is measured). Additional inputs include oxidation fraction and destruction efficiency. Calculate CH4 emissions using both of 2 methods: (1) Calculate annually using the modeled CH4 generation rate, the quantity of CH4 recovered, destruction efficiency, and soil oxidation factor (2) Calculate annually using the quantity of CH4 recovered, collection efficiency estimated at landfill (taking into account system coverage, operation, and cover system materials) oxidation fraction, and destruction efficiency.	Must calculate using both Method 1 and Method 2
	Landfills w/out gas collection systems	CH4	N/A	Calculate annually using: modeled CH4 generation rate, oxidation fraction	

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
II—Wastewater (§ 98.350)	Stationary combustion unit (and flares) - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	Anaerobic treatment systems other than digesters	CH4	N/A - default emissions factor	Calculate annually using: volumetric flow rate of wastewater sent to an anaerobic treatment system and average monthly COD (both monitored weekly using 24-hour flow-weighted composite sample), and maximum CH4 producing potential of wastewater (can use default)	
	Petroleum refining facility w/ onsite oil/water separator	CO2	N/A - default emissions factor	Calculate annually using: volumetric flow rate of wastewater treated through oil/water separator (monitor weekly) and carbon fraction in NMVOC (measured or default).	The flow should reflect the wasterwater treated in the oil/water separater
	Anaerobic digesters	CH4	N/A	Calculate CH4 destroyed annually using: quantity of CH4 generated by the anaerobic digester (calculated using: daily average volumetric flow rate, daily average CH4 concentration of digester gas, and the pressure and temperature at which flow is measured (measured daily)) and CH4 destruction efficiency from flaring or burning in engine.	
JJ—Manure Management (§ 98.360)	Stationary combustion unit (and flares) - calculate CO2, N2O, and CH4 emissions according to requirements of subpart C				
	All facilities other than digesters	CH4	N/A	Calculate CH4 emissions annually using: total volatile solids excreted by animal type (calculated using:annual average animal population, typical animal mass, average percent total volatile solids by animal type (determined from monthly manure monitoring), manure excretion rate (use default value or farm specific data)), maximum CH4-producing capacity (from Table JJ-1), percent of manure that is managed in each manure management system.	Collect samples monthly to determine TVS and TN concentration. Laboratory used should be certified for waste analysis for NPDES reporting. Total emissions for facility = [CH4 emissions + CH4 flow to digester combustion device – CH4 destruction of digester + CH4 leakage of digester) x 1 metric ton/1000 kg x 21] + [direct N2O emissions x 1 metric ton/1000 kg x 310]
	Anaerobic digesters	CH4	N/A	Calculate CH4 flow to the combustion device annually using: average daily volumetric flow rate, average daily CH4 concentration of digester gas, temperature, and pressure. Calculate the amount of CH4 destroyed annually using: CH4 flow to the comubtion device and CH4 destruction efficiency from flaring or burning in engine. Calculate the CH4 leakage at digesters annually using: CH4 combusted by digester, CH4 collection efficiency of anaerobic digester (as specified in Table JJ-3).	
	All facilities	N2O	N/A - default emissions factor	Calculate annually using: total nitrogen excreted per animal type (calculated using: annual average percent of nitrogen present in manure by animal type (as determined from monthly manure monitoring), average annual animal population, typical animal mass (using either the default values in Table JJ-1 or a farm-specific value based on farm data), and manure excretion rate (using either a default value from Table JJ-1 or a farm-specific value based on farm data)), percent of manure that is managed in each manure management system, and an emission factor from Table JJ-4.	

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
KK—Suppliers of Coal (§98.370)	Coal mines - produce 100,000 or more short tons coal annually	CO2	N/A - default emission factor used in Method 3	Calculate CO2 emissions annually using: mass and carbon content of the coal. The carbon content of the coal is determined using one of the following methods: Method 1: quantity of coal produced or quantity of coal in shipment and weighted avrg % carbon in coal (calculated using: mass fraction of carbon in coal and amount of coal supplied (both measured daily), the number of operating days per year, and the total coal supplied during the year). Method 2: (1) calculate weighted annual average gross calorific value (GCV) of the coal (using GCV or HHV of coal measured daily by proximate analysis (decimal value), amount of coal supplied (measured daily), total coal supplied during the year); (2) establish statistical relationship between GCV and carbon content (CC) using procedure described in §98.374(f); (3) calculate estimated annual weighted average of the mass fraction of carbon in the coal by applying the slope coefficient, determined according to the requirements of §98.374(f)(4), to the weighted annual average GCV of the coal determined in step (1). Method 3: (1) calculate weighted annual average gross calorific value (GCV) of the coal (using GCV or HHV of coal measured daily by proximate analysis (decimal value), amount of coal supplied (measured daily), total coal supplied during the year); and (2) identify estimated annual weighted average of the mass fraction of carbon in the coal from Table KK-1 using annual weighted GCV of coal from step (1).	Facilities can chose Method 1 or Method 2. A facility that does not satisfy the monitoring criteria for Method 2 must use Method 1.
	Coal mines - produce less than 100,000 short tons coal annually, coal/coke exporters, coal/coke importers, water coal producers	CO2			Facilities can chose Methods 1, 2, or 3. Coal exporters: calculate carbon content (CC) for each coal shipment using info on CC of exported coal provided by the source mine, according to Method 1, 2, or 3. Coal importers: calculate CC for each coal shipment using Methods 1 or 2, or by use of Method 3 in combination with mine specific info from country of origin, or published CC values for coal of same rank from country of origin. Waste coal reclaimers: calculate CC using Methods 1 2, or 3. Note: For importers, exporters, and waste coal reclaimers using Methods 1, 2, or 3, measurements of each shipment can be used in place of daily measurements
LL—Suppliers of Coal-based Liquid Fuels (§ 98.380)	Coal-to-liquids producers, importers, exporters	CO2	Can use site-specific or default emission factor. The site-specific emission factor is calculate using density and percentage of total mass that carbon represents for each coal-based liquid fuel.	Calculate annually using: annual volume of a coal-based liquid fuel and a CO2 emission factor determined using either Method 1 or Method 2: Method 1: Use default emission factor listed in column C in Table MM-1. Method 2: Use a site-specific CO2 emission factor calculated by multiplying the density by the carbon content of the coal-based liquid, where at least one of these parameters has been measured uisng the methods specified in §98.394(c). Default values for carbon content and density are included in Table MM-1.	

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
MM—Suppliers of Petroleum Products (§ 98.390)	Refiners - petroleum product or natural gas liquid	CO2	Default emissions factor (product specific, see tables in subpart MM) or ss factor (calculated using: density of petroleum product or natural gas liquid or non-crude feedstock and percent of total mass that carbon represents in petroleum product or natural gas liquid or non-crude feedstock). Refiners shall use the most appropriate default CO2 emission factor for biomass in Table MM-3 to calculate CO2 emissions.	Calculate emissions annually using: total annual volume produced by the reporting party (this volume only includes products ex refinery gate) and either a default or site-specific emission factor.	Total CO2 emissions for refiners = emissions from complete combustion or oxidation of each petroleum product or natural gas liquid - emissions from the complete combustion or oxidation of each non-crude feedstock - emissions from the complete combustion or oxidation of biomass
	Refiners - non-crude petroleum product and natural gas liquid feedstock	CO2		Calculated annually using: total annual volume of a petroleum product or natural gas liquid that enters the refinery as a feedstock to be further refined or otherwise used on site (any waste feedstock that enters the refinery must also be included) and either a default or site-specific emission factor.	
	Refiners - biomass co-processed with petroleum feedstocks	CO2		Total annual volume of a specific type of biomass that enters the refinery to be co-processed with petroleum feedstocks to produce a petroleum product and a default emission factor.	
	Importers, exporters	CO2		Calculate emissions from each individual petroleum product and natural gas liquid annually using: total annual volume of product imported or exported by the reporting party and either a default or site-specific emission factor.	Total CO2 emissions for importers and exporters = sum of emissions from the complete combustion or oxidation of all petroleum products and natural gas liquids
	All	CO2		In the event that some portion of a petroleum product or feedstock is biomass-based and was not derived by co-processing biomass and petroleum feedstocks together (i.e. the petroleum product or feedstock was produced by blending a petroleum-based product with a biomass-based product), the reporting party shall calculate emissions for the petroleum product or feedstock according to the following methods in paragraph (1) or (2), as appropriate. (a) If using default CO2 emission factors: (1) Use the annual volume of petroleum product produced, imported, or exported (for refineries this includes only products ex-refinery gate), the percent volume of the product that is petroleum-based, the petroleum product-specific default CO2 emission factor from Table MM-1. (2) Refineries may calculate the CO2 emissions associated with non-crude petroleum product using the annual volume of the petroleum product, the percent volume of the product that is petroleum-based, and the non-crude petroleum feedstock-specific CO2 emission factor. (b) If using site-specific CO2 emission factors: (1) Use the annual volume of petroleum product produced, imported, or exported (for refineries this includes only products ex-refinery gate), the percent volume of the product that is petroleum-based, the site-specific petroleum product CO2 emission factor, and a default CO2 emission factor from Table MM-3 for the biomass. (2) Refineries may calculate the CO2 emissions associated with non-crude petroleum product using the annual volume of the petroleum product, the percent volume of the product that is petroleum-based, the site-specific CO2 emission factor for the non-crude petroleum product, and a default emission factor from Table MM-3.	

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
NN—Suppliers of Natural Gas and Natural Gas Liquids (§ 98.400)	All Suppliers (natural gas processing plants and local distribution companies)	CO2	N/A - default emissions factor (can use facility- or company-specific CO2 emission factors, provided that they are determined using industry standard practices)	Calculate annually the estimated CO2 equivalent emissions using either Method 1 or 2: Method 1: Use the total annual volume of fuel or product, default factors from Table NN-1 for the CO2 emission factor, and higher heat value of the fuel supplied. Alternatively, reporter-specific higher heating values and CO2 emission factors may be used, provided they are developed using methods outlined in §98.404. Note: This calculation is used to find the annual *potential* CO2 mass emissions from the combustion of fuel. Method 2: Use the total annual volume of fuel or product supplied and the fuel-specific CO2 emission factors in Table NN-1. Alternatively, reporter-specific CO2 emission factors may be used, provided they are developed using methods outlined in §98.404. Note: This calculation is used to find the annual potential CO2 mass emissions from the combustion of fuel.	Natural gas processing plants: report CO2 emissions that would result from complete combustion or oxidation of annual quantity of propane, butane, ethane, isobutane and bulk NGLs sold or delivered for use off site. Local distribution companies: report CO2 emissions that would result from complete combustion or oxidation of annual volumes of natural gas provided to end-users.
OO—Suppliers of Industrial Greenhouse Gases (§ 98.410)	Fluroinated GHG production facility	Fluorinated GHG or N20 (mass)	N/A	Calculate annually using: mass of each fluorinated GHG or nitrous oxide: (1) produced at facility (calculated using the mass of each fluorinated GHG or nitrous oxide produced and the mass of each fluorinated GHG or nitrous oxide added to the production process upstream) , (2) transformed at facility (calculated using the mass of each fluorinated GHG and nitrous oxide input to the transformation process and the mass of residual, unreacted fluorinated GHG or nitrous oxide that is permanently removed from the transfromation process), (3) destroyed at facility (calculated using mass of fluorinated GHG input to the destruction device and the destruction efficiency), and (4) sent to another facility for destruction (all measured daily).	
	Bulk importer and exporter of fluorinated GHGs or N2O			No calculation method provided. Importers and exporters measure fluorinated GHGs and N2O imported or exported directly.	

Subpart	Source Category	GHGs	Calculating GHG Emissions		
			Info Needed for Emissions Factor & Freq of Measurement	Additional Info for GHG Calc & Freq of Measurement	Comments
PP—Suppliers of Carbon Dioxide (§ 98.420)	Production process units	CO2 (mass)	N/A	Calculate quarterly (prior to purification, processing, or compressing) using: average CO2 concentration in flow and quarterly mass flow rate.	If facility doesn't have a flow meter for quantities captured or extracted, measure quantities transferred off-site using a flow meter. In either case, sampling must be
	CO2 production wells				
	Facilities that import or export CO2			Calculate quarterly using: average CO2 concentration in flow and quarterly mass flow rate.	If the importer of a CO2 stream does not have mass flow meters installed to measure the mass flow of gas imported, the measurements shall be based on the mass flow of the imported CO2 stream transferred off site or used in on-site processes, as measured by mass flow meters. If an exporter of a CO2 stream does not have mass flow meters installed to measure the mass flow exported, the measurements shall be based on the mass flow of the CO2 stream received for export, as measured by mass flow meters. In all cases, sampling on at least a quarterly basis also must be conducted to determine the composition of the CO2 stream.

Table B-2 Procedures for Estimating Missing Data and QA/QC Requirements

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
C—General Stationary Fuel Combustion Sources (§98.30)	All facilities	For units subject to the requirements of the Acid Rain Program, the applicable missing data substitution procedures in part 75 are followed for CO2 concentration, stack gas flow rate, fuel flow rate, gross calorific value (GCV), and fuel carbon content. For all units that are not subject to the requirements of the Acid Rain Program, when the Tier 1, Tier 2, Tier 3, or Tier 4 calculation is used, use (1) and (2): (1) For each missing value of the heat content, carbon content, or molecular weight of the fuel, and for each missing value of CO2 concentration and percent moisture, the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period; and (2) For missing records of stack gas flow rate, fuel usage, and sorbent usage, the substitute data value shall be the best available estimate of the flow rate, fuel usage, or sorbent consumption, based on all available process data (e.g., steam production, electrical load, and operating hours). The owner or operator shall document and keep records of the procedures used for all such estimates.	Tiers 1, 2, and 3: Document the procedures used to ensure accuracy of the estimates of fuel usage and/or sorbent usage (as applicable), the technical basis for these estimates, and the accuracy of measurement devices. Tier 2: Follow the specified sampling and analysis methods to ensure the accuracy of high heat value meaurements. Tier 3: All oil and gas flow meters (except for gas billing meters) shall be calibrated prior to the first year for which GHG emissions are reported under this part, using an applicable flow meter test method listed in §98.7 or the calibration procedures specified by the flow meter manufacturer. Fuel flow meters shall be recalibrated either annually or at the minimum frequency specified by the manufacturer. Follow specified methods for oil tankdrop measurements, and carbon content sampling and analysis and molecular weight determination. Tier 4: Follow applicable QA procedures in in appendix B to part 75 of this chapter, appendix F to part 60 of this chapter, or an applicable State continuous monitoring program. If appendix F to part 60 of this chapter is selected for on-going quality assurance, perform daily calibration drift (CD) assessments for both the CO2 and flow rate monitors, conduct cylinder gas audits of the CO2 concentration monitor in three of the four quarters of each year (except for non-operating quarters), and perform annual RATAs of the CO2 concentration monitor and the CERMS. If O2 monitor is used, follow the applicable QA provisions of either part 75, part 60, or a State continuous monitoring program. Additional QA/QC is followed when sources using Tier 4 combust biogenic fuels, including MSW.
D—Electricity Generation (§98.40)	All facilities	See requirements for stationary combustion	
E—Adipic Acid Production (§98.50)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required.	All QA/QC procedures specified in the reference test methods and any associated performance specifications apply. For each performance test facility must prepare an emission factor determination report that includes: (1) analysis of samples, determination of raw data; (2) all information and data used to derive the emissions factors; and (3) the production rate during the test and how it was determined.
F—Aluminum Production (§98.60)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. (a) Where anode or paste consumption data is missing, CO2 emissions can be estimated from aluminum production using Tier 1 method (inputs required: metal production from prebake process, metal production from Soderburg process). (b) For other parameters, use the average of the two most recent data points.	None specified. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
G—Ammonia Manufacturing (§98.70)	Stationary combustion	See requirements for stationary combustion	
	CO2 collected and used onsite or transferred offsite	See requirements for CO2 suppliers	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. (a) For missing feedstock supply rates, use the lesser of the maximum supply rate that the unit is capable of processing or the maximum supply rate that the meter can measure. (b) There are no missing data procedures for carbon content. A re-test must be performed if the data from any monthly measurements are determined to be invalid.	All fuel flow meters and gas composition monitors shall be calibrated prior to the first reporting year, using a suitable method published by a consensus standards organization (e.g., ASTM, ASME, API, AGA, or others). Alternatively, calibration procedures specified by the flow meter manufacturer may be used. Fuel flow meters and gas composition monitors shall be recalibrated either annually or at the minimum frequency specified by the manufacturer, whichever is more frequent. Document the procedures used to ensure the accuracy of the estimates of feedstock consumption.
H—Cement Production (§98.80)	Fuel combustion at kilns and any other Stationary combustion unit	See requirements for stationary combustion	
	Production	If data on the carbonate content or organic carbon content analysis is missing, facilities must undertake a new analysis.	None specified. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
I—Electronics Manufacturing (§98.90)	Stationary combustion	See requirements for stationary combustion	
	Production	(a) For semiconductor facilities that have an annual capacity of greater than 10,500 m2 silicon, estimate missing site-specific gas process utilization and by-product formation using default factors from Tables I-2 through I-4 of this subpart. However, use of these default factors shall be restricted to less than 5 percent of the total facility emissions. (b) For facilities using heat transfer fluids and missing data for one or more of the parameters in Equation I-8, you shall estimate heat transfer fluid emissions using the arithmetic average of the emission rates for the year immediately preceding the period of missing data and the months immediately following the period of missing data. Alternatively, you may estimate missing information using records from the heat transfer fluid supplier. You shall document the method used and values estimated for all missing data values. (c) If the methods specified in paragraphs (a) and (b) of this section are likely to significantly under- or overestimate the value of the parameter during the period when data were missing (e.g., because the monitoring failure was linked to a process disturbance that is likely to have significantly increased the F-GHG emission rate), you shall develop a best estimate of the parameter, documenting the methods used, the rationale behind them, and the reasons why the methods specified in paragraphs (a) and (b) of this section would lead to a significant under- or overestimate of the parameter.	Estimating F-GHG & N2O emissions from cleaning/etching: (1) Follow the QA/QC procedures in the International SEMATECH Manufacturing Initiative's Guideline for Environmental Characterization of Semiconductor Process Equipment when estimating facility-specific gas process utilization and by-product gas formation. (2) Follow the QA/QC procedures in the EPA DRE measurement protocol when estimating abatement device DRE. (3) Certify that abatement devices are maintained in accordance with manufacturer specified guidelines. (4) Certify that gas consumption is tracked to a high degree of precision as part of normal facility operations and that further QA/QC is not required. Estimating F-GHG emissions from heat transfer fluid use: (1) Review all inputs to Equation I-4 to ensure that all inputs and outputs to the facility's system are accounted for. (2) Do not enter negative inputs into the mass balance equation and ensure that no negative emissions are calculated from the mass balance equation. (3) Ensure that the beginning of year inventory matches the end of year inventory from previous year. All flowmeters, scales, load cells, and volumetric and density measures used to measure quantities that are to be reported under §98.92 and §98.96 shall be calibrated using suitable NIST-traceable standards and suitable methods published by a consensus standards organization (e.g., ASTM, ASME, ASHRAE, or others). Alternatively, calibration procedures specified by the flowmeter, scale, or load cell manufacturer may be used. Calibration shall be performed prior to the first reporting year. After the initial calibration, recalibration shall be performed at least annually or at the minimum frequency specified by the manufacturer, whichever is more frequent.
J—Ethanol Production (§98.100)	Onsite stationary combustion	See requirements for stationary combustion	
	Onsite landfills	See requirements for landfills	
	Onsite wastewater treatment	See requirements for onsite wastewater treatment	

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
K—Ferroalloy Production (§98.110)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. (a) For each missing value of the carbon content the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period; and (b) For missing records of the mass of carbon-containing input or output material consumption, the substitute data value shall be the best available estimate of the mass of the input or output material. The owner or operator shall document and keep records of the procedures used for all such estimates. (c) If you are required to calculate CH4 emissions for the electric arc furnace as specified in §98.113(c), then you are required to have 100 percent of the specified data for each reporting period.	None specified. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
L—Fluorinated Greenhouse Gas Production (§98.120)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. (1) For each missing value of the mass of fluorinated GHG produced, the mass of reactants fed into the production process, the mass of reactants permanently removed from the production process, the mass flow of process streams containing more than trace concentrations of by-products that lead to yield losses, or the mass of wastes fed into the destruction device, the substitute value of that parameter shall be a secondary mass measurement taken during the period the primary mass measurement was not available. For example, if the mass produced is usually measured with a flowmeter at the inlet to the day tank and that flowmeter fails to meet an accuracy or precision test, malfunctions, or is rendered inoperable, then the mass produced may be estimated by calculating the change in volume in the day tank and multiplying it by the density of the product. (2) For each missing value of fluorinated GHG concentration, the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and 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 value obtained after the missing data period. (3) If the methods specified in paragraphs (a)(1) and (a)(2) are likely to significantly under- or overestimate the value of the parameter during the period when data were missing, you shall develop a best estimate of the parameter, documenting the methods used, the rationale behind them, and the reasons why the methods specified in (a)(1) and (a)(2) would lead to a significant under- or overestimate of the parameter.	All flowmeters, scales, load cells, and volumetric and density measures used to measure quantities that are to be reported under §98.126 shall be calibrated using suitable NIST-traceable standards and suitable methods published by a consensus standards organization (e.g., ASTM, ASME, ASHRAE, or others). Alternatively, calibration procedures specified by the flowmeter, scale, or load cell manufacturer may be used. Calibration shall be performed prior to the first reporting year. After the initial calibration, recalibration shall be performed at least annually or at the minimum frequency specified by the manufacturer, whichever is more frequent. All gas chromatographs used to determine the concentration of fluorinated greenhouse gases in process streams shall be calibrated at least monthly through analysis of certified standards with known concentrations of the same chemical(s) in the same range(s) (fractions by mass) as the process samples. Calibration gases prepared from a high-concentration certified standard using a gas dilution system that meets the requirements specified in Test Method 205, 40 CFR Part 51, Appendix M may also be used.
M—Food Processing (§98.130)	Onsite stationary combustion	See requirements for stationary combustion	
	Onsite landfills	See requirements for landfills	
	Onsite wastewater treatment	See requirements for onsite wastewater treatment	
N—Glass Production (§98.140)	Stationary combustion	See requirements for stationary combustion	
	Production	(a) Missing data on the monthly amounts of carbonate-based raw materials charged to any continuous glass melting furnace shall be replaced by the average of the data from the previous month and the following month for each carbonate-based raw material charged. (b) Missing data on the mass fractions of carbonate-based minerals in the carbonate-based raw materials shall be replaced using the assumption that the mass fraction of each carbonate based mineral is 1.0.	If use raw material supplier data to determine carbonate-mineral mass, facility should make its own measurements annually to verify the data. Such measurements shall be based on sampling and chemical analysis conducted by a certified laboratory using a suitable method published by a consensus standards organization (e.g., ASTM Method D3682, Test Method for Major and Minor Elements in Coal and Coke Ash by Atomic Absorption Method).

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
O—HCFC-22 Production and HFC-23 Destruction (§98.150)	All facilities	A complete record of all measured parameters used in the GHG emissions calculations is required. (1) For each missing value of the HFC-23 or HCFC-22 concentration, the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period. (2) For each missing value of the product stream mass flow or product mass, the substitute value of that parameter shall be a secondary product measurement. If that measurement is taken significantly downstream of the usual mass flow or mass measurement (e.g., at the shipping dock rather than near the reactor), the measurement shall be multiplied by 1.015 to compensate for losses. (3) Notwithstanding paragraphs (a)(1) and (a)(2), if the owner or operator has reason to believe that the methods specified in paragraphs (a)(1) and (a)(2) are likely to significantly under- or overestimate the value of the parameter during the period when data were missing (e.g., because the monitoring failure was linked to a process disturbance that is likely to have significantly increased the HFC-23 generation rate), develop best estimate of the parameter, documenting the methods used, the rationale behind them, and the reasons why the methods specified in (a)(1) and (a)(2) would probably lead to a significant under- or overestimate of the parameter.	All flowmeters, scales, and load cells used to measure quantities that are to be reported under section §98.156 of this subpart shall be calibrated using suitable NIST-traceable standards and suitable methods published by a consensus standards organization (e.g., ASTM, ASME, ASHRAE, or others). Alternatively, calibration procedures specified by the flowmeter, scale, or load cell manufacturer may be used. Calibration shall be performed prior to the first reporting year. After the initial calibration, recalibration shall be performed at least annually or at the minimum frequency specified by the manufacturer, whichever is more frequent. All gas chromatographs used to determine the concentration of HFC-23 in process streams shall be calibrated at least monthly through analysis of certified standards (or of calibration gases prepared from a high-concentration certified standard using a gas dilution system that meets the requirements specified in Test Method 205, 40 CFR part 51, appendix M) with known HFC-23 concentrations that are in the same range (fractions by mass) as the process samples.
P—Hydrogen Production (§98.160)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. (a) For missing feedstock supply rates, use the lesser of the maximum supply rate that the unit is capable of processing or the maximum supply rate that the meter can measure. (b) There are no missing data procedures for carbon content. A re-test must be performed if the data from any monthly measurements are determined to be invalid. (c) Facilities that use CEMS must comply with the monitoring and QA/QC procedures specified in §98.34(e).	All fuel flow meters, gas composition monitors, and heating value monitors shall be calibrated prior to the first reporting year, using a suitable method published by a consensus standards organization (e.g., ASTM, ASME, API, AGA, or others). Alternatively, calibration procedures specified by the flow meter manufacturer may be used. Fuel flow meters, gas composition monitors, and heating value monitors shall be recalibrated either annually or at the minimum frequency specified by the manufacturer. Document the procedures used to ensure the accuracy of the estimates of feedstock consumption.
Q—Iron & Steel Production (§98.170)	Stationary combustion	See requirements for stationary combustion	
	Production	There are no allowances for missing data for facilities that estimate emissions using the carbon balance procedure or the site-emission factor procedure, and 100 percent data availability is required.	None specified. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
R—Lead Production (§98.180)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. (a) For each missing value of the carbon content the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period; and (b) For missing records of the mass of carbon-containing input material consumption, the substitute data value shall be the best available estimate of the mass of the input material. The owner or operator shall document and keep records of the procedures used for all such estimates.	None specified. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.
S—Lime Manufacturing (§98.190)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. (a) For each missing value of quantity of lime types, CaO and MgO content, and quantity of LKD the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period; and (b) For missing records of mass of raw material consumption, the substitute data value shall be the best available estimate of the mass of inputs. The owner or operator shall document and keep records of the procedures used for all such estimates.	Follow the quality assurance/quality control procedures (including documentation) in the National Lime Association's "CO2 Emissions Calculation Protocol for the Lime Industry-English Units Version", February 5, 2008 Revision (incorporated by reference-see §98.7).

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
T—Magnesium Production (§98.200)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emission calculations is required. Replace missing data on the consumption of cover gases by multiplying magnesium production during the missing data period by the average cover gas usage rate from the most recent period when operating conditions were similar to those for the period for which the data are missing. Calculate the usage rate for each cover gas using equation T-5.	All flowmeters, scales, and load cells used to measure quantities that are to be reported under this subpart shall be calibrated using suitable NIST-traceable standards and suitable methods published by a consensus standards organization (e.g., ASTM, ASME, ASHRAE, or others). Alternatively, calibration procedures specified by the flowmeter, scale, or load cell manufacturer may be used. Calibration shall be performed prior to the first reporting year. After the initial calibration, recalibration shall be performed at least annually or at the minimum frequency specified by the manufacturer, whichever is more frequent. Option 2: (1) Track the identities and masses of containers leaving and entering storage with check-out and check-in sheets and procedures. The masses of cylinders returning to storage shall be measured immediately before the cylinders are put back into storage. (2) Ensure that all the quantities required by equations T-3 and T-4 of this subpart have been measured using scales or load cells with an accuracy of one percent of full scale or better, accounting for the tare weights of the containers. You may accept gas masses or weights provided by the gas supplier (e.g., for the contents of cylinders containing new gas or for the heels remaining in cylinders returned to the gas supplier); however, you remain responsible for the accuracy of these masses or weights under this subpart.
U—Misc. Uses of Carbonate (§ 98.210)	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. A re-test must be performed if the data from any measurements are determined to be invalid.	None specified. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.
V—Nitric Acid Production (§98.220)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required.	All QA/QC procedures specified in the reference test methods and any associated performance specifications apply. The report must include: (1) Analysis of samples, determination of emissions, and raw data; (2) All information and data used to derive the emissions factor; and (3) The production rate during the test and how it was determined.
W—Oil & Natural Gas Systems (§98.230)	Stationary combustion	See requirements for stationary combustion	
	Process facilities	A complete record of all measured parameters used in the GHG emissions calculations is required. If data are lost or an error occurs during annual emissions measurements, you must repeat the measurement activity for those sources until a valid measurement is obtained.	None specified. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
X—Petrochemical Production (§98.240)	Stationary combustion	See requirements for stationary combustion	
	Onsite wastewater treatment	See requirements for onsite wastewater treatment	
	Production	(a) For missing feedstock flow rates, product flow rates, and carbon contents, use the same procedures as for missing flow rates and carbon contents for fuels as specified in §98.35. (b) For missing CO2 concentration, stack gas flow rate, and moisture content for CEMS on any process vent stack, follow the applicable procedures specified in §98.35.	CEMS: see requirements of subpart C Mass balance: document procedures used to ensure the accuracy of the measurements of the feedstock and product flows including, but not limited to, calibration of all weighing equipment and other measurement devices. The estimated accuracy of measurements made with these devices shall be recorded, and the technical basis for these estimates shall be recorded. All feedstock and product flow meters must be calibrated prior to the first reporting year, using any applicable method incorporated by reference in §98.7(b)(1) through (6), (c)(1), (f)(3)(i) through (ii), or (g)(1). You should use the flow meter accuracy test procedures in appendix D to part 75 of this chapter. Alternatively, calibration procedures specified by the equipment manufacturer may be used. Flow meters and gas composition monitors shall be recalibrated annually or at the frequency specified by another applicable rule or the manufacturer, whichever is more frequent.
Y—Petroleum Refineries (§98.250)	Stationary combustion	See requirements for stationary combustion	
	Non-merchant hydrogen production	See requirements for hydrogen production	
	Onsite landfills	See requirements for landfills	
	Onsite wastewater treatment	See requirements for onsite wastewater treatment	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. (a) For each missing value of the heat content, carbon content, or molecular weight of the fuel, the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period. (b) For missing oil and gas flow rates, use the standard missing data procedures in section 2.4.2 of appendix D to part 75 of this chapter. (c) For missing CO2, CO, or O2, CH4, and N2O concentrations, stack gas flow rate, and stack gas moisture content values, use the applicable initial missing data procedures in §98.35 of subpart C.	All fuel flow meters, gas composition monitors, and/or heating value monitors that are used to provide data for the GHG emissions calculations shall be calibrated prior to the first reporting year, using a suitable method published by a consensus standards organization (e.g., ASTM, ASME, API, AGA, etc.). Alternatively, calibration procedures specified by the flow meter manufacturer may be used. Fuel flow meters, gas composition monitors, and heating value monitors shall be recalibrated either annually or at the minimum frequency specified by the manufacturer. Document the procedures used to ensure the accuracy of the estimates of fuel usage, gas composition, and/or heating value including, but not limited to, calibration of weighing equipment, fuel flow meters, and other measurement devices. The estimated accuracy of measurements made with these devices shall also be recorded, and the technical basis for these estimates shall be provided. All CO2 CEMS and flow rate monitors used for direct measurement of GHG emissions must comply with the QA procedures in §98.34(e).
Z—Phosphoric Acid Production (§98.260)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. A re-test must be performed if the data from the measurement are determined to be unacceptable.	None specified. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
AA—Pulp and Paper Manufacturing (§98.270)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. (a) There are no missing data procedures for measurements of heat content and carbon content of spent pulping liquor. A re-test must be performed if the data from any monthly measurements are determined to be invalid. (b) For missing spent pulping liquor flow rates, use the lesser value of either the maximum fuel flow rate for the combustion unit, or the maximum flow rate that the fuel flow meter can measure. (c) For the use of makeup chemicals (carbonates), the substitute data value shall be the best available estimate of makeup chemical consumption, based on available data (e.g., past accounting records, production rates). The owner or operator shall document and keep records of the procedures used for all such estimates.	Each facility must keep records that include a detailed explanation of how company records of measurements are used to estimate GHG emissions. The owner or operator must also document the procedures used to ensure the accuracy of the measurements of fuel and makeup chemical usage, including, but not limited to calibration of weighing equipment, fuel flow meters, and other measurement devices. The estimated accuracy of measurements made with these devices must be recorded and the technical basis for these estimates must be provided. The procedures used to convert spent liquor flow rates to units of mass (i.e., spent liquor solids firing rates) also must be documented. Records must be made available upon request for verification of the calculations and measurements. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.
BB—Silicon Carbide Production (§98.280)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. There are no missing value provisions for the carbon content factor or coke consumption. A re-test must be performed if the data from the quarterly carbon content measurements are determined to be unacceptable or not representative of typical operations.	None specified. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.
CC—Soda Ash Manufacturing (§98.290)	Fuel combustion at each kiln and from each stationary combustion unit	See requirements for stationary combustion	
	For each soda ash manufacturing line	A re-test must be performed if the data from the daily carbon content measurements are determined to be unacceptable.	Document the procedures used to ensure the accuracy of the monthly measurements of trona consumed soda ash production. A complete record of all measured parameters used in the GHG emissions calculations is required. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
DD—Sulfur Hexafluoride (SF6) from Electrical Equipment (§98.300)	Electric power system	A complete record of all measured parameters used in the GHG emissions calculations is required. Replace missing data, if needed, based on data from equipment with a similar nameplate capacity for SF6 and PFC, and from similar equipment repair, replacement, and maintenance operations.	(a) QA/QC methods for reviewing completeness and accuracy of reporting: (1) Review inputs to mass balance equation to ensure inputs and outputs to company's system are all included. (2) Do not enter negative inputs and confirm that negative emissions are not calculated. However, decrease in SF6 inventory and nameplate capacity may be calculated as negative numbers. (3) Ensure that beginning-of-year inventory matches end-of-year inventory from the previous year. (4) Ensure that in addition to SF6 purchased from bulk gas distributors, SF6 purchased from Original Equipment Manufacturers (OEM) and SF6 returned to the facility from off-site recycling are also accounted for among the total additions. (b) Ensure the following QA/QC methods are employed throughout the year: (1) Ensure that cylinders returned to the gas supplier are consistently weighed on a scale that is certified to be accurate and precise to within 1% of the true weight and is periodically recalibrated per the manufacturer's specifications. Either measure residual gas (the amount of gas remaining in returned cylinders) or have the gas supplier measure it. If the gas supplier weighs the residual gas, obtain from the gas supplier a detailed monthly accounting, within 1%, of residual gas amounts in the cylinders returned to the gas supplier. (2) Ensure that procedures are in place and followed to track and weigh all cylinders as they are leaving and entering storage. Cylinders shall be weighed on a scale that is certified to be accurate to within 1% of the true weight and the scale shall be recalibrated at least annually or at the minimum frequency specified by the manufacturer, whichever is more frequent. All scales used to measure quantities that are to be reported under §98.306 shall be calibrated using suitable NIST-traceable standards and suitable methods published by a consensus standards organization (e.g., ISWM, ISDA, NCWM, or others). Alternatively, calibration procedures specified by the scale manufacturer may be used. Calibration shall be performed prior to the first reporting year. (3) Ensure all substations have provided information to the manager compiling the emissions report (if it is not already handled through an electronic inventory system).
EE—Titanium Dioxide Production (§98.310)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required.	Document the procedures used to ensure the accuracy of monthly calcined petroleum coke consumption.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
FF—Underground Coal Mines (§98.320)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. For each missing value of CH4 concentration, flow rate, temperature, and pressure for ventilation and degassification systems, the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period.	All fuel flow meters and gas composition monitors shall be calibrated prior to the first reporting year, using a suitable method published by a consensus standards organization (e.g., ASTM, ASME, API, AGA, MSHA, or others). Alternatively, calibration procedures specified by the flow meter manufacturer may be used. Fuel flow meters, and gas composition monitors shall be recalibrated either annually or at the minimum frequency specified by the manufacturer or other applicable standards. All temperature and pressure monitors must be calibrated using the procedures and frequencies specified by the manufacturer. Document the procedures used to ensure the accuracy of gas flow rate, gas composition, temperature, and pressure measurements. Procedures include calibration fuel flow meters, and other measurement devices. The estimated accuracy of measurements and the technical basis for the estimated accuracy shall be recorded.
GG—Zinc Production (§98.330)	Stationary combustion	See requirements for stationary combustion	
	Production	A complete record of all measured parameters used in the GHG emissions calculations is required. (a) For each missing value of the carbon content the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period; and (b) For missing records of the mass of carbon-containing input material consumption, the substitute data value shall be the best available estimate of the mass of the input material. The owner or operator shall document and keep records of the procedures used for all such estimates.	None specified. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
HH—Landfills (§98.340)	Stationary combustion	See requirements for stationary combustion	
	Production (As required by related source methodology)	A complete record of all measured parameters used in the GHG emissions calculations is required. (1) For each missing value of the CH4 content, the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period. (2) For missing gas flow rates, the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period. (3) For missing daily waste disposal data for disposal in reporting years, the substitute value shall be the average daily waste disposal quantity for that day of the week as measured on the week before and week after the missing daily data.	All fuel flow meters and gas composition monitors shall be calibrated prior to the first reporting year, using ASTM D1945-03 (Reapproved 2006), Standard Test Method for Analysis of natural Gas by Gas Chromatography; ASTM D1946-90 (Reapproved 2006), Standard Practice for Analysis of Reformed Gas by Gas Chromatography; ASTM D4891-89 (Reapproved 2006, Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion; or UOP539-97 Refinery Gas Analysis by Gas Chromatrography (incorporated by reference, see §98.7). Alternatively, calibration procedures specified by the flow meter manufacturer may be used. Fuel flow meters, and gas composition monitors shall be recalibrated either annually or at the minimum frequency specified by the manufacturer. All temperature and pressure monitors must be calibrated using the procedures and frequencies specified by the manufacturer. Document the procedures used to ensure the accuracy of the estimates of disposal quantities and, if applicable, gas flow rate, gas composition, temperature, and pressure measurements. These procedures include, but are not limited to, calibration of weighing equipment, fuel flow meters, and other measurement devices. The estimated accuracy of measurements made with these devices shall also be recorded, and the technical basis for these estimates shall be provided.
II—Wastewater (§98.350)	Stationary combustion	See requirements for stationary combustion	
	Production (As required by related source methodology)	A complete record of all measured parameters used in the GHG emissions calculations is required. (1) For each missing monthly value of COD or wastewater flow treated, the substitute data value shall be the arithmetic average of the quality-assured values of those parameters for the weeks immediately preceding and immediately following the missing data incident. For each missing value of the CH4 content or gas flow rates, the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. (2) If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period.	All flow meters must be calibrated using the procedures and frequencies specified by the device manufacturer. All gas flow meters and gas composition monitors shall be calibrated prior to the first reporting year, using a suitable method published by a consensus standards organization (e.g., ASTM, ASME, API, AGA, or others). Alternatively, calibration procedures specified by the flow meter manufacturer may be used. Gas flow meters and gas composition monitors shall be recalibrated either annually or at the minimum frequency specified by the manufacturer. All temperature and pressure monitors must be calibrated using the procedures and frequencies specified by the device manufacturer. Document the procedures used to ensure the accuracy of gas flow rate, gas composition, temperature, and pressure measurements. These procedures include, but are not limited to, calibration fuel flow meters and other measurement devices. The estimated accuracy of measurements made with these devices shall also be recorded, and the technical basis for these estimates shall be provided.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
JJ—Manure Management (§98.360)	Stationary combustion	See requirements for stationary combustion	
	Production (As required by related source methodology)	A complete record of all measured parameters used in the GHG emissions calculations is required. For missing gas flow rates, volatile solids, or nitrogen or methane content data, the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period.	All temperature and pressure monitors must be calibrated using the procedures and frequencies specified by the manufacturer. All gas flow meters and gas composition monitors shall be calibrated prior to the first reporting year, using a suitable method published by a consensus standards organization (e.g., ASTM, ASME, API, AGA, or others). Alternatively, calibration procedures specified by the flow meter manufacturer may be used. Gas flow meters and gas composition monitors shall be recalibrated either annually or at the minimum frequency specified by the manufacturer. If applicable, document the procedures used to ensure the accuracy of gas flow rate, gas composition, temperature, and pressure measurements. These procedures include, but are not limited to, calibration of fuel flow meters and other measurement devices. The estimated accuracy of measurements made with these devices shall also be recorded, and the technical basis for these estimates shall be provided.
KK—Suppliers of Coal (§98.370)	All facilities	A complete record of all measured parameters used in the GHG emissions calculations is required. (b) Whenever a quality-assured value for coal production during any time period is unavailable, you must use the average of the parameter values recorded immediately before and after the missing data period in the calculations. (c) Facilities using Calculation Method 1 of this section shall develop the statistical relationship between GCV and carbon content according to §98.274(e), and use this statistical relationship to estimate daily carbon content for any day for which measured carbon content is not available. (d) Facilities, importers and exporters using Calculation Method 2 or 3 shall estimate the missing GCV values based on a weighted average value for the previous seven days. (e) Estimates of missing data shall be documented and records maintained showing the calculations.	Each owner or operator using mechanical coal sampling systems shall perform quality assurance and quality control according to ASTM D4702-07 and ASTM D6518-07.
LL—Suppliers of Coal-based Liquid Fuels (§98.380)	All facilities	(a) A complete record of all measured parameters used in the reporting of fuel volumes and the calculations of CO2 mass emissions is required. (b) For coal-to-liquids facilities, the last quality assured reading shall be used. If substantial variation in the flow rate is observed or if a quality assured measurement of quantity is unavailable for any other reason, the average of the last and the next quality assured reading shall be used to calculate a substitute measurement of quantity. (c) Calculation of substitute data shall be documented and records maintained showing the calculations.	All flow meters and product monitors shall be calibrated prior to the first reporting year, using a suitable method published by a consensus standards organization (e.g., ASTM, ASME, API, NAESB, or others). Alternatively, calibration procedures specified by the flow meter manufacturer may be used. Fuel flow meters shall be recalibrated either annually or at the minimum frequency specified by the manufacturer. Reporters shall take the following steps to ensure the quality and accuracy of the data reported under these rules: (1) for all volumes of coal-based liquid fuels, reporters shall maintain meter and such other records as are normally maintained in the course of business to document fuel flows; (2) for all estimates of CO2 mass emissions, reporters shall maintain calculations and worksheets used to calculate the emissions.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
MM—Suppliers of Petroleum Products (§98.390)	All facilities	Whenever a metered or quality-assured value of the quantity of petroleum products, natural gas liquids, biomass, or feedstocks during any period is unavailable, a substitute data value for the missing quantity measurement shall be used in the calculations contained in §98.393. (a) For marine-imported and exported refined and semi-refined products, the reporting party shall attempt to reconcile any differences between ship and shore volume readings. If the reporting party is unable to reconcile the readings, the higher of the two values shall be used for emission calculation purposes. (b) For pipeline imported and exported refined and semi-refined products, the last valid volume reading based on the company's established procedures for purposes of product tracking and billing shall be used. If the pipeline experiences substantial variations in flow rate, the average of the last valid volume reading and the next valid volume reading shall be used for emission calculation purposes. (c) For petroleum refineries, the last valid volume reading based on the facility's established procedures for purposes of product tracking and billing shall be used. If substantial variation in the flow rate is observed, the average of the last and the next valid volume reading shall be used for emission calculation purposes.	All flow meters and tank gauges shall be calibrated prior to use for reporting, using a suitable method published by a consensus standards organization (e.g., ASTM, ASME, API, or NAESB). Alternatively, calibration procedures specified by the flow meter manufacturer may be used. Product flow meters and tank gauges shall be recalibrated either annually or at the minimum frequency specified by the manufacturer, whichever is more frequent.
NN—Suppliers of Natural Gas and Natural Gas Liquids (§98.400)	All facilities	(a) A complete record of all measured parameters used in the reporting of fuel volumes and in the calculations of CO2 mass emissions is required. (b) For NGLs, natural gas processing plants shall substitute meter records provided by pipeline(s) for all pipeline receipts of NGLs; by manifests for deliveries made to trucks or rail cars; or metered quantities accepted by the entities purchasing the output from the processing plant whether by pipeline or by truck or rail car. In cases where the metered data from the receiving pipeline(s) or purchasing entities are not available, substitute estimates based on contract quantities required to be delivered under purchase or delivery contracts with other parties. (c) Natural gas local distribution companies may substitute the metered quantities from the delivering pipelines for all deliveries into the distribution system. In cases where the pipeline metered delivery data are not available, substitute ~~their~~ pipeline nominations and scheduled quantities for the period when metered values of actual deliveries are not available. (d) Estimates of missing data shall be documented and records maintained showing the calculations of the values used for the missing data.	All flow meters and product or fuel composition monitors shall be calibrated prior to the first reporting year, using a suitable method published by the American Gas Association Gas Measurement Committee reports on flow metering and heating value calculations and the Gas Processors Association standards on measurement and heating value. Alternatively, calibration procedures specified by the flow meter manufacturer may be used. Fuel flow meters shall be recalibrated either annually or at the minimum frequency specified by the manufacturer.

Subpart	Source Category	Procedures for Estimating Missing Data	QA/QC
OO—Suppliers of Industrial Greenhouse Gases (§98.410)	All facilities	A complete record of all measured parameters used in the GHG emissions calculations is required. (1) For each missing value of the mass produced, fed into the production process (for used material being reclaimed), fed into transformation processes, fed into destruction devices, sent to another facility for transformation, or sent to another facility for destruction, the substitute value of that parameter shall be a secondary mass measurement. (2) For each missing value of fluorinated GHG concentration, except the annual destruction device outlet concentration measurement specified in §98.414(h), the substitute data value shall be the arithmetic average of the quality-assured values of that parameter immediately preceding and immediately following the missing data incident. If, for a particular parameter, no quality-assured data are available prior to the missing data incident, the substitute data value shall be the first quality-assured value obtained after the missing data period. There are no missing value allowances for the annual destruction device outlet concentration measureme (3) Notwithstanding paragraphs (1) and (2), if the owner or operator has reason to believe that the methods specified in paragraphs (1) and (2) are likely to significantly under- or overestimate the value of the parameter during the period when data were missing, the designated representative shall develop his or her best parameter, documenting the methods used, the rationale behind them, and the reasons why the methods specified in (1) and (2) would probably lead to a significant under- or overestimate of the parameter. EPA may reject the alternative estimate and replace it with an estimate based on the applicable method in paragraph (1) or (2) if EPA does not agree with the rationale or method for the alternative estimate.	Facilities that destroy fluorinated GHGs shall account for any temporary reductions in the destruction efficiency that result from any startups, shutdowns, or malfunctions of the destruction device, including departures from the operating conditions defined in state or local permitting requirements and/or oxidizer manufacturer specifications. All flowmeters, weigh scales, and combinations of volumetric and density measurements that are used to measure or calculate quantities that are to be reported under this subpart shall be calibrated using suitable NIST-traceable standards and suitable methods published by a consensus standards organization (e.g., ASTM, ASME, ASHRAE, or others). Alternatively, calibration procedures specified by the flowmeter, scale, or load cell manufacturer may be used. Calibration shall be performed prior to the first reporting year. After the initial calibration, recalibration shall be performed at least annually or at the minimum frequency specified by the manufacturer, whichever is more frequent. All gas chromatographs that are used to measure or calculate quantities that are to be report shall be calibrated at least monthly through analysis of certified standards with known concentrations of the same chemical(s) in the same range(s) (fractions by mass) as the process samples. Calibration gases prepared from a high-concentration certified standard using a gas dilution system that meets the requirements specified in Test Method 205, 40 CFR Part 51, Appendix M may also be used.
PP—Suppliers of Carbon Dioxide (§98.420)	All facilities	(a) Missing quarterly monitoring data on mass flow of CO2 streams captured, extracted, imported, or exported shall be substituted with the greater of the following values: (1) Quarterly CO2 mass flow of gas transferred off site measured during the current reporting year; or (2) Quarterly or annual average values of the monitored CO2 mass flow from the past calendar year. (b) Missing monitoring data on the mass flow of the CO2 stream transferred off site shall be substituted with the quarterly or annual average values from off site transfers from the past calendar year. (c) Missing data on composition of the CO2 stream captured, extracted, transferred, imported, or exported may be substituted for with quarterly or annual average values from the past calendar year.	(a) Mass flow meter calibrations must be NIST traceable. (b) Methods to measure the composition of the carbon dioxide captured, extracted, transferred, imported, or exported must conform to applicable chemical analytical standards. Acceptable methods include U.S. Food and Drug Administration food-grade specifications for carbon dioxide (see 21 CFR 184.1250) and ASTM standard E-1745-95 (2005).