# Appendix C:
# Greenhouse Gas Reporting Program: Reporting Thresholds and Reporting Requirements

## Appendix C. Greenhouse Gas Reporting Program: Reporting Thresholds and Reporting Requirements

| Subpart | Reporting Threshold | Reporting and Verification |
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| C—General Stationary Combustion (§98.30) | 25,000 metric tons $C0_2e$/year | **Units that use the four tiers:**<br>(1) Unit ID number.<br>(2) Code representing the type of unit.<br>(3) Maximum rated heat input capacity of the unit, in mmBtu/hr for boilers and process heaters only and relevant units of measure for other combustion sources.<br>(4) Each type of fuel combusted in the unit during the report year.<br>(5) The methodology (i.e., tier) used to calculate the $CO_2$ emissions for each type of fuel combusted.<br>(6) The methodology start date, for each fuel type.<br>(7) The methodology end date, for each fuel type.<br>(8) For a unit that uses Tiers 1, 2, or 3: the annual $CO_2$ mass emissions (including biogenic $CO_2$), $CH_4$, and $N_2O$ mass emissions for each type of fuel combusted during the reporting year, expressed in metric tons of each gas and in metric tons of $CO_2e$ as well as metric tons of biogenic $CO_2$ emissions (if applicable).<br>(9) For a unit that uses Tier 4: total annual $CO_2$ mass emissions, expressed in metric tons, If the total annual $CO_2$ mass emissions measured by the CEMS consists entirely of non-biogenic $CO_2$; total annual non-biogenic $CO_2$ mass emissions and the annual $CO_2$ mass emissions from biomass combustion, if this total includes both biogenic and non-biogenic $CO_2$ mass emissions measured by the CEMS (reporting by fuel type is not required); and estimate of the heat input from each type of fuel listed in Table C–2 of subpart C that was combusted in the unit during the report year, and the annual $CH_4$ and $N_2O$ emissions for each of these fuels, expressed in metric tons of each gas and in metric tons of $CO_2e$.<br>(10) Annual $CO_2$ emissions from sorbent (if calculated using Equation C–11 of subpart C), expressed in metric tons.<br>(11) Verification data listed in 40 CFR 98.36(e) (see below).<br><br>(a) Tier 1 Calculation Methodology:<br>(i) Total quantity of each type of fuel combusted in the unit or group of aggregated units (as applicable) during the reporting year, in short tons for solid fuels, gallons for liquid fuels and standard cubic feet for gaseous fuels, or, if applicable, therms or mmBtu for natural gas.<br><br>(b) Tier 2 Calculation Methodology:<br>(i) The total quantity of each type of fuel combusted in the unit or group of aggregated units (as applicable) during each month of the reporting year, expressed in short tons for solid fuels, gallons for liquid fuels, and scf for gaseous fuels<br>(ii) The frequency of the HHV determinations (e.g., once a month, once per fuel lot).<br>(iii) The high heat values used in the CO2 emissions calculations for each type of fuel combusted during the reporting year, in mmBtu per short ton for solid fuels, mmBtu per gallon for liquid fuels, and mmBtu per scf for gaseous fuels, for each calendar month in which HHV determination is required (the arithmetic average value for the month if multiple values are obtained in a given month) as well as an indication whether each reported HHV is measured value or substitute data value.<br>(iv) If Equation C–2c of subpart C is used to calculate CO2 mass emissions: the total quantity (i.e., pounds) of steam produced from MSW or solid fuel combustion during each month of the reporting year, and the ratio of the maximum rate heat input capacity to the design rated steam output capacity of the unit, in mmBtu per lb of steam.<br><br>(c) Tier 3 Calculation Methodology:<br>(i) The quantity of each type of fuel combusted in the unit or group of units (as applicable) during each month of the reporting year, in short tons for solid fuels, gallons for liquid fuels, and scf for gaseous fuels.<br>(ii) The frequency of carbon content and, if applicable, molecular weight determinations for each type of fuel for the reporting year (e.g., daily, weekly, monthly, semiannually, once per fuel lot).<br>(iii) The carbon content (expressed as a decimal fraction for solid fuels, kg C per gallon for liquid fuels, and kg C per kg of fuel for gaseous fuels) and, if applicable, gas molecular weight (expressed in units of kg per kg-mole) values used in the emission calculations (including both valid and substitute data values) (report the arithmetic average value for the month if multiple values of a parameter are obtained in a given month).<br>(iv) The total number of valid carbon content determinations and, if applicable, molecular weight determinations made during the reporting year, for each fuel type.<br>(v) The number of substitute data values used for carbon content and, if applicable, molecular weight used in the annual GHG emissions calculations.<br>(vi) The annual average HHV, when measured HHV data, rather than a default HHV from Table C–1 of subpart C, are used to calculate CH4 and N2O emissions for a Tier 3 unit, in accordance with §98.33(c)(1).<br>(vii) The value of the molar volume constant (MVC) used in Equation C–5 (if applicable).<br><br>(d) Tier 4 Calculation Methodology:<br>(i) The total number of source operating hours in the reporting year.<br>(ii) The cumulative CO2 mass emissions in each quarter of the reporting year, i.e., the sum of the hourly values calculated from Equation C–6 or C–7 of subpart C (as applicable), in metric tons |

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| C—General Stationary Combustion (§98.30) | 25,000 metric tons $C0_2e$/year | **Reporting alternatives for units using the four tiers (40 CFR 98.36(c)):**<br><br>*Aggregation of units*<br>(1) Group ID number, beginning with the prefix "GP".<br>(2) The highest maximum rated heat input capacity of any unit in the group (mmBtu/hr).<br>(3) Each type of fuel combusted in the group of units during the reporting year.<br>(4) Annual CO2 mass emissions and annual CH4, and N2O mass emissions, aggregated for each type of fuel combusted in the group of units during the report year, expressed in metric tons of each gas and in metric tons of CO2e; annual CO2 emissions from combustion of all fossil fuels combined and annual CO2 emissions from combustion of all biomass fuels combined, expressed in metric tons, if the units burn both fossil fuels and biomass.<br>(5) The methodology (i.e., tier) used to calculate the CO2 mass emissions for each type of fuel combusted in the units (i.e., Tier 1, Tier 2, or Tier 3).<br>(6) The methodology start date, for each fuel type.<br>(7) The methodology end date, for each fuel type.<br>(8) The calculated CO2 mass emissions (if any) from sorbent expressed in metric tons.<br><br>*Monitored common stack or duct configuration*<br>(1) Common stack or duct identification number, beginning with the prefix "CS".<br>(2) Number of units sharing the common stack or duct.<br>(3) Combined maximum rated heat input capacity of the units sharing the common stack or duct (mmBtu/hr), only when all of the units sharing the common stack are stationary fuel combustion units.<br>(4) Each type of fuel combusted in the units during the year.<br>(5) The methodology (tier) used to calculate the CO2 mass emissions.<br>(6) The methodology start date.<br>(7) The methodology end date .<br>(8) An estimate of the heat input from each type of fuel listed in Table C–2 of subpart C that was combusted during the report year in the units sharing the common stack or duct during the report year, and, for each of these fuels, the annual CH4 and N2O mass emissions from the units sharing the common stack or duct, expressed in metric tons of each gas and in metric tons of CO2e.<br><br>*Common pipe configurations*<br>(1) Common pipe identification number, beginning with the prefix "CP".<br>(2) The highest maximum rated heat input capacity of any unit served by the common pipe (mmBtu/hr).<br>(3) The fuels combusted in the units during the reporting year.<br>(4) The methodology used to calculate the CO2 mass emissions.<br>(5) If the any of the units burns both fossil fuels and biomass, the annual CO2 mass emissions from combustion of all fossil fuels and annual CO2 emissions from combustion of all biomass fuels from the units served by the common pipe, expressed in metric tons.<br>(6) Annual CO2 mass emissions and annual CH4 and N2O emissions from each fuel type for the units served by the common pipe, expressed in metric tons of each gas and in metric tons of CO2e.<br>(7) Methodology start date.<br>(8) Methodology end date.<br>(9) If a common liquid or gaseous fuel supply is shared between one or more large combustion units: attribute all of the GHG emissions from combustion of the shared fuel to the large combustion unit(s) (provided that the total quantity of the fuel combusted during the report year in the units sharing the fuel supply is measured, either at the "gate" to the facility or at a point inside the facility, using a fuel flow meter, billing meter, or tank drop measurements (as applicable); on an annual basis, at least 95 percent (by mass or volume) of the shared fuel is combusted in the large combustion unit(s), and the remainder is combusted in the small combustion sources; and the use of this reporting option is documented in the Monitoring Plan required under §98.3(g)(5)). |

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| C—General Stationary Combustion (§98.30) | 25,000 metric tons C0$_2$e/year | **Units also subject to 40 CFR part 75:**<br>(1) Unit or stack identification numbers that are reported under 40 CFR 75.64.<br>(2) Annual $CO_2$ emissions at each monitored location, expressed in both short tons and metric tons.<br>(3) Annual $CH_4$ and $N_2O$ emissions at each monitored location, for each fuel type listed in Table C–2 that was combusted during the year (except as otherwise provided in §98.33(c)(4)(ii)(B)), expressed in metric tons of $CO_2$e.<br>(4) The total heat input from each fuel listed in Table C–2 that was combusted during the year (except as otherwise provided in §98.33(c)(4)(ii)(B)), expressed in mmBtu.<br>(5) Identification of the Part 75 methodology used to determine the $CO_2$ mass emissions.<br>(6) Methodology start date.<br>(7) Methodology end date.<br>(8) Acid Rain Program indicator.<br>(9) Annual $CO_2$ mass emissions from the combustion of biomass, expressed in metric tons of $CO_2$e (except where the reporting provisions of §§98.3(c)(12)(i) through (c)(12)(iii) are implemented for the 2010 reporting year)<br>(10) For units that use the alternative $CO_2$ mass emissions calculation methods provided in 40 CFR 98.33(a)(5): unit, stack, or pipe ID numbers.<br>(11) For units that use methods specified in 40 CFR 98.33(a)(5)(i) and (ii): each type of fuel combusted in the unit during the reporting year; methodology used to calculate the $CO_2$ mass emissions for each fuel type; methodology start date; methodology end date; code or flag to indicate whether heat input is calculated according to appendix D to part 75 or 40 CFR 75.19 ; annual $CO_2$ emissions at each monitored location, across all fuel types, expressed in metric tons of $CO_2$e; annual heat input from each type of fuel listed in Table C–2 of subpart C that was combusted during the reporting year, expressed in mmBtu; annual $CH_4$ and $N_2O$ emissions at each monitored location, from each fuel type listed in Table C–2 of subpart C that was combusted during the reporting year (except as otherwise provided in 40 CFR 98.33(c)(4)(ii)(D)), expressed in metric tons $CO_2$e; annual CO2 mass emissions from the combustion of biomass, expressed in metric tons CO2e (except where the reporting provisions of 40 CFR 98.3(c)(12)(i) through (c)(12)(iii) are implemented for the 2010 reporting year).<br>(12) For units that use methods specified in 40 CFR 98.33(a)(5)(iii) to monitor heat input year-round: each type of fuel combusted during the reporting year; methodology used to calculate the $CO_2$ mass emissions; methodology start date; methodology end date; code or flag to indicate that the heat input data is derived from CEMS measurements; total annual $CO_2$ emissions at each monitored location, expressed in metric tons of $CO_2$e; annual heat input from each type of fuel listed in Table C–2 of subpart C that was combusted during the reporting year, expressed in mmBtu; annual $CH_4$ and $N_2O$ emissions at each monitored location, from each fuel type listed in Table C–2 of subpart C that was combusted during the reporting year (except as otherwise provided in 40 CFR 98.33(c)(4)(ii)(B)), expressed in metric tons $CO_2$e; and annual $CO_2$ mass emissions from the combustion of biomass, expressed in metric tons $CO_2$e (except where the reporting provisions of 40 CFR 98.3(c)(12)(i) through (c)(12)(iii) are implemented for the 2010 reporting year). |
| D—Electricity Generation (§98.40) | All In | (1) Unit or stack identification numbers that are reported under 40 CFR 75.64.<br>(2) Annual CO2 emissions at each monitored location, expressed in both short tons and metric tons.<br>(3) Annual CH4 and N2O emissions at each monitored location, for each fuel type listed in Table C–2 that was combusted during the year (except as otherwise provided in §98.33(c)(4)(ii)(B)), expressed in metric tons of CO2e.<br>(4) The total heat input from each fuel listed in Table C–2 that was combusted during the year (except as otherwise provided in §98.33(c)(4)(ii)(B)), expressed in mmBtu.<br>(5) Identification of the Part 75 methodology used to determine the CO2 mass emissions.<br>(6) Methodology start date.<br>(7) Methodology end date.<br>(8) Acid Rain Program indicator.<br>(9) Annual CO2 mass emissions from the combustion of biomass, expressed in metric tons of CO2e (except where the reporting provisions of §§98.3(c)(12)(i) through (c)(12)(iii) are implemented for the 2010 reporting year) |

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| E—Adipic Acid Production (§98.50) | All In | (1) Annual process $N_2O$ emissions from adipic acid production (metric tons).<br>(2) Annual adipic acid production (tons).<br>(3) Annual adipic acid production during which $N_2O$ abatement technology (located after the test point) is operating (tons).<br>(4) Annual process $N_2O$ emissions from adipic acid production facility that is sold or transferred off-site (metric tons).<br>(5) Number of abatement technologies (if applicable).<br>(6) Types of abatement technologies used (if applicable).<br>(7) Abatement technology destruction efficiency for each abatement technology (percent destruction).<br>(8) Abatement utilization factor for each abatement technology (fraction of annual production that abatement technology is operating).<br>(9) Number of times in the reporting year that missing data procedures were followed to measure adipic acid production (months).<br>(10) Fraction control factor for each abatement technology (percent of total emissions from the production unit that are sent to the abatement technology) if equation E–3c is used. |
| | | **If a performance test and site-specific emissions factors were used:**<br>(1) Emission factor (lb $N_2O$/ton adipic acid).<br>(2) Test method used for performance test.<br>(3) Production rate per test run during performance test (tons/hr).<br>(4) $N_2O$ concentration per test run during performance test (ppm $N_2O$).<br>(5) Volumetric flow rate per test run during performance test (dscf/hr).<br>(6) Number of test runs.<br>(7) Number of times in the reporting year that a performance test had to be repeated (number). |
| | | **If approval was requested for an alternative method of calculating $N_2O$ concentration**:<br>(1) Name of alternative method.<br>(2) Description of alternative method.<br>(3) Request date.<br>(4) Approval date. |
| F—Aluminum Production (§98.60) | All In | (1) Annual aluminum production in metric tons.<br>(2) Type of smelter technology used.<br>(3) The following PFC-specific information on an annual basis: Perfluoromethane emissions and perfluoroethane emissions from anode effects in all prebake and all Søderberg electolysis cells combined; Anode effect minutes per cell-day (AE-mins/cell-day), anode effect frequency (AE/cell-day), anode effect duration (minutes). (Or anode effect overvoltage factor ((kg CF4/metric ton Al)/(mV/cell day)), potline overvoltage (mV/cell day), current efficiency (%)); Smelter-specific slope coefficients (or overvoltage emission factors) and the last date when the smelter-specific-slope coefficients (or overvoltage emission factors) were measured.<br>(4) Method used to measure the frequency and duration of anode effects (or overvoltage).<br>(5) The following $CO_2$-specific information for prebake cells: Annual anode consumption and annual $CO_2$ emissions from the smelter.<br>(6) The following $CO_2$-specific information for Søderberg cells: Annual paste consumption and annual $CO_2$ emissions from the smelter.<br>(7) Smelter-specific inputs to the $CO_2$ process equations (e.g., levels of sulfur and ash) that were used in the calculation, on an annual basis.<br>(8) Exact data elements required will vary depending on smelter technology (e.g., point-feed prebake or Søderberg) and process control technology (e.g., Pechiney or other). |

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| G—Ammonia Manufacturing (§98.70) | All In | **If a CEMS is used to measure $CO_2$ emissions:**<br>All relevant information required under 40 CFR 98.36 for the Tier 4 Calculation Methodology plus:<br>(1) Annual quantity of each type of feedstock consumed for ammonia manufacturing (scf of feedstock or gallons of feedstock or kg of feedstock).<br>(2) Method used for determining quantity of feedstock used. |
| | | **If a CEMS is not used to measure emissions**:<br>(1) Annual $CO_2$ process emissions (metric tons) for each ammonia manufacturing process unit.<br>(2) Monthly quantity of each type of feedstock consumed for ammonia manufacturing for each ammonia processing unit (scf of feedstock or gallons of feedstock or kg of feedstock).<br>(3) Method used for determining quantity of monthly feedstock used.<br>(4) Whether carbon content for each feedstock for month n is based on reports from the supplier or analysis of carbon content.<br>(5) If carbon content of feedstock for month n is based on analysis, the test method used.<br>(6) Sampling analysis results of carbon content of petroleum coke as determined for QA/QC of supplier data under 98.74(e)<br>(7) If a facility uses gaseous feedstock, the carbon content of the gaseous feedstock, for month n, (kg C per kg of feedstock).<br>(8) If a facility uses gaseous feedstock, the molecular weight of the gaseous feedstock (kg/kg-mole).<br>(9) If a facility uses gaseous feedstock, the molar volume conversion factor of the gaseous feedstock (scf per kg-mole).<br>(10) If a facility uses liquid feedstock, the carbon content of the liquid feedstock, for month n, (kg C per gallon of feedstock).<br>(11) If a facility uses solid feedstock, the carbon content of the solid feedstock, for month n, (kg C per kg of feedstock).<br>(12) Annual urea production (metric tons) and method used to determine urea production.<br>(13) $CO_2$ from the steam reforming of a hydrocarbon or the gasification of solid and liquid raw material at the ammonia manufacturing process unit used to produce urea and the method used to determine the $CO_2$ consumed in urea production. |
| H—Cement Production (§98.80) | All In | **If a CEMS is used to measure $CO_2$ emissions:**<br>All relevant information required under 40 CFR 98.37(e)(2)(vi) plus:<br>(1) Monthly clinker production from each kiln at the facility.<br>(2) Monthly cement production from each kiln at the facility.<br>(3) Number of kilns and number of operating kilns. |
| | | **If a CEMS is not used to measure $CO_2$ emissions**:<br>(1) Kiln identification number.<br>(2) Monthly clinker production from each kiln.<br>(3) Annual cement production at the facility.<br>(4) Number of kilns kilns and number of operating kilns.<br>(5) Quarterly quantity of CKD not recycled to the kiln for each kiln at the facility.<br>(6) Monthly fraction of total CaO, total MgO, non-calcined CaO and non-calcined MgO in clinker for each kiln (as wt-fractions).<br>(7) Method used to determine non-calcined CaO and non-calcined MgO in clinker.<br>(8) Quarterly fraction of total CaO, total MgO, non-calcined CaO and non-calcined MgO in CKD not recycled to the kiln for each kiln (as wt-fractions).<br>(9) Method used to determine non-calcined CaO and non-calcined MgO in CKD.<br>(10) Monthly kiln-specific clinker $CO_2$ emission factors for each kiln (metric tons $CO_2$/metric ton clinker produced).<br>(11) Quarterly kiln-specific CKD $CO_2$ emission factors for each kiln (metric tons $CO_2$/metric ton CKD produced).<br>(12) Annual organic carbon content of raw kiln feed or annual organic carbon content of each raw material (wt-fraction, dry basis).<br>(13) Annual consumption of raw kiln feed or annual consumption each raw material (dry basis).<br>(14) Number of times missing data procedures were used to determine: (i) Clinker production (number of months); (ii) Carbonate contents of clinker (number of months); (iii) Non-calcined content of clinker (number of months); (iv) CKD not recycled to kiln (number of quarters); (v) Non-calcined content of CKD (number of quarters); (vi) Organic carbon contents of raw materials (number of times); and (vii) Raw material consumption (number of months).<br>(15) Method used to determine the monthly clinker production from each kiln reported under 40 CFR 98.86 (b)(2), including monthly kiln-specific clinker factors, if used. |

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| I—Electronics Manufacturing (§98.90) | 25,000 metric tons $C0_2$e/year | (1) Annual manufacturing capacity of the facility as determined in Equation I–5 of subpart I.<br>(2) For facilities that manufacture semiconductors, the diameter of wafers manufactured at the facility (mm).<br>(3) Annual emissions of: (i) Each fluorinated GHG emitted from each process type for which the facility is required to calculate emissions as calculated in Equations I–6 and I–7 of subpart I; (ii) Each fluorinated GHG emitted from each individual recipe (including those in a set of similar recipes), or process sub-type as calculated in Equations I–8 and I–9 of subpart I, as applicable; (iii) $N_2O$ emitted from each chemical vapor deposition process and from other $N_2O$-using manufacturing processes as calculated in Equation I–10 of subpart I; and (iv) Each fluorinated heat transfer fluid emitted as calculated in Equation 1–16 of subpart I.<br>(4) The method of emissions calculation used in 40 CFR 98.93.<br>(5) Annual production in terms of substrate surface area (e.g., silicon, PV-cell, glass).<br>(6) When using factors for fluorinated GHG process utilization and by-product formation rates other than the defaults provided in Tables I–3, I–4, I–5, I–6, and I–7 to subpart I and/or $N_2O$ utilization factors other than the defaults provided in Table I–8 to subpart I, report the following, as applicable: (i) The recipe-specific utilization and by-product formation rates for each individual recipe (or set of similar recipes) and/or facility-specific $N_2O$ utilization factors; (ii) For recipe-specific utilization and by-product formation rates, the film or substrate that was etched/cleaned and the feature type that was etched, as applicable; (iii) Certification that the recipes included in a set of similar recipes are similar, as defined in 40 CFR 98.98; (iv) Certification that the measurements for all reported recipe-specific utilization and by-product formation rates and/or facility-specific $N_2O$ utilization factors were made using the International SEMATECH #06124825A–ENG (incorporated by reference, see 40 CFR 98.7), or the International SEMATECH #01104197A–XFR (incorporated by reference, see 40 CFR 98.7) if measurements were made prior to January 1, 2007; (v) Source of the recipe-specific utilization and by-product formation rates and/or facility-specific-$N_2O$ utilization factors; and (vi) Certification that the conditions under which the measurements were made for facility-specific $N_2O$ utilization factors are representative of the facility's $N_2O$ emitting production processes.<br>(7) Annual gas consumption for each fluorinated GHG and $N_2O$ as calculated in Equation I–11 of subpart I, including where the facility used less than 50 kg of a particular fluorinated GHG or $N_2O$ during the reporting year. For all fluorinated GHGs and $N_2O$ used at the facility for which emissions have not calculated using Equations I–6, I–7, I–8, I–9, and I–10 of subpart I, the chemical name of the GHG used, the annual consumption of the gas, and a brief description of its use.<br>(8) All inputs used to calculate gas consumption in Equation I–11 of subpart I, for each fluorinated GHG and $N_2O$ used.<br>(9) Disbursements for each fluorinated GHG and $N_2O$ during the reporting year, as calculated using Equation I–12 of subpart I.<br>(10) All inputs used to calculate disbursements for each fluorinated GHG and $N_2O$ used in Equation I–12 of subpart I, including all facility-wide gas-specific heel factors used for each fluorinated GHG and $N_2O$. If the facility used less than 50 kg of a particular fluorinated GHG during the reporting year, facility-wide gas-specific heel factors do not need to be reported for those gases.<br>(11) Annual amount of each fluorinated GHG consumed for each recipe, process sub-type, or process type, as appropriate, and the annual amount of $N_2O$ consumed for each chemical vapor deposition and other electronics manufacturing production processes, as calculated using Equation I–13 of subpart I.<br>(12) All apportioning factors used to apportion fluorinated GHG and $N_2O$ consumption.<br>(13) For the facility-specific apportioning model used to apportion fluorinated GHG and $N_2O$ consumption under 40 CFR 98.94(c), the following information to determine it is verified in accordance with procedures in 40 CFR 98.94(c)(1) and (2): (i) Identification of the quantifiable metric used in the facility-specific engineering model to apportion gas consumption; (ii) The start and end dates selected under 40 CFR 98.94(c)(2)(i); (iii) Certification that the gases selected under 40 CFR 98.94(c)(2)(ii) correspond to the largest quantities consumed on a mass basis, at the facility in the reporting year for the plasma etching process type and the chamber cleaning process type; and (iv) The result of the calculation comparing the actual and modeled gas consumption under 40 CFR 98.94(c)(2)(iii).<br>(14) Fraction of each fluorinated GHG or $N_2O$ fed into a recipe, process sub-type, or process type that is fed into tools connected to abatement systems.<br>(15) Fraction of each fluorinated GHG or $N_2O$ destroyed or removed in abatement systems connected to process tools where recipe, process sub-type, or process type j is used, as well as all inputs and calculations used to determine the inputs for Equation I–14 of subpart I.<br>(16) Inventory and description of all abatement systems through which fluorinated GHGs or $N_2O$ flow at the facility, including the number of devices of each manufacturer, model numbers, manufacturer claimed fluorinated GHG and $N_2O$ destruction or removal efficiencies, if any, and records of destruction or removal efficiency measurements over their in-use lives. The inventory of abatement systems must describe the tools with model numbers and the recipe(s), process sub-type, or process type for which these systems treat exhaust.<br>(17) For each abatement system through which fluorinated GHGs or $N_2O$ flow at the facility, for which controlled emissions are reported, the following: (i) Certification that each abatement system has been installed, maintained, and operated in accordance with manufacturers' specifications; (ii) All inputs and results of calculations made accounting for the uptime of abatement systems used during the reporting year, in accordance with Equations I–14 and I–15 of subpart I; (iii) The default destruction or removal efficiency value or properly measured destruction or removal efficiencies for each abatement system used in the reporting year; (iv) Where the default destruction or removal efficiency value is used to report controlled emissions, certification that the abatement systems for which emissions are being reported were specifically designed for fluorinated GHG and $N_2O$ abatement. Support this certification by providing abatement system supplier documentation stating that the system was designed for fluorinated GHG and $N_2O$ abatement; (v) Where properly measured destruction or removal efficiencies or class averages of destruction or removal efficiencies are used, the following must also be reported: (a) A description of the class, including the abatement system manufacturer and model number and the fluorinated GHG(s) and $N_2O$ in the effluent stream; (b) The total number of systems in that class for the reporting year; (c) The total number of systems for which destruction or removal efficiency was properly measured in that |

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| I—Electronics Manufacturing (§98.90) | 25,000 metric tons C0$_2$e/year | class for the reporting year; (d) A description of the calculation used to determine the class average, including all inputs to the calculation; (e) A description of the method used for randomly selecting class members for testing.<br>(18) For fluorinated heat transfer fluid emissions, inputs to the fluorinated heat transfer fluid mass balance equation, Equation I–16 of subpart I, for each fluorinated heat transfer fluid used.<br>(19) Where missing data procedures were used to estimate inputs into the fluorinated heat transfer fluid mass balance equation under 40 CFR 98.95(b), the number of times missing data procedures were followed in the reporting year, the method used to estimate the missing data, and the estimates of those data.<br>(20) A brief description of each "best available monitoring method" used according to 40 CFR 98.94(a), the parameter measured or estimated using the method, and the time period during which the "best available monitoring method" was used.<br>(21) For each fluorinated heat transfer fluid used, whether the emission estimate includes emissions from all applications or from only the applications specified in the definition of fluorinated heat transfer fluids in 40 CFR 98.98.<br>(22) For reporting year 2012 only, the date on which monitoring emissions of fluorinated heat transfer fluids began whose vapor pressure falls below 1 mm Hg absolute at 25 °C. This is either January 1, 2012 or March 23, 2012. |
| K—Ferroalloy Production (§98.110) | 25,000 metric tons C0$_2$e/year | **All**:<br>(a) Annual facility ferroalloy product production capacity (tons).<br>(b) Annual production for each ferroalloy product identified in 40 CFR 98.110, from each EAF (tons).<br>(c) Total number of EAFs at facility used for production of ferroalloy products. |
| | | **If a CEMS is used to measure $CO_2$ emissions:**<br>All relevant information required under 40 CFR 98.37(e)(2)(vi) for the Tier 4 Calculation Methodology plus:<br>(1) Annual process $CO_2$ emissions (in metric tons) from each EAF used for the production of any ferroalloy listed in Table K-1 of subpart K.<br>(2) Annual process $CH_4$ emissions (in metric tons) from each EAF used for the production of any ferroalloy listed in Table K-1 of subpart K (metric tons).<br>(3) Identification each EAF. |
| | | **If a CEMS is not used to measure $CO_2$ process emissions**, and the carbon mass balance procedure is used to determine $CO_2$ emissions according to the requirements in 40 CFR 98.113(b):<br>(1) Annual process $CO_2$ emissions (in metric tons) from each EAF used for the production of any ferroalloy listed in Table K-1 of subpart K (metric tons).<br>(2) Annual process $CH_4$ emissions (in metric tons) from each EAF used for the production of any ferroalloy listed in Table K-1 of subpart K (metric tons).<br>(3) Identification number for each material.<br>(4) Annual material quantity for each material included for the calculation of annual process $CO_2$ emissions for each EAF.<br>(5) Annual average of the carbon content determinations for each material included for the calculation of annual process $CO_2$ emissions for each EAF (percent by weight, expressed as a decimal fraction).<br>(6) The method used for the determination of carbon content for each material reported in paragraph (e)(5) of this section (e.g., supplier provided information, analyses of representative samples collected).<br>(7) For missing data procedures: How monthly mass of carbon-containing inputs and outputs with missing data was determined and the number of months the missing data procedures were used. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| L—Fluorinated Gas Production (§98.120) | 25,000 metric tons $C0_2e$/year | **All:**<br>(1) *Frequency of reporting under paragraph (a) of this section.* The information in paragraphs (a)(2), (5), and (6) of this section must be reported annually. The information in paragraphs (a)(3) and (4) of this section must be reported once by March 31, 2012 for each process and operating scenarios that operates between December 31, 2010 and December 31, 2011. For other processes and operating scenarios, the information in paragraphs (a)(3) and (4) of this section must be reported once by March 31 of the year following the year in which the process or operating scenario commences or recommences.<br>(2) Report the total mass in metric tons of each fluorinated GHG emitted from: (i) Each fluorinated gas production process and all fluorinated gas production processes combined; (ii) Each fluorinated gas transformation process that is not part of a fluorinated gas production process and all such fluorinated gas transformation processes combined, except report separately fluorinated GHG emissions from transformation processes where a fluorinated GHG reactant is produced at another facility; (iii) Each fluorinated gas destruction process that is not part of a fluorinated gas production process or a fluorinated gas transformation process and all such fluorinated gas destruction processes combined; and (iv) Venting of residual fluorinated GHGs from containers returned from the field.<br>(3) The chemical identities of the contents of the stream(s) (including process, emissions, and destroyed streams) analyzed under the initial scoping speciation of fluorinated GHG at 40 CFR 98.124(a), by process.<br>(4) The location and function of the stream(s) (including process streams, emissions streams, and destroyed streams) that were analyzed under the initial scoping speciation of fluorinated GHG at 40 CFR 98.124(a), by process.<br>(5) The method used to determine the mass emissions of each fluorinated GHG, i.e., mass balance, process-vent-specific emission factor, or process-vent-specific emission calculation factor, for each process and process vent at the facility. For processes for which the process-vent-specific emission factor or process-vent-specific emission calculation factor are used, report the method used to estimate emissions from equipment leaks.<br>(6) The chemical formula and total mass produced of the fluorinated gas product in metric tons, by chemical and process. |
| | | **For mass balance approach:** For processes whose emissions are determined using the mass-balance approach under 40 CFR 98.123(b), report the information listed in (1) through (13) for each process on an annual basis. Identify and separately report fluorinated GHG emissions from transformation processes where the fluorinated GHG reactants are produced at another facility. If using an element other than fluorine in the mass-balance equation pursuant to 40 CFR 98.123(b)(3), substitute that element for fluorine in the reporting requirements of this paragraph.<br>(1) If calculating the relative and absolute errors under 98.123(b)(1), the absolute and relative errors calculated under paragraph 40 CFR 98.123(b)(1), as well as the data (including quantities and their accuracies and precisions) used in these calculations.<br>(2) The balanced chemical equation that describes the reaction used to manufacture the fluorinated GHG product and each fluorinated GHG transformation product.<br>(3) The mass and chemical formula of each fluorinated GHG reactant emitted from the process in metric tons.<br>(4) The mass and chemical formula of the fluorinated GHG product emitted from the process in metric tons.<br>(5) The mass and chemical formula of each fluorinated GHG by-product emitted from the process in metric tons.<br>(6) The mass and chemical formula of each fluorine-containing reactant that is fed into the process (metric tons).<br>(7) The mass and chemical formula of each fluorine-containing product produced by the process (metric tons).<br>(8) If using 40 CFR 98.123(b)(4) to estimate the total mass of fluorine in destroyed or recaptured streams, report: (i) The mass and chemical formula of each fluorine-containing product that is removed from the process and fed into the destruction device (metric tons); (ii) The mass and chemical formula of each fluorine-containing by-product that is removed from the process and fed into the destruction device (metric tons); (iii) The mass and chemical formula of each fluorine-containing reactant that is removed from the process and fed into the destruction device (metric tons); (iv) The mass and chemical formula of each fluorine-containing by-product that is removed from the process and recaptured (metric tons); and (v) The demonstrated destruction efficiency of the destruction device for each fluorinated GHG fed into the device from the process in greater than trace concentrations (fraction).<br>(9) If using 40 CFR 98.123(b)(15) to estimate the total mass of fluorine in destroyed or recaptured streams: (i) The mass of fluorine in each stream that is fed into the destruction device (metric tons); (ii) The mass of fluorine that is recaptured (metric tons); and (iii) The weighted average destruction efficiency of the destruction device calculated for each stream under 40 CFR 98.123(b)(16).<br>(10) The fraction of the mass emitted that consists of each fluorine-containing reactant.<br>(11) The fraction of the mass emitted that consists of the fluorine-containing product.<br>(12) The fraction of the mass emitted that consists of each fluorine-containing by-product.<br>(13) The method used to estimate the total mass of fluorine in destroyed or recaptured streams (specify 40 CFR 98.123(b)(4) or (15)). |
| | | *For emission factor and emission calculation factor approach.* For processes whose emissions are determined using the emission factor approach under 40 CFR 98.123(c)(3) or the emission calculation factor under 40 CFR 98.123(c)(4), report the following for each process. Fluorinated GHG emissions from transformation processes where the fluorinated GHG reactants are produced at another facility must be identified and reported separately from other fluorinated GHG emissions.<br>(1) The identity and quantity of the process activity used to estimate emissions (e.g., tons of product produced or tons of reactant consumed).<br>(2) The site-specific, process-vent-specific emission factor(s) or emission calculation factor for each process vent.<br>(3) The mass of each fluorinated GHG emitted from each process vent (metric tons).<br>(4) The mass of each fluorinated GHG emitted from equipment leaks (metric tons). |
| | | **For missing data:** Where missing data have been estimated pursuant to 40 CFR 98.125, 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. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| L—Fluorinated Gas Production (§98.120) | 25,000 metric tons $C0_2e$/year | **Destruction device excess emissions data:** Each fluorinated gas production facility that destroys fluorinated GHGs must report the excess emissions that result from malfunctions of the destruction device, and these excess emissions would be reflected in the fluorinated GHG estimates in 40 CFR 98.123(b) and (c). Such excess emissions would occur if the destruction efficiency was reduced due to the malfunction. |
| | | **Destruction device testing:** By March 31, 2012 or by March 31 of the year immediately following the year in which it begins fluorinated GHG destruction, each fluorinated gas production facility that destroys fluorinated GHGs must submit a report containing the information in paragraphs (f)(1) through (f)(4) of this section. This report is one-time unless making a change to the destruction device that would be expected to affect its destruction efficiencies.<br>(1) Destruction efficiency (DE) of each destruction device for each fluorinated GHG whose destruction the facility reflects in 40 CFR 98.123, in accordance with 40 CFR 98.124(g)(1)(i) through (iv).<br>(2) Chemical identity of the fluorinated GHG(s) used in the performance test conducted to determine destruction efficiency, including surrogates, and information on why the surrogate is sufficient to demonstrate the destruction efficiency for each fluorinated GHG, consistent with requirements in 40 CFR 98.124(g)(1), vented to the destruction device.<br>(3) Date of the most recent destruction device test.<br>(4) Name of all applicable Federal or State regulations that may apply to the destruction process.<br>(5) If making a change to the destruction device that would be expected to affect its destruction efficiencies, submit a revised report that reflects the changes, including the revised destruction efficiencies measured for the device under 40 CFR 98.124(g)(2)(ii), by March 31 of the year that immediately follows the change. |
| | | **Destruction of previously produced fluorinated GHGs:** Each fluorinated gas production facility that destroys fluorinated GHGs must report, separately from the fluorinated GHG emissions reported under paragraphs (b) or (c) of this section, the following for each previously produced fluorinated GHG destroyed:<br>(1) The mass of the fluorinated GHG fed into the destruction device.<br>(2) The mass of the fluorinated GHG emitted from the destruction device. |
| | | **Emissions from venting of residual fluorinated GHGs from containers:** Each fluorinated gas production facility that vents residual fluorinated GHGs from containers must report the following for each fluorinated GHG vented:<br>(1) The mass of the residual fluorinated GHG vented from each container size and type annually (tons).<br>(2) If applicable, the heel factor calculated for each container size and type. |
| | | **Fluorinated GHG products of incomplete combustion (PICs) of fluorinated gases:** Each fluorinated gas production facility that destroys fluorinated gases must submit a one-time report by June 30, 2011, that describes any measurements, research, or analysis that it has performed or obtained that relate to the formation of products of incomplete combustion that are fluorinated GHGs during the destruction of fluorinated gases. The report must include the methods and results of any measurement or modeling studies, including the products of incomplete combustion for which the exhaust stream was analyzed, as well as copies of relevant scientific papers, if available, or citations of the papers, if they are not. No new testing is required to fulfill this requirement. |
| N—Glass Production (§98.140) | 25,000 metric tons $C0_2e$/year | **If a CEMS is used to measure $CO_2$ emissions:**<br>All relevant information required under 40 CFR 98.36 for the Tier 4 Calculation Methodology plus:<br>(1) Annual quantity of each carbonate-based raw material charged to each continuous glass melting furnace and for all furnaces combined (tons).<br>(2) Annual quantity of glass produced by each glass melting furnace and by all furnaces combined (tons). |
| | | **If a CEMS is not used to determine $CO_2$ emissions** from continuous glass melting furnaces, and process $CO_2$ emissions are calculated according to the procedures specified in 40 CFR 98.143(b):<br>(1) Annual process emissions of $CO_2$ (metric tons) for each continuous glass melting furnace and for all furnaces combined.<br>(2) Annual quantity of each carbonate-based raw material charged (tons) to each continuous glass melting furnace and for all furnaces combined.<br>(3) Annual quantity of glass produced (tons) from each continuous glass melting furnace and from all furnaces combined.<br>(4) Carbonate-based mineral mass fraction (percentage, expressed as a decimal) for each carbonate-based raw material charged to a continuous glass melting furnace.<br>(5) 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, including (i) Date of test; (ii) Method(s) and any variations used in the analyses; and (iii) Mass fraction of each sample analyzed;<br>(6) The fraction of calcination achieved (percentage, expressed as a decimal) for each carbonate-based raw material, if a value other than 1.0 is used to calculate process mass emissions of $CO_2$.<br>(7) Method used to determine fraction of calcination.<br>(8) Total number of continuous glass melting furnaces.<br>(9) The number of times in the reporting year that missing data procedures were followed to measure monthly quantities of carbonate-based raw materials or mass fraction of the carbonate-based minerals for any continuous glass melting furnace (months). |

| Subpart | Reporting Threshold | Reporting and Verification |
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| O—HCFC-22 Production and HFC-23 Destruction (§98.150) | HCFC-22: All In<br><br>HFC-23 destruction processes that are not collocated with a HCFC-22 production and that destroy more than 2.14 metric tons HFC-23 per year: All In | **HCFC-22 production facilities**<br>At the facility level:<br>(1) Annual mass of HCFC-22 produced in metric tons.<br>(2) Loss Factor used to account for the loss of HCFC– 22 upstream of the measurement.<br>(3) Annual mass of reactants fed into the process in metric tons of reactant.<br>(4) 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.<br>(5) The method for tracking startups, shutdowns, and malfunctions and HFC-23 generation/emissions during these events.<br>(6) 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.<br>(7) Annual mass of the HFC-23 generated in metric tons.<br>(8) Annual mass of any HFC-23 sent off site for sale in metric tons.<br>(9) Annual mass of any HFC-23 sent off site for destruction in metric tons.<br>(10) Mass of HFC-23 in storage at the beginning and end of the year, in metric tons.<br>(11) Annual mass of HFC-23 emitted in metric tons.<br>(12) Annual mass of HFC-23 emitted from equipment leaks in metric tons.<br>(13) Annual mass of HFC-23 emitted from process vents in metric tons. |
| | | **HFC-23 destruction facilities**<br>(1) Annual mass of HFC-23 fed into the destruction device.<br>(2) Annual mass of HFC-23 destroyed.<br>(3) Annual mass of HFC-23 emitted from the destruction device.<br>The concentration (mass fraction) of HFC–23 measured at the outlet of the destruction device during the facility's annual HFC–23 concentration measurements at the outlet of the device.<br>If the HFC–23 concentration measured pursuant to 40 CFR 98.154(l) is greater than that measured during the performance test that is the basis for the destruction efficiency (DE), the facility shall report the revised destruction efficiency calculated under 40 CFR 98.154(l) and the values used to calculate it, specifying whether 40 CFR 98.154(l)(1) or 40 CFR 98.154(l)(2) has been used for the calculation. Specifically, the facility shall report the following:<br>(i) The flow rate of HFC-23 being fed into the destruction device in kg/hr.<br>(ii) The concentration (mass fraction) of HFC-23 at the outlet of the destruction device.<br>(iii) The flow rate at the outlet of the destruction device in kg/hr.<br>(iv) The emission rate calculated from (ii) and (iii) above in kg/hr.<br>(iv) Destruction efficiency (DE) calculated from paragraphs (i) and (iv) of this section.<br>Plus a one-time report including the following information:<br>(1) Destruction efficiency (DE).<br>(2) The methods used to determine destruction efficiency.<br>(3) The methods used to record the mass of HFC-23 destroyed.<br>(4) The name of other relevant federal or state regulations that may apply to the destruction process.<br>(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. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| P—Hydrogen Production (§98.160) | 25,000 metric tons $C0_2e$/year | **If a CEMS is used to measure $CO_2$ emissions:**<br>All relevant information required under 40 CFR 98.3(c) for the Tier 4 Calculation Methodology plus:<br>(1) Unit identification number and annual $CO_2$ emissions.<br>(2) Annual quantity of hydrogen produced (metric tons) for each process unit and for all units combined.<br>(3) Annual quantity of ammonia produced (metric tons), if applicable (metric tons) for each process unit and for all units combined. |
| | | **If a CEMS is not used to measure $CO_2$ emissions**:<br>(1) Unit identification number and annual $CO_2$ emissions.<br>(2) Monthly consumption of each fuel and feedstock used for hydrogen production and its type (scf of gaseous fuels and feedstocks, gallons of liquid fuels and feedstocks, kg of solid fuels and feedstocks).<br>(3) Annual quantity of hydrogen produced (metric tons).<br>(4) Annual quantity of ammonia produced, if applicable (metric tons).<br>(5) Monthly analyses of carbon content for each fuel and feedstock used in hydrogen production (kg carbon/kg of gaseous and solid fuels and feedstocks, (kg carbon per gallon of liquid fuels and feedstocks).<br>(6) Monthly analyses of the molecular weight of gaseous fuels and feedstocks (kg/kg-mole) used, if any. |
| | | **All:**<br>(1) Quantity of $CO_2$ collected and transferred off site in either gas, liquid, or solid forms, following the requirements of subpart PP of this part.<br>(2) Annual quantity of carbon other than $CO_2$ collected and transferred off site in either gas, liquid, or solid forms (kg carbon). |
| Q—Iron & Steel Production (§98.170) | 25,000 metric tons $C0_2e$/year | **Each coke pushing operation; taconite indurating furnace; basic oxygen furnace; non-recovery coke oven battery; sinter process; EAF; decarburization vessel; direct reduction furnace, and flare burning coke oven gas or blast furnace gas:**<br>(1) Unit identification number and annual $CO_2$ emissions (in metric tons) .<br>(2) Annual production quantity (in metric tons) for taconite pellets, coke, sinter, iron, and raw steel. |
| | | **If a CEMS is used to measure $CO_2$ emissions:** All relevant information required under 40 CFR 98.36 for the Tier 4 Calculation Methodology |
| | | **If a CEMS is not used to measure $CO_2$ emissions**: An indication for each of whether for each process whether the emissions were determined using the carbon mass balance method in 40 CFR 98.173(b)(1) or the site-specific emission factor method in 40 CFR 98.173(b)(2). |
| | | **If the carbon mass balance method in 40 CFR 98.173(b)(1) is used to determine $CO_2$ emissions**:<br>(1) The carbon content of each process input and output used to determine $CO_2$ emissions.<br>(2) Whether the carbon content was determined from information from the supplier or by laboratory analysis, and if by laboratory analysis, the method used.<br>(3) The annual volume of gaseous fuel (reported separately for each type in standard cubic feet), the annual volume of liquid fuel (reported separately for each type in gallons), and the annual mass (in metric tons) of each other process inputs and outputs used to determine $CO_2$ emissions.<br>(4) The molecular weight of gaseous fuels.<br>(5) For the missing data procedures in 40 CFR 98.175(b): How the monthly mass for each process input or output with missing data was determined and the number of months the missing data procedures were used. |
| | | **If the site-specific emission factor method** 40 CFR 98.173(b)(2) **is used to determine $CO_2$ emissions**:<br>(1) The measured average hourly $CO_2$ emission rate during the test (in metric tons per hour).<br>(2) The average hourly feed or production rate (as applicable) during the test (in metric tons per hour).<br>(3) The site-specific emission factor (in metric tons of $CO_2$ per metric ton of feed or production, as applicable).<br>(4) The annual feed or production rate (as applicable) used to estimate annual $CO_2$ emissions (in metric tons). |
| | | **All:**<br>(1) The annual amount of coal charged to the coke ovens (in metric tons).<br>(2) For flares burning coke oven gas or blast furnace gas, the information specified in 40 CFR 98.256(e) of subpart Y (Petroleum Refineries) of this part. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| R—Lead Production (§98.180) | 25,000 metric tons $CO_2e$/year | **If a CEMS is used to measure $CO_2$ emissions according to the requirements in 40 CFR 98.183(a) or (b)(1):**<br>All relevant information required under 40 CFR 98.36 for the Tier 4 Calculation Methodology plus:<br>(1) Identification number of each smelting furnace.<br>(2) Annual lead product production capacity (tons).<br>(3) Annual production for each lead product (tons).<br>(4) Total number of smelting furnaces at facility used for lead production.<br>**If a CEMS is not used to measure $CO_2$ emissions and measuring $CO_2$ emissions according to the requirements in 40 CFR 98.183(b)(2)(i) and (b)(2)(ii):**<br>(1) Identification number of each smelting furnace.<br>(2) Annual process $CO_2$ emissions (in metric tons) from each smelting furnace as determined by Eq. R-1 of subpart R.<br>(3) Annual lead product production capacity for the facility and each smelting furnace (tons).<br>(4) Annual production for each lead product (tons).<br>(5) Total number of smelting furnaces at facility used for production of lead products reported in (4).<br>(6) Annual material quantity for each material used for the calculation of annual process $CO_2$ emissions using Eq. R-1 of subpart R for each smelting furnace (tons).<br>(7) Annual average of the carbon content determinations for each material used for the calculation of annual process $CO_2$ emissions using Eq. R-1 of subpart R for each smelting furnace.<br>(8) The method used for the determination of carbon content for each material reported in (7) (e.g., supplier provided information, analyses of representative samples).<br>(9) For the missing data procedures in 40 CFR 98.185(b): How the monthly mass of carbon-containing materials with missing data was determined and the number of months the missing data procedures were used. |
| S—Lime Manufacturing (§98.190) | All In | **If a CEMS is used to measure $CO_2$ emissions:**<br>All relevant information required under 40 CFR 98.36 for the Tier 4 Calculation Methodology plus:<br>(1) Method used to determine the quantity of lime that is produced and sold.<br>(2) Method used to determine the quantity of calcined lime byproduct/waste sold.<br>(3) Beginning and end of year inventories for each lime product that is produced, by type.<br>(4) Beginning and end of year inventories for calcined lime byproducts/wastes sold, by type.<br>(5) Annual amount of calcined lime byproduct/waste sold, by type (tons).<br>(6) Annual amount of lime product sold, by type (tons).<br>(7) Annual amount of calcined lime byproduct/waste that is not sold, by type (tons).<br>(8) Annual amount of lime product not sold, by type (tons).<br>**If a CEMS is not used to measure $CO_2$ emissions**:<br>(1) Annual $CO_2$ process emissions from all kilns combined (metric tons).<br>(2) Monthly emission factors for each lime type produced.<br>(3) Monthly emission factors for each calcined byproduct/waste by lime type that is sold.<br>(4) Standard method used (ASTM or NLA testing method) to determine chemical compositions of each lime type produced and each calcined lime byproduct/waste type.<br>(5) Monthly results of chemical composition analysis of each lime product produced and calcined byproduct/waste sold.<br>(6) Annual results of chemical composition analysis of each type of lime byproduct/waste not sold.<br>(7) Method used to determine the quantity of lime produced and/or lime sold.<br>(8) Monthly amount of lime product sold, by type (tons).<br>(9) Method used to determine the quantity of calcined lime byproduct/waste sold.<br>(10) Monthly amount of calcined lime byproduct/waste sold, by type (tons).<br>(11) Annual amount of calcined lime byproduct/waste that is not sold, by type (tons).<br>(12) Monthly weight or mass of each lime type produced (tons).<br>(13) Beginning and end of year inventories for each lime product that is produced.<br>(14) Beginning and end of year inventories for calcined lime byproducts/wastes sold.<br>(15) Annual lime production capacity (tons) per facility.<br>(16) Number of times in the reporting year that missing data procedures were followed to measure lime production (months) or the chemical composition of lime products sold (months).<br>(17) Indicate whether $CO_2$ was used on-site (i.e. for use in a purification process). If $CO_2$ was used on-site, provide: (i) The annual amount of $CO_2$ captured for use in the on-site process; and (ii) The method used to determine the amount of $CO_2$ captured. |
| T—Magnesium Production (§98.200) | 25,000 metric tons $CO_2e$/year | (1) Emissions of each cover or carrier gas in metric tons.<br>(2) Types of production processes at the facility (e.g., primary, secondary, die casting).<br>(3) Amount of magnesium produced or processed in metric tons for each process type. This includes the output of primary and secondary magnesium production processes and the input to magnesium casting processes.<br>(4) Cover and carrier gas flow rate (e.g., standard cubic feet per minute) for each production unit and composition in percent by volume.<br>(5) For any missing data, report the length of time the data were missing for each cover gas or carrier gas, the method used to estimate emissions in their absence, and the quantity of emissions thereby estimated.<br>(6) The annual cover gas usage rate for the facility for each cover gas, excluding the carrier gas (kg gas/metric ton Mg).<br>(7) 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 emissions).<br>(8) A description of any new melt protection technologies adopted to account for reduced or increased GHG emissions in any given year. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| U—Misc. Uses of Carbonate (§98.210) | 25,000 metric tons $C0_2e$/year | (1) Annual $CO_2$ emissions from miscellaneous carbonate use (metric tons).<br>(2) Annual mass of each carbonate type consumed (tons).<br>(3) Measurement method used to determine the mass of carbonate.<br>(4) Method used to calculate emissions.<br>(5) For the calculation method of 40 CFR 98.213(b)(1)(i): (i) Annual carbonate consumption by carbonate type (tons); (ii) Annual calcination fractions used in calculations; (iii) The standard method that was used to determine the calcinations fraction, if applicable.<br>(6) For the calculation method of 40 CFR 98.213(b)(1)(ii): (i) Annual carbonate input by carbonate type (tons) and (ii) Annual carbonate output by carbonate type (tons).<br>(7) Number of times in the reporting year that missing data procedures were followed to measure carbonate consumption, carbonate input or carbonate output (months). |

| Subpart | Reporting Threshold | Reporting and Verification |
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| V—Nitric Acid Production (§98.220) | All In | (1) Train identification number.<br>(2) Annual process $N_2O$ emissions from each nitric acid train (metric tons).<br>(3) Annual nitric acid production from each nitric acid train (tons, 100 percent acid basis).<br>(4) Annual nitric acid production from each nitric acid train during which $N_2O$ abatement technology is operating (ton acid produced, 100 percent acid basis)<br>(5) Annual nitric acid production from the nitric acid facility (tons, 100 percent acid basis).<br>(6) Number of nitric acid trains.<br>(7) Number of different $N_2O$ abatement technologies per nitric acid train “t”.<br>(8) Abatement technologies used (if applicable).<br>(9) Abatement technology destruction efficiency for each abatement technology (percent destruction).<br>(10) Abatement utilization factor for each abatement technology (fraction of annual production that abatement technology is operating).<br>(11) Type of nitric acid process used for each nitric acid train (low, medium, high, or dual pressure).<br>(12) Number of times in the reporting year that missing data procedures were followed to measure nitric acid production (months).<br>(13) If a performance test was conducted and site-specific emissions factor was calculated: (i) Emission factor calculated for each nitric acid train (lb $N_2O$/ ton nitric acid, 100 percent acid basis); (ii) Test method used for performance test; (iii) Production rate per test run during performance test (tons nitric acid produced/hr, 100 percent acid basis); (iv) $N_2O$ concentration per test run during performance test (ppm $N_2O$); (v) Volumetric flow rate per test run during performance test (dscf/hr); (vi) Number of test runs during performance test; (vii) Number of times in the reporting year that a performance test had to be repeated (number).<br>(14) If approval was requested for an alternative method of determining $N_2O$ concentration under 40 CFR 98.223(a)(2),: (i) Name of alternative method; (ii) Description of alternative method; (iii) Request date; and (iv) Approval date.<br>(15) Fraction control factor for each abatement technology (percent of total emissions from the production unit that are sent to the abatement technology) if equation V–3c is used. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| W—Petroleum and Natural Gas Systems (§98.230) | 25,000 metric tons $C0_2$e/year | **Report annual emissions in metric tons of $CO_2$e for each GHG separately for each of these industry segments:**<br>(1) Onshore petroleum and natural gas production.<br>(2) Offshore petroleum and natural gas production.<br>(3) Onshore natural gas processing.<br>(4) Onshore natural gas transmission compression.<br>(5) Underground natural gas storage.<br>(6) LNG storage.<br>(7) LNG import and export.<br>(8) Natural gas distribution. |
| | | **For offshore petroleum and natural gas production**, report emissions of $CH_4$, $CO_2$, and $N_2O$ as applicable to the source type (in metric tons $CO_2$e per year at standard conditions) individually for all of the emissions source types listed in the most recent BOEMRE study. |
| | | **For onshore petroleum and natural gas production,** report the best available estimate of API gravity, best available estimate of gas to oil ratio, and best available estimate of average low pressure separator pressure for each oil sub-basin category. For onshore petroleum and natural gas production and natural gas distribution combustion emissions, report the following: (i) Cumulative number of external fuel combustion units with a rated heat capacity equal to or less than 5 mmBtu/hr, by type of unit; (ii) Cumulative number of external fuel combustion units with a rated heat capacity larger than 5 mmBtu/hr, by type of unit; (iii) Report annual CO2, CH4, and N2O emissions from external fuel combustion units with a rated heat capacity larger than 5 mmBtu/hr, expressed in metric tons CO2e for each gas, by type of unit; (iv) Cumulative volume of fuel combusted in external fuel combustion units with a rated heat capacity larger than 5 mmBtu/hr, by fuel type; (v) Cumulative number of internal fuel combustion units, not compressor-drivers, with a rated heat capacity equal to or less than 1 mmBtu/hr or 130 horsepower, by type of unit; (vi) Report annual CO2, CH4, and N2O emissions from internal combustion units greater than 1mmBtu/hr, expressed in metric tons CO2e for each gas, by type of unit; (vii) Cumulative volume of fuel combusted in internal combustion units with a rated heat capacity larger than 1 mmBtu/hr or 130 horsepower, by fuel type; (d) Report annual throughput as determined by engineering estimate based on best available data for each industry segment listed in paragraphs (a)(1) through (a)(8) of this section. |
| | | **For natural gas pneumatic devices**, report the following: (i) Actual count and estimated count separately of natural gas pneumatic high bleed devices as applicable; (ii) Actual count and estimated count separately of natural gas pneumatic low bleed devices as applicable; (iii) Actual count and estimated count separately of natural gas pneumatic intermittent bleed devices as applicable; (iv) Report annual $CO_2$ and $CH_4$ emissions at the facility level, expressed in metric tons $CO_2$e for each gas, for each of the following pieces of equipment: high bleed pneumatic devices; intermittent bleed pneumatic devices; low bleed pneumatic devices.<br><br>**For natural gas driven pneumatic pumps**, report: (i) Count of natural gas driven pneumatic pumps; and (ii) Report annual $CO_2$ and $CH_4$ emissions at the facility level, expressed in metric tons $CO_2$e for each gas, for all natural gas driven pneumatic pumps combined.<br><br>**For each acid gas removal unit**, report: (i) Total throughput off the acid gas removal unit using a meter or engineering estimate based on process knowledge or best available data in million cubic feet per year; (ii) For Calculation Methodology 1 and Calculation Methodology 2 of 40 CFR 98.233(d), annual average fraction of $CO_2$ content in the vent from the acid gas removal unit; (iii) For Calculation Methodology 3 of 40 CFR 98.233(d), annual average volume fraction of $CO_2$ content of natural gas into and out of the acid gas removal unit; (iv) Report the annual quantity of $CO_2$, expressed in metric tons $CO_2$e, that was recovered from the AGR unit and transferred outside the facility, under subpart PP of this part; (v) Report annual $CO_2$ emissions for the AGR unit, expressed in metric tons $CO_2$e; (vi) For the onshore natural gas processing industry segment only, report a unique name or ID number for the AGR unit; and (vii) An indication of which calculation methodology was used for the AGR.<br><br>**For dehydrators**, report: (i) For each Glycol dehydrator with a throughput greater than or equal to 0.4 MMscfd, report the following: (A) Glycol dehydrator feed natural gas flow rate in MMscfd, determined by engineering estimate based on best available data; (B) Glycol dehydrator absorbent circulation pump type; (C) Whether stripper gas is used in glycol dehydrator; (D) Whether a flash tank separator is used in glycol dehydrator; (E) Type of absorbent; (F) Total time the glycol dehydrator is operating in hours; (G) Temperature, in degrees Fahrenheit and pressure, in psig, of the wet natural gas; (H) Concentration of $CH_4$ and $CO_2$ in wet natural gas; (I) What vent gas controls are used; (J) For each glycol dehydrator, report annual $CO_2$ and $CH_4$ emissions that resulted from venting gas directly to the atmosphere, expressed in metric tons $CO_2$e for each gas; (K) For each glycol dehydrator, report annual $CO_2$, $CH_4$, and $N_2O$ emissions that resulted from flaring process gas from the dehydrator, expressed in metric tons $CO_2$e for each gas, (L) For the onshore natural gas processing industry segment only, report a unique name or ID number for glycol dehydrator; (ii) For all glycol dehydrators with a throughput less than 0.4 MMscfd, report the following: (A) Count of glycol dehydrators; (B) Which vent gas controls are used; (C) Report annual $CO_2$ and $CH_4$ emissions at the facility level that resulted from venting gas directly to the atmosphere, expressed in metric tons $CO_2$e for each gas, combined for all glycol dehydrators with annual average daily throughput of less than 0.4 MMscfd; and (D) Report annual $CO_2$, $CH_4$, and $N_2O$ emissions at the facility level that resulted from the flaring of process gas, expressed in metric tons $CO_2$e for each gas, combined for all glycol dehydrators with annual average daily throughput of less than 0.4 MMscfd; and (iii) For absorbent desiccant dehydrators, report the following: (A) Count of desiccant dehydrators; (B) Report annual $CO_2$ and $CH_4$ emissions at the facility level, expressed in metric tons $CO_2$e for each gas, for all absorbent desiccant dehydrators combined. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| W—Petroleum and Natural Gas Systems (§98.230) | 25,000 metric tons $C0_2$e/year | **For well venting for liquids unloading:** report: (i) For Calculation Methodology 1, report the following for each tubing diameter group and pressure group combination within each sub-basin category: (A) Count of wells vented to atmosphere for liquids unloading; (B) Count of plunger lifts. Whether the selected well from the tubing diameter and pressure group combination had a plunger lift (yes/no); (C) Cumulative number of unloadings vented to the atmosphere; (D) Average flow rate of the measured well venting in cubic feet per hour; (E) Internal casing diameter or internal tubing diameter in inches, where applicable, and well depth of each well, in feet, selected to represent emissions in that tubing size and pressure combination; (F) Casing pressure, in psia, of each well selected to represent emissions in that tubing size group and pressure group combination that does not have a plunger lift; (G) Tubing pressure, in psia, of each well selected to represent emissions in a tubing size group and pressure group combination that has plunger lift; (H) Report annual CO2 and CH4 emissions in metric tons CO2e for each gas; (ii) For Calculation Methodologies 2 and 3, report the following for each sub-basin category: (A) Count of wells vented to the atmosphere for liquids unloading; (B) Count of plunger lifts; (C) Cumulative number of unloadings vented to the atmosphere; (D) Average internal casing diameter, in inches, of each well, where applicable; and (E) Report annual $CO_2$ and $CH_4$ emissions, expressed in metric tons $CO_2$e for each GHG gas.<br><br>**For well completions and workovers**, report the following for each sub-basin category: (i) For gas well completions and workovers with hydraulic fracturing by sub-basin and well type (horizontal or vertical) combination, report the following: (A) Total count of completions in calendar year; (B) When using Equation W–10A, measured flow rate of backflow during well completion in standard cubic feet per hour; (C) Total count of workovers in calendar year that flare gas or vent gas to the atmosphere; (D) When using Equation W–10A, measured flow rate of backflow during well workover in standard cubic feet per hour; (E) When using Equation W–10A, total number of days of backflow from all wells during completions; (F) When using Equation W–10A, total number of days of backflow from all wells during workovers; (G) Report number of completions employing purposely designed equipment that separates natural gas from the backflow and the amount of natural gas, in standard cubic feet, recovered using engineering estimate based on best available; (H) Report number of workovers employing purposely designed equipment that separates natural gas from the backflow and the amount of natural gas, in standard cubic feet, recovered using engineering estimate based on best available data; (I) Annual $CO_2$ and $CH_4$ emissions that resulted from venting gas directly to the atmosphere, expressed in metric tons $CO_2$e for each gas; and (J) Annual $CO_2$, $CH_4$, and $N_2O$ emissions that resulted from flares, expressed in metric tons $CO_2$e for each gas; and (ii) For gas well completions and workovers without hydraulic fracturing: (A) Total count of completions in calendar year; (B) Total count of workovers in calendar year that flare gas or vent gas to the atmosphere; (C) Total number of days of gas venting to the atmosphere during backflow for completion; (D) Annual $CO_2$ and $CH_4$ emissions that resulted from venting gas directly to the atmosphere, expressed in metric tons $CO_2$e for each gas; and (E) Annual $CO_2$, $CH_4$, and $N_2O$ emissions that resulted from flares, expressed in metric tons $CO_2$e for each gas.<br><br>**For blowdown vent stack emission source:** report the following: (i) For each unique physical volume that is blown down more than once during the calendar year, report the following: (A) Total number of blowdowns for each unique physical volume in the calendar year; (B) Annual $CO_2$ and $CH_4$ emissions, for each unique physical blowdown volume, expressed in metric tons $CO_2$e for each gas; (C) A unique name or ID number for the unique physical volume; (ii) For all unique volumes that are blown down once during the calendar year, report the following: (A) Total number of blowdowns for all unique physical volumes in the calendar year; (B) Annual $CO_2$ and $CH_4$ emissions from all unique physical volumes as an aggregate per facility, expressed in metric tons $CO_2$e for each gas. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| W—Petroleum and Natural Gas Systems (§98.230) | 25,000 metric tons $C0_2$e/year | **For gas emitted from produced oil sent to atmospheric tanks**: (i) For wellhead gas-liquid separator with oil throughput greater than or equal to 10 barrels per day, using Calculation Methodology 1 and 2 of 40 CFR 98.233(j), report the following by sub-basin category, unless otherwise specified: (A) Number of wellhead separators sending oil to atmospheric tanks; (B) Estimated average separator temperature, in degrees Fahrenheit, and estimated average pressure, in psig; (C) Estimated average sales oil stabilized API gravity, in degrees; (D) Count of hydrocarbon tanks at well pads; (E) Best estimate of count of stock tanks not at well pads receiving oil; (F) Total volume of oil from all wellhead separators sent to tank(s) in barrels per year; (G) Count of tanks with emissions control measures, either vapor recovery system or flaring, for tanks at well pads; (H) Best estimate of count of stock tanks assumed to have emissions control measures not at well pads, receiving oil; (I) Range of concentrations of flash gas, $CH_4$ and $CO_2$; (J) Annual $CO_2$ and $CH_4$ emissions that resulted from venting gas to the atmosphere, expressed in metric tons $CO_2$e for each gas, for all wellhead gas-liquid separators or storage tanks using Calculation Methodology 1, and for all wellhead gas-liquid separators or storage tanks using Calculation Methodology 2 of 40 CFR 98.233(j); (K) Annual $CO_2$ and $CH_4$ gas quantities that were recovered, expressed in metric tons $CO_2$e for each gas, for all wellhead gas-liquid separators or storage tanks using Calculation Methodology 1, and for all wellhead gas-liquid separators or storage tanks using Calculation Methodology 2 of 40 CFR 98.233(j); (L) Annual $CO_{2,}CH_{4,}$and $N_2O$ emissions that resulted from flaring gas, expressed in metric tons $CO_2$e for each gas, for all wellhead gas-liquid separators or storage tanks using Calculation Methodology 1, and for all wellhead gas-liquid separators or storage tanks using Calculation Methodology 2 of 40 CFR 98.233(j); (ii) For wells with oil production greater than or equal to 10 barrels per day, using Calculation Methodology 3 and 4 of 40 CFR 98.233(j), report the following by sub-basin category: (A) Total volume of sales oil from all wells in barrels per year; (B) Total number of wells sending oil directly to tanks; (C) Total number of wells sending oil to separators off the well pads; (D) Sales oil API gravity range for wells in (c)(8)(ii)(B) and (c)(8)(ii)(C) of this section, in degrees; (E) Count of hydrocarbon tanks on wellpads; (F) Count of hydrocarbon tanks, both on and off well pads assumed to have emissions control measures: either vapor recovery system or flaring of tank vapors; (G) Annual CO2 and CH4 emissions that resulted from venting gas to the atmosphere, expressed in metric tons CO2e for each gas, at the sub-basin level for Calculation Methodology 3 or 4 of 40 CFR 98.233(j); (H) Annual CO2 and CH4 gas quantities that were recovered, expressed in metric tons CO2e for each gas, at the sub-basin level for Calculation Methodology 3 or 4 of 40 CFR 98.233(j); (I) Annual CO2,CH4,and N2O emissions that resulted from flaring gas, expressed in metric tons CO2e for each gas, at the sub-basin level for Calculation Methodology 3 and 4 of 40 CFR 98.233(j); (iii) For wellhead gas-liquid separators and wells with throughput less than 10 barrels per day, using Calculation Methodology 5 of 40 CFR 98.233(j) Equation W–15 of 40 CFR 98.233, report the following: (A) Number of wellhead separators; (B) Number of wells without wellhead separators; (C) Total volume of oil production in barrels per year; (D) Best estimate of fraction of production sent to tanks with assumed control measures: either vapor recovery system or flaring of tank vapors; (E) Count of hydrocarbon tanks on well pads; (F) Annual CO2 and CH4 emissions that resulted from venting gas to the atmosphere, expressed in metric tons CO2e for each gas, at the sub-basin level for Calculation Methodology 5 of 40 CFR 98.233(j); (G) Annual CO2 and CH4 gas quantities that were recovered, expressed in metric tons CO2e for each gas, at the sub-basin level for Calculation Methodology 5 of 40 CFR 98.233(j); (H) Annual CO2,CH4,and N2O emissions that resulted from flaring gas, expressed in metric tons CO2e for each gas, at the sub-basin level for Calculation Methodology 5 of 40 CFR 98.233(j); (iv) If wellhead separator dump valve is functioning improperly during the calendar year, report the following: (A) Count of wellhead separators that dump valve factor is applied; (B) Annual $CO_2$ and $CH_4$ emissions that resulted from venting gas to the atmosphere, expressed in metric tons $CO_2$e for each gas, at the sub-basin level for improperly functioning dump valves. **For transmission tank emissions identified using optical gas imaging instrument or acoustic leak detection of scrubber dump valves:** report the following: (i) For each vent stack, report annual $CO_2$ and $CH_4$ emissions that resulted from venting gas directly to the atmosphere, expressed in metric tons $CO_2$e for each gas; (ii) For each transmission storage tank, report annual $CO_2$, $CH_4$, and $N_2O$ emissions that resulted from flaring process gas from the transmission storage tank, expressed in metric tons $CO_2$e for each gas; (iii) A unique name or ID number for the vent stack monitored according to 40 CFR 98.233(k).<br><br>**For well testing venting and flaring**, report the following: (i) Number of wells tested per basin in calendar year; (ii) Average gas to oil ratio for each basin; (iii) Average number of days the well is tested in a basin; (iv) Report annual $CO_2$ and $CH_4$ emissions at the facility level, expressed in metric tons $CO_2$e for each gas, emissions from well testing venting; (v) Report annual $CO_{2,}CH_{4,}$and $N_2O$ emissions at the facility level, expressed in metric tons $CO_2$e for each gas, emissions from well testing flaring.<br><br>**For associated natural gas venting and flaring:** report the following for each basin: (i) Number of wells venting or flaring associated natural gas in a calendar year; (ii) Average gas to oil ratio for each basin; (iii) Report annual $CO_2$ and $CH_4$ emissions at the facility level, expressed in metric tons $CO_2$e for each gas, emissions from associated natural gas venting; (iv) Report annual $CO_{2,}CH_{4,}$and $N_2O$ emissions at the facility level, expressed in metric tons $CO_2$e for each gas, emissions from associated natural gas flaring.<br><br>**For flare stacks:** report the following for each flare: (i) Whether flare has a continuous flow monitor; (ii) Volume of gas sent to flare in cubic feet per year; (iii) Percent of gas sent to un-lit flare determined by engineering estimate and process knowledge based on best available data and operating records; (iv) Whether flare has a continuous gas analyzer; (v) Flare combustion efficiency; (vi) Report uncombusted $CH_4$ emissions, in metric tons $CO_2$e; (vii) Report uncombusted $CO_2$ emissions, in metric tons $CO_2$e ); (viii) Report combusted $CO_2$ emissions, in metric tons $CO_2$e ; (ix) Report $N_2O$ emissions, in metric tons $CO_2$e; (x) For the natural gas processing industry segment, a unique name or ID number for the flare stack; (xi) In the case that a CEMS is used to measure $CO_2$ emissions for the flare stack, indicate that a CEMS was used in the annual report and report the combusted $CO_2$ and uncombusted $CO_2$ as a combined number. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| W—Petroleum and Natural Gas Systems (§98.230) | 25,000 metric tons $CO_2e$/year | **For each centrifugal compressor:** (i) For compressors with wet seals in operational mode, report the following for each degassing vent: (A) Number of wet seals connected to the degassing vent; (B) Fraction of vent gas recovered for fuel or sales or flared; (C) Annual throughput in million scf, use an engineering calculation based on best available data; (D) Type of meters used for making measurements; (E) Reporter emission factor for wet seal oil degassing vents in cubic feet per hour; (F) Total time the compressor is operating in hours; (G) Report seal oil degassing vent emissions for compressors measured and for compressors not measured; (ii) For wet and dry seal centrifugal compressors in operating mode, report the following: (A) Total time in hours the compressor is in operating mode; (B) Reporter emission factor for blowdown vents in cubic feet per hour; (C) Report blowdown vent emissions when in operating mode. (iii) For wet and dry seal centrifugal compressors in not operating, depressurized mode, report the following: (A) Total time in hours the compressor is in shutdown, depressurized mode; (B) Reporter emission factor for isolation valve emissions in shutdown, depressurized mode in cubic feet per hour; (C) Report the isolation valve leakage emissions in not operating, depressurized mode in cubic feet per hour; (iv) Report total annual compressor emissions from all modes of operation; (v) For centrifugal compressors in onshore petroleum and natural gas production refer to Equation W–25 of 40 CFR 98.233), report the following: (A) Count of compressors; (B) Report emissions collectively.<br><br>**For reciprocating compressors:** (i) For reciprocating compressors rod packing emissions with or without a vent in operating mode, report the following: (A) Annual throughput in million scf, use an engineering calculation based on best available data; (B) Total time in hours the reciprocating compressor is in operating mode; (C) Report rod packing emissions for compressors measured and for compressors not measured; (ii) For reciprocating compressors blowdown vents not manifold to rod packing vents, in operating and standby pressurized mode , report the following: (A) Total time in hours the compressor is in standby, pressurized mode; (B) Reporter emission factor for blowdown vents in cubic feet per hour; (C) Report blowdown vent emissions when in operating and standby pressurized modes; (iii) For reciprocating compressors in not operating, depressurized mode, report the following: (A) Total time the compressor is in not operating, depressurized mode; (B) Reporter emission factor for isolation valve emissions in not operating, depressurized mode in cubic feet per hour; (C) Report the isolation valve leakage emissions in not operating, depressurized mode; (iv) Report total annual compressor emissions from all modes of operation; (v) For reciprocating compressors in onshore petroleum and natural gas production, report the following: (A) Count of compressors; (B) Report emissions collectively.<br><br>**For each component type (major equipment type for onshore production) that uses emission factors for estimating emissions**: (i) For equipment leaks found in each leak survey, report the following: (A) Total count of leaks found in each complete survey listed by date of survey and each component type for which there is a leaker emission factor in Tables W–2, W–3, W–4, W–5, W–6, and W–7 of subpart W; (B) For onshore natural gas processing, range of concentrations of $CH_4$and $CO_2$; (C) Annual $CO_2$ and $CH_4$ emissions, in metric tons $CO_2e$ for each gas, by component type.<br><br>**For local distribution companies:** report the following: (i) Total number of above grade T–D transfer stations in the facility; (ii) Number of years over which all T–D transfer stations will be monitored at least once; (iii) Number of T–D stations monitored in calendar year; (iv) Total number of below grade T–D transfer stations in the facility; (v) Total number of above grade metering-regulating stations (this count will include above grade T–D transfer stations) in the facility; (vi) Total number of below grade metering-regulating stations (this count will include below grade T–D transfer stations) in the facility; (vii) [Reserved]; (viii) Leak factor for meter/regulator run developed in Equation W–32 of 40 CFR 98.233; (ix) Number of miles of unprotected steel distribution mains; (x) Number of miles of protected steel distribution mains; (xi) Number of miles of plastic distribution mains; (xii) Number of miles of cast iron distribution mains; (xiii) Number of unprotected steel distribution services; (xiv) Number of protected steel distribution services; (xv) Number of plastic distribution services; (xvi) Number of copper distribution services; (xvii) Annual $CO_2$ and $CH_4$ emissions, in metric tons $CO_2e$ for each gas, from all above grade T–D transfer stations combined; (xviii) Annual $CO_2$ and $CH_4$ emissions, in metric tons $CO_2e$ for each gas, from all below grade T–D transfer stations combined; (xix) Annual $CO_2$ and $CH_4$ emissions, in metric tons $CO_2e$ for each gas, from all above grade metering-regulating stations (including T–D transfer stations) combined; (xx) Annual $CO_2$ and $CH_4$ emissions, in metric tons $CO_2e$ for each gas, from all below grade metering-regulating stations (including T–D transfer stations) combined; (xxi) Annual $CO_2$ and $CH_4$ emissions, in metric tons $CO_2e$ for each gas, from all distribution mains combined; and (xxii) Annual $CO_2$ and $CH_4$ emissions, in metric tons $CO_2e$ for each gas, from all distribution services combined.<br><br>**For each EOR injection pump blowdown:** report the following: (i) Pump capacity, in barrels per day; (ii) Volume of critical phase gas between isolation valves; (iii) Number of blowdowns per year; (iv) Critical phase EOR injection gas density; (v) For each EOR pump, report annual $CO_2$ and $CH_4$ emissions, expressed in metric tons $CO_2e$ for each gas.<br><br>**For EOR hydrocarbon liquids dissolved $CO_2$ for each sub-basin category:** report the following: (i) Volume of crude oil produced in barrels per year; (ii) Amount of $CO_2$ retained in hydrocarbon liquids in metric tons per barrel, under standard conditions; and (iii) Report annual $CO_2$ emissions at the sub-basin level, expressed in metric tons $CO_2e$. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| X—Petrochemical Production (§98.240) | All In | **For mass balance:**<br>For each type of petrochemical produced, reported by process unit:<br>(1) The petrochemical process unit ID number or other appropriate descriptor.<br>(2) The type of petrochemical produced, names of other products, and names of carbon-containing feedstocks.<br>(3) Annual $CO_2$ emissions calculated using Equation X-4 of subpart X.<br>(4) Each of the monthly volume, mass, and carbon content values used in Equations X-1 through X-3 (i.e., the directly measured values, substitute values, or the calculated values based on other measured data such as tank levels or gas composition), the molecular weights for gaseous feedstocks and products used in Equation X-1, and the temperature (in °F) at which the gaseous feedstock and product volumes used in Equation X–1 of subpart X were determined. Plus an indication of whether alternative sampling analysis was used.<br>(5) Annual quantity of each type of petrochemical produced from each process unit (metric tons).<br>(6) Name of each method listed in 40 CFR 98.244 used to determine a measured parameter (or description of manufacturer's recommended method).<br>(7)Identification of each combustion unit that burned both process off-gas and supplemental fuel.<br>(8) For the alternative to sampling and analysis: The amount of time during which off-specification product was produced, the volume or mass of off-specification product produced, and if applicable, the date of any process change that reduced the composition to less than 99.5 percent.<br>(9) Respondents may elect to report the flow and carbon content of wastewater and the annual mass of carbon released in fugitive emissions and in process vents that are not controlled with a combustion device. These values may be estimated based on engineering analyses. These values are not to be used in the mass balance calculation.<br>(10) If carbon content or composition of a feedstock or product is determined using a method under 40 CFR 98.244(b)(4)(xv)(B), report the following in the first applicable annual report, and provide any changes to this information in subsequent annual reports: (i) Name or title of the analytical method; (ii) A copy of the method. If the method is a modification of a method listed in 40 CFR 98.244(b)(4)(i) through (xiv), provide a copy of only the sections that differ from the listed method; (iii) An explanation of why an alternative to the methods listed in 40 CFR 98.244(b)(4)(i) through (xii) is needed. |
| | | **If emissions are measured in accordance with 40 CFR 98.243(b):**<br>(1) The petrochemical process unit ID or other appropriate descriptor, and the type of petrochemical produced.<br>(2) For CEMS used on stacks for stationary combustion units, report the relevant information required under 40 CFR 98.36 for the Tier 4 calculation methodology. Section 98.36(b)(9)(iii) does not apply for the purposes of subpart X.<br>(3) For CEMS used on stacks that are not used for stationary combustion units, report the information required under 40 CFR 98.36(e)(2)(vi).<br>(2) The combined $CO_2$ emissions from each stack and the combined $CO_2$ emissions from all stacks (except flare stacks) that handle process vent emissions and emissions from stationary combustion units that burn process off-gas for the petrochemical process unit. For each stationary combustion unit (or group of combustion units monitored with a single $CO_2$CEMS) that burns petrochemical process off-gas, provide an estimate based on engineering judgment of the fraction of the total emissions that is attributable to combustion of off-gas from the petrochemical process unit.<br>(3) For stationary combustion units that burn process off-gas from the petrochemical process unit, report the information related to $CH_4$ and $N_2O$ emissions as specified in paragraphs (b)(5)(i) through (b)(5)(iv) of this section.<br>(4) ID or other appropriate descriptor of each stationary combustion unit that burns process off-gas.<br>(5) Information listed in 40 CFR 98.256(e) of subpart Y for each flare that burns process off-gas.<br>(6) Annual quantity of each type of petrochemical produced from each process unit (metric tons). |
| | | **For the combustion methodology (40 CFR 98.243(d)):**<br>(1) The ethylene process unit ID or other appropriate descriptor.<br>(2) For each stationary combustion unit that burns ethylene process off-gas (or group of stationary sources with a common pipe), except flares, the relevant information listed in 40 CFR 98.36 for the applicable Tier methodology. For each stationary combustion unit or group of units (as applicable) that burns ethylene process off-gas, provide an estimate based on engineering judgment of the fraction of the total emissions that is attributable to combustion of off-gas from the ethylene process unit.<br>(3) Information listed in 40 CFR 98.256(e) of subpart Y for each flare that burns ethylene process off-gas.<br>(4) Name and annual quantity of each feedstock.<br>(5) Annual quantity of each type of petrochemical produced from each process unit (metric tons). |

| Subpart | Reporting Threshold | Reporting and Verification |
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| Y—Petroleum Refineries (§98.250) | All In | **Combustion Sources:** See reporting requirements for General Stationary Fuel Combustion Sources (subpart C). |
| | | **Hydrogen plants :** See reporting requirements for Hydrogen Production (subpart P). |
| | | **Flares:**<br>(1) The flare ID number (if applicable).<br>(2) A description of the type of flare (steam assisted, air-assisted).<br>(3) A description of the flare service (general facility flare, unit flare, emergency only or back-up flare).<br>(4) The calculated $CO_2$, $CH_4$, and $N_2O$ annual emissions for each flare, expressed in metric tons of each pollutant emitted.<br>(5) A description of the method used to calculate the $CO_2$ emissions for each flare (e.g., reference section and Equation number).<br>(6) If Equation Y-1a of subpart Y was used: an indication of whether daily or weekly measurement periods are used, the annual volume of flare gas combusted (in scf/year) and the annual average molecular weight (in kg/kg-mole), the molar volume conversion factor (in scf/kg-mole), and annual average carbon content of the flare gas (in kg carbon per kg flare gas).<br>(7) If Equation Y-1b of subpart Y was used: an indication of whether daily or weekly measurement periods are used, the annual volume of flare gas combusted (in scf/year), the molar volume conversion factor (in scf/kg-mole), the annual average $CO_2$ concentration (volume or mole percent), the number of carbon containing compounds other than $CO_2$ in the flare gas stream, and for each of the carbon containing compounds other than $CO_2$ in the flare gas stream: (i) The annual average concentration of the compound (volume or mole percent) and (ii) The carbon mole number of the compound (moles carbon per mole compound).<br>(8) If Equation Y-2 of subpart Y was used: an indication of whether daily or weekly measurement periods are used, the annual volume of flare gas combusted (in million (MM) scf/year), the annual average higher heating value of the flare gas (in mmBtu/mmscf), and an indication of whether the annual volume of flare gas combusted and the annual average higher heating value of the flare gas were determined using standard conditions of 68 °F and 14.7 psia or 60 °F and 14.7 psia.<br>(9) If Equation Y-3 of subpart Y was used: The annual volume of flare gas combusted (in MMscf/year) during normal operations, the annual average higher heating value of the flare gas (in MMBtu/MMscf), the number of SSM events exceeding 500,000 scf/day, and the volume of gas flared (in scf/event) and the average molecular weight (in kg/kg-mole), the molar volume conversion factor (in scf/kg-mole), and carbon content of the flare gas (in kg carbon per kg flare) for each SSM event over 500,000 scf/day.<br>(9) The fraction of carbon in the flare gas contributed by methane used in Equation Y-4 of subpart Y and the basis for its value. |
| | | **For catalytic cracking units, traditional fluid coking units, and catalytic reforming units:**<br>(1) The unit ID number (if applicable).<br>(2) A description of the type of unit (fluid catalytic cracking unit, thermal catalytic cracking unit, traditional fluid coking unit, or catalytic reforming unit).<br>(3) Maximum rated throughput of the unit, in bbl/stream day.<br>(4) The calculated $CO_2$, $CH_4$, and $N_2O$ annual emissions for each unit, expressed in metric tons of each pollutant emitted.<br>(5) A description of the method used to calculate the $CO_2$ emissions for each unit (e.g., reference section and equation number).<br>(6) If a CEMS was used: the relevant information required under 40 CFR 98.36 for the Tier 4 Calculation Methodology, the $CO_2$ annual emissions as measured by the CEMS (unadjusted to remove $CO_2$ combustion emissions associated with additional units, if present) and the process $CO_2$ emissions as calculated according to 40 CFR 98.253(c)(1)(ii). Respondents must report the $CO_2$ annual emissions associated with sources other than those from the coke burn-off in the applicable subpart (e.g., subpart C of this part in the case of a CO boiler).<br>(7) If Equation Y-6 of subpart Y was used: The annual average exhaust gas flow rate, $\%CO_2$, %CO, and the molar volume conversion factor (in scf/kg-mole).<br>(8) If Equation Y-7a of subpart Y was used: The annual average flow rate of inlet air and oxygen-enriched air, %O2, $\%O_{oxy}$, $\%CO_2$, and %CO.<br>(9) If Equation Y-7b of subpart Y was used: The annual average flow rate of inlet air and oxygen-enriched air, $\%N_{2,oxy}$, and $\%N_{2,exhaust}$.<br>(10) If Equation Y-8 of subpart Y was used: The coke burn-off factor, annual throughput of unit, and the average carbon content of coke and the basis for the value.<br>(11) An indication of whether a measured value, a unit-specific emission factor, or default emission factor was used for $CH_4$ emissions. If unit-specific emission factors for $CH_4$ are used, respondents must report the the unit-specific emission factor for $CH_4$, units of measure for the unit-specific factor, the activity data for calculating emissions (e.g., if the emission factor is based on coke burn-off rate, the annual quantity of coke burned), and the basis for the factor.<br>(12) An indication of whether a measured value, a unit-specific emission factor, or default emission factor was used for $N_2O$ emissions. If a unit-specific emission factor was used: The unit-specific emission factor for $N_2O$, The units of measure for the unit-specific factor, the activity data for calculating emissions (e.g., if the emission factor is based on coke burn-off rate, the annual quantity of coke burned), and the basis for the factor.<br>(13) If Equation Y-11 of subpart Y was used: The number of regeneration cycles or measurement periods during the reporting year, the average coke burn-off quantity per cycle or measurement period, and the average carbon content of the coke. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| Y—Petroleum Refineries (§98.250) (continued) | All in | **Fluid coking unit of the flexicoking type:**<br>(1) The unit ID number (if applicable).<br>(2) A description of the type of unit.<br>(3) Maximum rated throughput of the unit, in bbl/stream day.<br>(4) Indicate whether the GHG emissions from the low heat value gas are accounted for in subpart C of this part or 40 CFR 98.253(c).<br>(5) If the GHG emissions for the low heat value gas are calculated at the flexicoking unit: The calculated annual $CO_2$, $CH_4$, and $N_2O$ emissions for each unit, expressed in metric tons of each pollutant emitted, and the applicable equation input parameters specified in (7) through (13) above. |
| | | **For sulfur recovery plants and emissions from sour gas sent off-site for sulfur recovery:**<br>(1) The plant ID number (if applicable).<br>(2) Maximum rated throughput of each independent sulfur recovery plant, in metric tons sulfur produced/stream day, a description of the type of sulfur recovery plant, and an indication of the method used to calculate $CO_2$ annual emissions for the sulfur recovery plant (e.g., $CO_2$ CEMS, Equation Y–12, or process vent method in 40 CFR 98.253(j)).<br>(3) The calculated $CO_2$ annual emissions for each sulfur recovery plant, expressed in metric tons. Plus the calculated annual $CO_2$ emissions from sour gas sent off-site for sulfur recovery, expressed in metric tons.<br>(4) If Equation Y-12 of subpart Y was used: The annual volumetric flow to the sulfur recovery plant (in scf/year), the molar volume conversion factor (in scf/kg-mole), and the annual average mole fraction of carbon in the sour gas (in kg-mole C/kg-mole gas).<br>(5) If tail gas is recycled to the front of the sulfur recovery plant: An indication of whether the recycled flow rate and carbon content are included in the measured data under 40 CFR 98.253(f)(2) and (3). Also an indication of whether a correction for $CO_2$ emissions in the tail gas was used in Equation Y-12. If so, then respondents must report the value of the correction, the annual volume of recycled tail gas (in scf/year), and the annual average mole fraction of carbon in the tail gas (in kg-mole C/kg-mole gas). Respondents must also indicate whether they used the default (95%) or a unit specific correction, and if used, report the approach used.<br>(6) For a CEMS: the relevant information required under 40 CFR 98.36 for the Tier 4 Calculation Methodology, the $CO_2$ annual emissions as measured by the CEMS and the annual process $CO_2$ emissions calculated according to 40 CFR 98.253(f)(1). Plus the $CO_2$ annual emissions associated with the process emissions calculated according to 40 CFR 98.253(f)(1). Plus the $CO_2$ annual emissions associated with fuel combustion under 40 CFR 98, subpart C.<br>(7) If the process vent method is used in 40 CFR 98.253(j) for a non-Claus sulfur recovery plant, the relevant information required under paragraph (l)(5) of this section. |
| | | **For coke calcining units:**<br>(1) The unit ID number (if applicable).<br>(2) Maximum rated throughput of the unit, in metric tons coke calcined/stream day.<br>(3) The calculated $CO_2$, $CH_4$, and $N_2O$ annual emissions for each unit, expressed in metric tons of each pollutant emitted.<br>(4) A description of the method used to calculate the $CO_2$ emissions for each unit (e.g., reference section and equation number).<br>(5) If Equation Y-13 of subpart Y is used: Annual mass and carbon content of green coke fed to the unit, the annual mass and carbon content of marketable coke produced, the annual mass of coke dust collected in dust collection systems, and and an indication of whether coke dust is recycled to the unit (e.g., all dust is recycled, a portion of the dust is recycled, or none of the dust is recycled).<br>(6) If a CEMS is used: the relevant information required under 40 CFR 98.36 for the Tier 4 Calculation Methodology, the $CO_2$ annual emissions as measured by the CEMS and the annual process $CO_2$ emissions calculated according to 40 CFR 98.253(g)(1).<br>(7) An indication of whether a measured value, a unit-specific emission factor or a default for $CH_4$ emissions was used. If a unit-specific emission factor for $CH_4$, is used: the unit-specific emission factor for $CH_4$, the units of measure for the unit-specific factor, the activity data for calculating emissions (e.g., if the emission factor is based on coke burn-off rate, the annual quantity of coke burned), and the basis for the factor.<br>(8) An indication of whether a measured value, a unit-specific emission factor, or a default emission factor was used for $N_2O$ emissions. If a unit-specific emission factor for $N_2O$ is used, report the unit-specific emission factor for $N_2O$, the units of measure for the unit-specific factor, the activity data for calculating emissions (e.g., if the emission factor is based on coke burn-off rate, the annual quantity of coke burned), and the basis for the factor. |
| | | **For asphalt blowing operations:**<br>(1) The unit ID number (if applicable).<br>(2) The quantity of asphalt blown (in million bbl) at the unit in the reporting year.<br>(3) The type of control device used to reduce methane (and other organic) emissions from the unit.<br>(4) The calculated annual $CO_2$ and $CH_4$ emissions for each unit, expressed in metric tons of each pollutant emitted.<br>(5) If Equation Y-14 of subpart Y is used: The $CO_2$ emission factor used and the basis for the value.<br>(6) If Equation Y-15 of subpart Y is used: The $CH_4$ emission factor used and the basis for the value.<br>(7) If Equation Y-16 of subpart Y is used: The carbon emission factor used and the basis for the value.<br>(8) If Equation Y-16b of subpart Y is used: The $CO_2$ emission factor used and the basis for its value and the carbon emission factor used and the basis for its value.<br>(9) If Equation Y-17 of subpart Y is used: The $CH_4$ emission factor used and the basis for the value. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| Y—Petroleum Refineries (§98.250) (continued) | All in | **For delayed coking units:**<br>(1) The cumulative annual $CH_4$ emissions (in metric tons of $CH_4$) for all delayed coking units at the facility.<br>(2) A description of the method used to calculate the $CH_4$ emissions for each unit (e.g., reference section and equation number).<br>(3) The total number of delayed coking units at the facility, the total number of delayed coking drums at the facility, and for each coke drum or vessel: the dimensions, the typical gauge pressure of the coking drum when first vented to the atmosphere, typical void fraction, the typical drum outage (i.e. the unfilled distance from the top of the drum, in feet), the molar volume conversion factor (in scf/kg-mole), and annual number of coke-cutting cycles.<br>(4) For each set of coking drums that are the same dimensions: the number of coking drums in the set, the height and diameter of the coke drums (in feet), the cumulative number of vessel openings for all delayed coking drums in the set, the typical venting pressure (in psig), void fraction (in cf gas/cf of vessel), and the mole fraction of methane in coking gas (in kg-mole $CF_4$/kg-mole gas, wet basis).<br>(5) The basis for the volumetric void fraction of the coke vessel prior to steaming and the basis for the mole fraction of methane in the coking gas. |
| | | **For process vents subject to 40 CFR 98.253(j):**<br>(1) The vent ID number (if applicable).<br>(2) The unit or operation associated with the emissions.<br>(3) The type of control device used to reduce methane (and other organic) emissions from the unit, if applicable.<br>(4) The calculated annual $CO_2$, $CH_4$, and $N_2O$ emissions for each vent, expressed in metric tons of each pollutant emitted.<br>(5) The annual volumetric flow discharged to the atmosphere (in scf), and an indication of the measurement or estimation method, annual average mole fraction of each GHG above the concentration threshold or otherwise required to be reported and an indication of the measurement or estimation method, the molar volume conversion factor (in scf/kg-mole), and for intermittent vents, the number of venting events and the cumulative venting time. |
| | | **For uncontrolled blowdown systems:**<br>(1) An indication of whether the uncontrolled blowdown emission are reported under 40 CFR 98.253(k) or 40 CFR 98.253(j) or a statement that the facility does not have any uncontrolled blowdown systems.<br>(2) The cumulative annual $CH_4$ emissions (in metric tons of $CH_4$) for uncontrolled blowdown systems.<br>(3) For uncontrolled blowdown systems reporting under 40 CFR 98.253(k), 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, the methane emission factor used for uncontrolled blowdown systems, the basis for the value, and the molar volume conversion factor (in scf/kg-mole).<br>(4) For uncontrolled blowdown systems reporting under 40 CFR 98.253(j), the relevant information required under paragraph (l)(5) of this section. |
| | | **For equipment leaks:**<br>**(**1) The cumulative $CH_4$ emissions (in metric tons of each pollutant emitted) for all equipment leak sources.<br>(2) The method used to calculate the reported equipment leak emissions.<br>(3) The number of each type of emission source listed in Equation Y-21 at the facility. |
| | | **For storage tanks:**<br>(1) The cumulative annual $CH_4$ emissions (in metric tons of $CH_4$) for all storage tanks, except for those used to process unstabilized crude oil.<br>(2) For storage tanks other than those processing unstabilized crude oil: (i) The method used to calculate the reported storage tank emissions for storage tanks other than those processing unstabilized crude (i.e., either AP 42, Section 7.1 (incorporated by reference, see 40 CFR 98.7), or Equation Y–22 of this section) and (ii) The total quantity (in MMbbl) of crude oil plus the quantity of intermediate products received from off site that are processed at the facility in the reporting year.<br>(3) The cumulative $CH_4$ emissions (in metric tons of $CH_4$) for storage tanks used to process unstabilized crude oil or a statement that the facility did not receive any unstabilized crude oil during the reporting year.<br>(4) For storage tanks that process unstabilized crude oil: (i) The method used to calculate the reported unstabilized crude oil storage tank emissions, (ii) The quantity of unstabilized crude oil received during the calendar year (in MMbbl), (iii) The average pressure differential (in psi), (iv) The molar volume conversion factor (in scf/kg-mole), (v) The average mole fraction of $CH_4$ in vent gas from unstabilized crude oil storage tanks and the basis for the mole fraction, and (vi) If Equation Y-23 was not used, the tank-specific methane composition data and the gas generation rate data used to estimate the cumulative $CH_4$ emissions for storage tanks used to process unstabilized crude oil.<br>(5) The method used to calculate the reported storage tank emissions for storage tanks processing unstabilized crude oil.<br>(6) The quantity of unstabilized crude oil received during the calendar year (in MMbbl), the average pressure differential (in psi), and the mole fraction of $CH_4$ in vent gas from the unstabilized crude oil storage tank, and the basis for the mole fraction.<br>(7) The tank-specific methane composition data and the gas generation rate data, if Equation Y–23 was not used. |
| | | **For loading operations:**<br>(1) The cumulative annual $CH_4$ emissions (in metric tons of each pollutant emitted) for loading operations.<br>(2) The quantity and types of materials loaded by vessel type (barge, tanker, marine vessel, etc.) 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.<br>(3) 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 (submerged loading, vapor balancing, etc.). |

| Subpart | Reporting Threshold | Reporting and Verification |
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| Y—Petroleum Refineries (§98.250) (continued) | All in | **For all:** Name of each method listed in 40 CFR 98.254 or a description of the manufacturer's recommended method used determine a measured parameter. |
| Z—Phosphoric Acid Production (§98.260) | All In | **All:**<br>(1) Annual phosphoric acid production by origin (as listed in Table Z-1 to subpart Z) of the phosphate rock (tons).<br>(2) Annual phosphoric acid permitted production capacity (tons).<br>(3) Annual arithmetic average percent inorganic carbon or carbon dioxide in phosphate rock from monthly records (percent by weight, expressed as a decimal fraction).<br>(4) Annual phosphate rock consumption from monthly measurement records by origin (as listed in Table Z-1 to subpart Z) (tons). |
| | | **If a CEMS is used to measure $CO_2$ emissions:**<br>(1) The identification number of each wet-process phosphoric acid process line.<br>(2) The annual $CO_2$ emissions from each wet-process phosphoric acid process line (metric tons) and the relevant information required under 40 CFR 98.36 (e)(2)(vi) for the Tier 4 Calculation Methodology. |
| | | **If a CEMS is not used to measure $CO_2$ emissions:**<br>(1) Identification number of each wet-process phosphoric acid process line.<br>(2) Annual $CO_2$ emissions from each wet-process phosphoric acid process line (metric tons) as calculated by either Eq. Z-1a or Equation Z-1b of subpart Z.<br>(3) Annual phosphoric acid permitted production capacity (tons) for each wet-process phosphoric acid process line (metric tons).<br>(4) Method used to estimate any missing values of inorganic carbon or carbon dioxide content of phosphate rock for each wet-process phosphoric acid process line.<br>(5) Monthly inorganic carbon content of phosphate rock for each wet-process phosphoric acid process line for which Equation Z-1a is used (percent by weight, expressed as a decimal fraction), or $CO_2$ (percent by weight, expressed as a decimal fraction) for which Equation Z-1b is used.<br>(6) Monthly mass of phosphate rock consumed by origin, (as listed in Table Z-1 to subpart Z) in production for each wet-process phosphoric acid process line (tons).<br>(7) Number of wet-process phosphoric acid process lines.<br>(8) Number of times missing data procedures were used to estimate phosphate rock consumption (months) and inorganic carbon contents of the phosphate rock (months).<br>(9) Annual process $CO_2$ emissions from phosphoric acid production facility (metric tons). |
| AA—Pulp and Paper Manufacturing (§98.270) | 25,000 metric tons C02e/year | (1) Annual emissions of $CO_2$, biogenic $CO_2$, $CH_4$, biogenic $CH_4N_2O$, and biogenic $N_2O$ (metric tons per year).<br>(2) Annual quantities fossil fuels by type used in chemical recovery furnaces and chemical recovery combustion units in short tons for solid fuels, gallons for liquid fuels and scf for gaseous fuels.<br>(3) Annual mass of the spent liquor solids combusted (short tons per year), and basis for determining the annual mass of the spent liquor solids combusted (whether based on T650 om-05 Solids Content of Black Liquor, TAPPI (incorporated by reference, see 40 CFR 98.7) or an online measurement system).<br>(4) The high heat value (HHV) of the spent liquor solids used in Equation AA-1 of subpart AA (mmBtu per kilogram).<br>(5) The default or site-specific emission factor for $CO_2$, $CH_4$, or $N_2O$, used in Equation AA-1 of subpart AA (kg $CO_2$, $CH_4$, or $N_2O$ per mmBtu).<br>(6) The carbon content (CC) of the spent liquor solids, used in equation AA-2 of subpart AA (percent by weight, expressed as a decimal fraction, e.g., 95% = 0.95).<br>(7) Annual quantities of fossil fuels by type used in pulp mill lime kilns in short tons for solid fuels, gallons for liquid fuels and scf for gaseous fuels.<br>(8) Make-up quantity of $CaCO_3$ used for the reporting year (metric tons per year) used in Equation AA-3 of subpart AA.<br>(9) Make-up quantity of $Na_2CO_3$ used for the reporting year (metric tons per year) used in Equation AA-3 of subpart AA.<br>(10) Annual steam purchases (pounds of steam per year).<br>(11) Annual production of pulp and/or paper products produced (metric tons). |
| BB—Silicon Carbide Production (§98.280) | All In | **If a CEMS is used to measure $CO_2$ emissions:**<br>All relevant information required under 40 CFR 98.36 for the Tier 4 Calculation Methodology plus:<br>(1) Annual consumption of petroleum coke (tons).<br>(2) Annual production of silicon carbide (tons).<br>(3) Annual production capacity of silicon carbide (tons). |
| | | **If a CEMS is not used to measure process $CO_2$ emissions:**<br>(1) Monthly consumption of petroleum coke (tons).<br>(2) Annual production of silicon carbide (tons).<br>(3) Annual production capacity of silicon carbide (tons).<br>(4) Carbon content factor of petroleum coke from the supplier or as measured by the applicable method in 98.284(c) for each month (percent by weight expressed as a decimal fraction).<br>(5) Whether carbon content of the petroleum coke is based on reports from the supplier or through self measurement using applicable ASTM standard method.<br>(6) $CO_2$ emissions factor calculated for each month (metric tons $CO_2$/metric ton of petroleum coke consumed).<br>(7) Sampling analysis results for carbon content of consumed petroleum coke as determined for QA/QC of supplier data under 98.284(d) (percent by weight expressed as a decimal fraction).<br>(8) Number of times in the reporting year that missing data procedures were followed to measure the carbon contents of petroleum coke (number of months) and petroleum coke consumption (number of months). |

| Subpart | Reporting Threshold | Reporting and Verification |
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| CC—Soda Ash Manufacturing (§98.290) | All in | **If a CEMS is used to measure $CO_2$ emissions:**<br>All relevant information required under 40 CFR 98.36 plus:<br>(1) Annual consumption of trona or liquid alkaline feedstock for each manufacturing line (tons).<br>(2) Annual production of soda ash for each manufacturing line (tons).<br>(3) Annual production capacity of soda ash for each manufacturing line (tons).<br>(4) Identification number of each manufacturing line.<br>**If a CEMS is not used to measure $CO_2$ emissions**:<br>(1) Identification number of each manufacturing line<br>(2) Annual process $CO_2$ emissions from each soda ash manufacturing line (metric tons).<br>(3) Annual production of soda ash for each manufacturing line (tons).<br>(4) Annual production capacity of soda ash for each manufacturing line (tons).<br>(5) Monthly consumption of trona or liquid alkaline feedstock for each manufacturing line (tons).<br>(6) Monthly production of soda ash for each manufacturing line (tons).<br>(7) Inorganic carbon content factor of trona or soda ash (depending on use of Eq. CC-1 or CC-2) as measured by the applicable method in 40 CFR 98.294(b) or (c) for each month (percent by weight expressed as a decimal fraction).<br>(8) Whether $CO_2$ emissions for each manufacturing line were calculated using a trona input method as described in Equation CC-1, a soda ash output method as described in Equation CC-2, or a site-specific emission factor method as described in Equations CC-3 through CC-5.<br>(9) Number of manufacturing lines located used to produce soda ash.<br>(10) For soda ash produced using the liquid alkaline feedstock process, if the site-specific emission factor method is used to estimate emissions: (i) Stack gas volumetric flow rate during performance test (dscfm); (ii) Hourly $CO_2$ concentration during performance test (percent $CO_2$); (iii) $CO_2$ emission factor (metric tons $CO_2$/metric tons of process vent flow from mine water stripper/evaporator); (iv) $CO_2$ mass emission rate during performance test (metric tons/hour); (v) Average process vent flow from mine water stripper/evaporator during performance test (pounds/hour); (vi) Annual process vent flow rate from mine stripper/evaporator (thousand pounds/hour); and (vii) Annual operating hours for each manufacturing line used to produce soda ash using liquid alkaline feedstock (hours).<br>(11) Number of times missing data procedures were used and for which of the following parameters: (i) Trona or soda ash (number of months); (ii) Inorganic carbon contents of trona or soda ash (weeks); or (iii) Process vent flow rate from mine water stripper/evaporator (number of months) |
| DD – Electrical Transmission and Distribution Equipment Use (§98.300) | Electrical transmission and distribution equipment use at facilities where the total nameplate capacity of $SF_6$and PFC containing equipment exceeds 17,820 pounds | (1) Nameplate capacity of equipment (pounds) containing $SF_6$and nameplate capacity of equipment (pounds) containing each PFC: (i) Existing at the beginning of the year (excluding hermetically sealed-pressure switchgear); (ii) New during the year (all $SF_6$-insulated equipment, including hermetically sealed-pressure switchgear); and (iii) Retired during the year (all $SF_6$-insulated equipment, including hermetically sealed-pressure switchgear).<br>(2) Transmission miles (length of lines carrying voltages above 35 kilovolt).<br>(3) Distribution miles (length of lines carrying voltages at or below 35 kilovolt).<br>(4) Pounds of $SF_6$and PFC stored in containers, but not in energized equipment, at the beginning of the year.<br>(5) Pounds of SF6 and PFC stored in containers, but not in energized equipment, at the end of the year.<br>(6) Pounds of $SF_6$and PFC purchased in bulk from chemical producers or distributors.<br>(7) Pounds of $SF_6$and PFC purchased from equipment manufacturers or distributors with or inside equipment, including hermetically sealed-pressure switchgear.<br>(8) Pounds of $SF_6$and PFC returned to facility after off-site recycling.<br>(9) Pounds of $SF_6$and PFC in bulk and contained in equipment sold to other entities.<br>(10) Pounds of $SF_6$and PFC returned to suppliers.<br>(11) Pounds of $SF_6$and PFC sent off-site for recycling.<br>(12) Pounds of $SF_6$and PFC sent off-site for destruction. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| EE—Titanium Dioxide Production (§98.310) | All In | **If a CEMS is used to measure $CO_2$ emissions:**<br>All relevant information required under 40 CFR 98.37(e)(2)(vi) for the Tier 4 Calculation Methodology plus:<br>(1) Identification number of each process line.<br>(2) Annual consumption of calcined petroleum coke (tons).<br>(3) Annual production of titanium dioxide (tons).<br>(4) Annual production capacity of titanium dioxide (tones).<br>(5) Annual production of carbon-containing waste (tons), if applicable.<br>**If a CEMS is not used to measure $CO_2$ emissions:**<br>(1) Identification number of each process line.<br>(2) Annual $CO_2$ emissions from each chloride process line (metric tons/year).<br>(3) Annual consumption of calcined petroleum coke for each process line (tons).<br>(4) Annual production of titanium dioxide for each process line (tons).<br>(5) Annual production capacity of titanium dioxide for each process line (tons).<br>(6) Calcined petroleum coke consumption for each process line for each month (tons).<br>(7) Annual production of carbon-containing waste for each process line (tons), if applicable.<br>(8) Monthly production of titanium dioxide for each process line (tons).<br>(9) Monthly carbon content factor of petroleum coke (percent by weight expressed as a decimal fraction).<br>(10) Whether monthly carbon content of the petroleum coke is based on reports from the supplier or through self measurement using applicable ASTM standard methods.<br>(11) Carbon content for carbon-containing waste for each process line (percent by weight expressed as a decimal fraction).<br>(12) If carbon content of petroleum coke is based on self measurement, the ASTM Standard methods used.<br>(13) Sampling analysis results of carbon content of petroleum coke as determined for QA/QC of supplier data under 40 CFR 98.314(d) (percent by weight expressed as a decimal fraction).<br>(14) Number of separate chloride process lines located at the facility.<br>(15) The number of times in the reporting year that missing data procedures were followed to measure the carbon contents of petroleum coke (number of months); petroleum coke consumption (number of months); carbon-containing waste generated (number of months); and carbon contents of the carbon-containing waste (number of times during year). |
| FF – Underground Coal Mines (§98.320) | Underground coal mines liberating 36,500,000 actual cubic feet of $CH_4$ or more per year | (1) Quarterly $CH_4$ liberated from each ventilation monitoring point ($CH_{4Vm}$), (metric tons $CH_4$).<br>(2) Weekly $CH_4$ liberated from each degasification system monitoring point (metric tons $CH_4$).<br>(3) Quarterly $CH_4$ destruction at each ventilation and degasification system destruction device or point of offsite transport (metric tons $CH_4$).<br>(4) Quarterly $CH_4$ emissions (net) from all ventilation and degasification systems (metric tons $CH_4$).<br>(5) Quarterly $CO_2$ emissions from on-site destruction of coal mine gas $CH_4$, where the gas is not a fuel input for energy generation or use (e.g., flaring) (metric tons $CO_2$).<br>(6) Quarterly volumetric flow rate for each ventilation monitoring point (scfm), date and location of each measurement, and method of measurement (quarterly sampling or continuous monitoring), used in Equation FF–1 of subpart FF.<br>(7) Quarterly $CH_4$ concentration for each ventilation monitoring point, dates and locations of each measurement and method of measurement (sampling or continuous monitoring).<br>(8) Weekly volumetric flow rate used to calculate $CH_4$ liberated from degasification systems (cfm) and method of measurement (sampling or continuous monitoring), used in Equation FF–3 of subpart FF.<br>(9) Quarterly CEMS $CH_4$ concentration (%) used to calculate $CH_4$ liberated from degasification systems (average from daily data), or quarterly $CH_4$ concentration data based on results from weekly sampling data).<br>(10) Weekly volumetric flow rate used to calculate $CH_4$ destruction for each destruction device and each point of offsite transport (cfm).<br>(11) Weekly $CH_4$ concentration (%) used to calculate $CH_4$ flow to each destruction device and each point of offsite transport.<br>(12) Dates in quarterly reporting period where active ventilation of mining operations is taking place.<br>(13) Dates in quarterly reporting period where degasification of mining operations is taking place.<br>(14) Dates in quarterly reporting period when continuous monitoring equipment is not properly functioning, if applicable.<br>(15) Temperatures (°R), pressure (atm), and moisture content used in Equation FF–1 and FF–3 of subpart FF, and the gaseous organic concentration correction factor, if Equation FF–9 was required.<br>(16) For each destruction device, a description of the device, including an indication of whether destruction occurs at the coal mine or off-site. If destruction occurs at the mine, also report an indication of whether a back-up destruction device is present at the mine, the annual operating hours for the primary destruction device, the annual operating hours for the back-up destruction device (if present), and the destruction efficiencies assumed (percent).<br>(17) A description of the gas collection system (manufacturer, capacity, and number of wells) the surface area of the gas collection system (square meters), and the annual operating hours of the gas collection system.<br>(18) Identification information and description for each well and shaft, indication of whether the well or shaft is monitored individually, or as part of a centralized monitoring point. Note which method (sampling or continuous monitoring) was used.<br>(19) For each centralized monitoring point, identification of the wells and shafts included in the point. Note which method (sampling or continuous monitoring) was used. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| GG—Zinc Production (§98.330) | 25,000 metric tons $C0_2e$/year | **If a CEMS is used to measure $CO_2$ emissions:**<br>All relevant information required under 40 CFR 98.36 for the Tier 4 Calculation Methodology plus:<br>(1) Annual zinc product production capacity (tons).<br>(2) Annual production quantity for each zinc product (tons).<br>(3) Annual facility production quantity for each zinc product (tons).<br>(4) Number of Waelz kilns at each facility used for zinc production.<br>(5) Number of electrothermic furnaces at each facility used for zinc production.<br>**If a CEMS is not used to measure $CO_2$ emissions:**<br>(1) Identification number and annual process $CO_2$ emissions from each individual Waelz kiln or electrothermic furnace (metric tons).<br>(2) Annual zinc product production capacity (tons).<br>(3) Annual production quantity for each zinc product (tons).<br>(4) Number of Waelz kilns at each facility used for zinc production.<br>(5) Number of electrothermic furnaces at each facility used for zinc production.<br>(6) Annual mass of each carbon-containing input material charged to each kiln or furnace (including zinc bearing material, flux materials (e.g., limestone, dolomite), carbon electrode, and other carbonaceous materials (e.g., coal, coke) (tons).<br>(7) Carbon content of each carbon-containing input material charged to each kiln or furnace (including zinc bearing material, flux materials, and other carbonaceous materials) from the annual carbon analysis or from information provided by the material supplier for each kiln or furnace (percent by weight, expressed as a decimal fraction).<br>(8) Whether carbon content of each carbon-containing input material charged to each kiln or furnace is based on reports from the supplier or through self measurement using applicable ASTM standard method.<br>(9) If carbon content of each carbon-containing input material charged to each kiln or furnace is based on self measurement, the ASTM Standard Method used.<br>(10) Carbon content of the carbon electrode used in each furnace from the annual carbon analysis or from information provided by the material supplier (percent by weight, expressed as a decimal fraction).<br>(11) Whether carbon content of the carbon electrode used in each furnace is based on reports from the supplier or through self measurement using applicable ASTM standard method.<br>(12) If carbon content of carbon electrode used in each furnace is based on self measurement, the ASTM standard method used.<br>(13) For the missing data procedures in 40 CFR 98.335(b): How the monthly mass of carbon-containing materials with missing data was determined and the number of months the missing data procedures were used. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| HH—Landfills (§98.340) | Municipal solid waste landfills that generate $CH_4$ in amounts equivalent to 25,000 metric tons $CO_2$e or more per year | **All:**<br>(1) A classification of the landfill as "open" (actively received waste in the reporting year) or "closed" (no longer receiving waste), the year in which the landfill first started accepting waste for disposal, the last year the landfill accepted waste (for open landfills, enter the estimated year of landfill closure), the capacity (in metric tons) of the landfill, an indication of whether leachate recirculation is used during the reporting year and its typical frequency of use over the past 10 years (e.g., used several times a year for the past 10 years, used at least once a year for the past 10 years, used occasionally but not every year over the past 10 years, not used), an indication as to whether scales are present at the landfill, and the waste disposal quantity for each year of landfilling required to be included when using Equation HH-1 of subpart HH (in metric tons, wet weight).<br>(2) Method for estimating reporting year and historical waste disposal quantities, reason for its selection, and the range of years it is applied. For years when waste quantity data are determined using the methods in 40 CFR 98.343(a)(3), report separately the quantity of waste determined using the methods in 40 CFR 98.343(a)(3)(i) and the quantity of waste determined using the methods in 40 CFR 98.343(a)(3)(ii). For historical waste disposal quantities that were not determined using the methods in 40 CFR 98.343(a)(3), provide the population served by the landfill for each year the Equation HH–2 of subpart HH is applied, if applicable, or, for open landfills using Equation HH–3 of subpart HH, provide the value of landfill capacity (LFC) used in the calculation.<br>(3) Waste composition for each year required for Equation HH–1 of subpart HH, in percentage by weight, for each waste category listed in Table HH–1 to subpart HH that is used in Equation HH–1 of subpart HH to calculate the annual modeled $CH_4$ generation.<br>(4) For each waste type used to calculate $CH_4$ generation using Equation HH-1 of subpart HH: Degradable organic carbon (DOC), methane correction factor (MCF), and fraction of DOC dissimilated ($DOC_F$) values used in the calculations. If an MCF value other than the default of 1 is used, provide an indication of whether active aeration of the waste in the landfill was conducted during the reporting year, a description of the aeration system, including aeration blower capacity, the fraction of the landfill containing waste affected by the aeration, the total number of hours during the year the aeration blower was operated, and other factors used as a basis for the selected MCF value.<br>(5) Fraction of $CH_4$ in landfill gas (F) and an indication of whether the fraction of $CH_4$ was determined based on measured values or the default value.<br>(6) The surface area of the landfill containing waste (in square meters), identification of the type of cover material used (as either organic cover, clay cover, sand cover, or other soil mixtures). If multiple cover types are used, the surface area associated with each cover type.<br>(7) The modeled annual methane generation rate for the reporting year (metric tons $CH_4$) calculated using Equation HH-1 of subpart HH.<br>(8) For landfills without gas collection systems, the annual methane emissions (i.e., the methane generation, adjusted for oxidation, calculated using Equation HH-5 of subpart HH), reported in metric tons $CH_4$, and an indication of whether passive vents and/or passive flares (vents or flares that are not considered part of the gas collection system as defined in 40 CFR 98.6) are present at this landfill. |
| | | **For landfills with gas collection systems:**<br>(1) Total volumetric flow of landfill gas collected for destruction for the reporting year (cubic feet at 520°R or 60°F and 1 atm).<br>(2) Annual average $CH_4$ concentration of landfill gas collected for destruction (percent by volume).<br>(3) Monthly average temperature for each month at which flow is measured for landfill gas collected for destruction, or statement that temperature and/or pressure is incorporated into internal calculations run by the monitoring equipment.<br>(4) An indication as to whether flow was measured on a wet or dry basis, an indication as to whether $CH_4$ concentration was measured on a wet or dry basis, and if required for Equation HH–4 of subpart HH, monthly average moisture content for each month at which flow is measured for landfill gas collected for destruction.<br>(5) An indication of whether destruction occurs at the landfill facility or off-site. If destruction occurs at the landfill facility: An indication of whether a back-up destruction device is present at the landfill, the annual operating hours for the primary destruction device, the annual operating hours for the back-up destruction device (if present), and the destruction efficiency used (percent).<br>(6) Annual quantity of recovered $CH_4$ (metric tons $CH_4$) calculated using Equation HH-4 of subpart HH.<br>(7) A description of the gas collection system (manufacture, capacity, number of number of wells), the surface area (square meters) and estimated waste depth (meters) for each area specified in Table HH-3 of subpart HH, the estimated gas collection system efficiency for landfills with this gas collection system, the annual operating hours of the gas collection system, and an indication of whether passive vents and/or passive flares (vents or flares that are not considered part of the gas collection system as defined in 40 CFR 98.6) are present at the landfill.<br>(8) Methane generation corrected for oxidation calculated using Equation HH-5 of subpart HH, reported in metric tons $CH_4$.<br>(9) Methane generation ($G_{CH4}$) value used as an input to HH-6 of subpart HH. Specify whether the value is modeled ($G_{CH4}$ from HH-1) or measured (R from Eq. HH-4).<br>(10) Methane generation corrected for oxidation calculated using Equation HH-7 of subpart HH, reported in metric tons $CH_4$.<br>(11) Methane emissions calculated using Equation HH-6 of subpart HH, reported in metric tons $CH_4$; and<br>(12) Methane emissions calculated using Equation HH-8 of subpart HH, reported in metric tons $CH_4$. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| II—Industrial Wastewater Treatment (§98.350) | 25,000 metric tons $CO_2$e/year | **All:**<br>A description or diagram of the industrial wastewater treatment system, identifying the processes used to treat industrial wastewater and industrial wastewater treatment sludge. Indicate how the processes are related to each other and identify the anaerobic processes. Provide a unique identifier for each anaerobic process, indicate the average depth in meters of each anaerobic lagoon, and indicate whether biogas generated by each anaerobic process is recovered. The anaerobic processes must be identified as:<br>(1) Anaerobic reactor.<br>(2) Anaerobic deep lagoon (depth more than 2 meters).<br>(3) Anaerobic shallow lagoon (depth less than 2 meters).<br>(4) Anaerobic sludge digester.<br>The total mass of $CH_4$ emitted from all anaerobic processes from which biogas is not recovered (calculated in Equation II–3 of subpart II) and from all anaerobic processes from which some biogas is recovered (calculated in Equation II–6 of subpart II) using Equation II–7 of subpart II. |
| | | **For each anaerobic wastewater treatment process (reactor, deep lagoon, or shallow lagoon):**<br>(1) Weekly average COD or $BOD_5$ concentration of wastewater entering each anaerobic wastewater treatment process, for each week the anaerobic process was operated.<br>(2) Volume of wastewater entering each anaerobic wastewater treatment process for each week the anaerobic process was operated.<br>(3) Maximum $CH_4$ production potential ($B_0$) used as an input to Equation II–1 or II–2 of subpart II, from Table II–1 to subpart II.<br>(4) Methane conversion factor (MCF) used as an input to Equation II–1 or II–2 of subpart II, from Table II–1 to subpart II.<br>(5) Annual mass of $CH_4$ generated by each anaerobic wastewater treatment process, calculated using Equation II–1 or II–2 of subpart II. |
| | | **For each anaerobic wastewater treatment process from which biogas is not recovered, report the annual $CH_4$ emissions, calculated using Equation II–3 of subpart II.** |
| | | **For each anaerobic wastewater treatment process and anaerobic sludge digester from which some biogas is recovered:**<br>(1) Annual quantity of $CH_4$ recovered from the anaerobic process calculated using Equation II–4 of subpart II.<br>(2) Total weekly volumetric biogas flow for each week (up to 52 weeks/year) that biogas is collected for destruction.<br>(3) Weekly average $CH_4$ concentration for each week that biogas is collected for destruction.<br>(4) Weekly average biogas temperature for each week at which flow is measured for biogas collected for destruction, or statement that temperature is incorporated into monitoring equipment internal calculations.<br>(5) Whether flow was measured on a wet or dry basis, whether $CH_4$ concentration was measured on a wet or dry basis, and if required for Equation II–4 of subpart II, weekly average moisture content for each week at which flow is measured for biogas collected for destruction, or statement that moisture content is incorporated into monitoring equipment internal calculations.<br>(6) Weekly average biogas pressure for each week at which flow is measured for biogas collected for destruction, or statement that pressure is incorporated into monitoring equipment internal calculations.<br>(7) $CH_4$ collection efficiency (CE) used in Equation II–5 of subpart II.<br>(8) Whether destruction occurs at the facility or off-site. If destruction occurs at the facility, also report whether a back-up destruction device is present at the facility, the annual operating hours for the primary destruction device, the annual operating hours for the back-up destruction device (if present), the destruction efficiency for the primary destruction device, and the destruction efficiency for the back-up destruction device (if present).<br>(9) For each anaerobic process from which some biogas is recovered, report the annual $CH_4$ emissions, as calculated by Equation II–6 of subpart II. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| JJ—Manure Management (§98.360) | Manure management systems with combined $CH_4$ and $N_2O$ emissions in amounts equivalent to 25,000 metric tons $CO_2e$ or more per year | **All:**<br>(1) List of manure management system components at the facility.<br>(2) Fraction of manure from each animal type that is handled in each manure management system component.<br>(3) Average annual animal population (for each animal type) for static populations or the results of Equation JJ-4 for growing populations.<br>(4) Average number of days that growing animals are kept at the facility (for each animal type).<br>(5) The number of animals produced annually for growing populations (for each animal type).<br>(6) Typical animal mass (for each animal type).<br>(7) Total facility emissions (results of Equation JJ-14).<br>(8) $CH_4$ emissions from manure management system components listed in 40 CFR 98.360(b), except digesters (results of Equation JJ-2).<br>(9) VS value used (for each animal type).<br>(10) $B_0$ value used (for each animal type).<br>(11) Methane conversion factor used for each MMS component.<br>(12) Average ambient temperature used to select each methane conversion factor.<br>(13) $N_2O$ emissions (results of Equation JJ-13).<br>(14) N value used for each animal type.<br>(15) $N_2O$ emission factor selected for each MMS component. |
| | | **For facilities with anaerobic digesters:**<br>(1) $CH_4$ emissions from anaerobic digesters (results of Equation JJ-5)<br>(2) $CH_4$ flow to the digester combustion device for each digester (results of Equation JJ-6, or value from fully integrated monitoring system as described in 40 CFR 98.363(b))<br>(3) $CH_4$ destruction for each digester (results of Equation JJ-11)<br>(4) $CH_4$ leakage for each digester (results of Equation JJ-12)<br>(5) Total annual volumetric biogas flow for each digester (results of Equation JJ-7).<br>(6) Average annual $CH_4$ concentration for each digester (results of Equation JJ-8).<br>(7) Average annual temperature at which gas flow is measured for each digester (results of Equation JJ-9).<br>(8) Average annual gas flow pressure at which gas flow is measured for each digester (results of Equation JJ-10).<br>(9) Destruction efficiency used for each digester.<br>(10) Number of days per year that each digester was operating.<br>(11) Collection efficiency used for each digester. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| LL—Suppliers of Coal-based Liquid Fuels (§98.380) | Producers of coal-to-liquid products: All in<br><br>Importers & Exporters: 25,000 metric tons C02e/year | **Producers (for each coal-to-liquid facility):**<br>(1) For each product listed in table MM-1 that enters the coal-to-liquid facility to be further processed or otherwise used on site: The annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, quantity shall reflect the individual components of the product.<br>(2) For each product listed in table MM-1 that enters the coal-to-liquid facility to be further processed or otherwise used on site: The total annual quantity in metric tons or barrels. For natural gas liquids, quantity must reflect the individual components of the product.<br>(3) For each feedstock reported in (2) that was produced by blending a fossil fuel-based product with a biomass-based product: The percent of the volume reported in (2) that is fossil fuel-based (excluding any denaturant that may be present in any ethanol product).<br>(4) Each standard method or other industry standard practice used to measure each quantity reported in (1).<br>(5) For each product (leaving the coal-to-liquid facility) listed in table MM-1: The annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, quantity shall reflect the individual components of the product. Those products that enter the facility, but are not reported in (1), shall not be reported under this paragraph.<br>(6) For each product (leaving the coal-to-liquid facility) listed in table MM-1: The total annual quantity in metric tons or barrels. For natural gas liquids, quantity must reflect the individual components of the product. Those products that enter the facility, but are not reported in (2), shall not be reported under this paragraph.<br>(7) For each product reported in (6) that was produced by blending a fossil fuel-based product with a biomass-based product: The percent of the volume reported in (6) that is fossil fuel-based (excluding any denaturant that may be present in any ethanol product).<br>(8) Each standard method or other industry standard practice used to measure each quantity reported in (5).<br>(9) For every feedstock reported in (2) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The number of samples collected according to 40 CFR 98.394(c); (ii) The sampling standard method used; (iii) The carbon share test results in percent mass; (iv) The standard method used to test carbon share; and (v) The calculated $CO_2$ emissions factor.<br>(10) For every non-solid feedstock reported in (2) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The density test results in metric tons per barrel, and (ii) The standard method used to test density.<br>(11) For every product reported in (6) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The number of samples collected according to 40 CFR 98.394(c); (ii) The sampling standard method used; (iii) The carbon share test results in percent mass; (iv) The standard method used to test carbon share; and (v) The calculated $CO_2$ emissions factor.<br>(12) For every non-solid product reported in (6) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The density test results in metric tons per barrel, and (ii) The standard method used to test density.<br>(13) For each specific type of biomass that enters the coal-to-liquid facility to be co-processed with fossil fuel-based feedstock to produce a product reported in (6): The annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used.<br>(14) For each specific type of biomass that enters the coal-to-liquid facility to be co-processed with fossil fuel-based feedstock to produce a product reported in (6): The total annual quantity in metric tons or barrels.<br>(15) Each standard method or other industry standard practice used to measure each quantity reported in (3).<br>(16) The $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each feedstock reported in (2), calculated according to 40 CFR 98.393(b) or (h).<br>(17) The $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each product (leaving the coal-to-liquid facility) reported in (6), calculated according to 40 CFR 98.393(a) or (h).<br>(18) Annual $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each type of biomass feedstock co-processed with fossil fuel-based feedstocks reported in (3), calculated according to 40 CFR 98.393(c).<br>(19) Annual $CO_2$ emissions that would result from the complete combustion or oxidation of all products, calculated according to 40 CFR 98.393(d).<br>(20) Annual quantity of bulk NGLs in metric tons or barrels received for processing during the reporting year. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| LL—Suppliers of Coal-based Liquid Fuels (§98.380) (continued) | Producers of coal-to-liquid products: All in<br><br>Importers & Exporters: 25,000 metric tons C02e/year | **Importers (at the corporate level):**<br>(1) For each product listed in table MM-1 of subpart MM: The annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, quantity shall reflect the individual components of the product.<br>(2) For each product listed in table MM-1 of subpart MM: The total annual quantity in metric tons or barrels. For natural gas liquids, quantity shall reflect the individual components of the product as listed in table MM-1.<br>(3) For each product reported in (2) that was produced by blending a fossil fuel-based product with a biomass-based product: The percent of the volume reported in (2) that is fossil fuel-based (excluding any denaturant that may be present in any ethanol product).<br>(4) Each standard method or other industry standard practice used to measure each quantity reported in (1).<br>(5) For each product reported in (2) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The number of samples collected according to 40 CFR 98.394(c); (ii) The sampling standard method used; (iii) The carbon share test results in percent mass; (iv) The standard method used to test carbon share; and (v) The calculated $CO_2$ emissions factor in metric tons.<br>(6) For each non-solid product reported in (2) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The density test results in metric tons per barrel, and (ii) The standard method used to test density.<br>(7) The $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each imported product reported in (2), calculated according to 40 CFR 98.393(a).<br>(8) The total sum of $CO_2$ emissions that would result from the complete combustion or oxidation of all imported products, calculated according to 40 CFR 98.393(e). |
| | | **Exporters (at the corporate level):**<br>(1) For each product listed in table MM-1: The annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, quantity must reflect the individual components of the product.<br>(2) For each product listed in table MM-1: The total annual quantity in metric tons or barrels. For natural gas liquids, quantity must reflect the individual components of the product.<br>(3) For each product reported in (2) that was produced by blending a fossil fuel-based product with a biomass-based product: The percent of the volume reported in (2) that is fossil fuel-based (excluding any denaturant that may be present in any ethanol product.<br>(4) Each standard method or other industry standard practice used to measure each quantity reported in (1).<br>(5) For each product reported in (2) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The number of samples collected according to 40 CFR 98.394(c); (ii) The sampling standard method used; (iii) The carbon share test results in percent mass; (iv) The standard method used to test carbon share; and (v) The calculated $CO_2$ emissions factor in metric tons.<br>(6) For each non-solid product reported in (2) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The density test results in metric tons per barrel, and (ii) The standard method used to test density.<br>(7) The $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each exported product reported in (2), calculated according to 40 CFR 98.393(a).<br>(8) Total sum of $CO_2$ emissions that would result from the complete combustion or oxidation of all exported products, calculated according to 40 CFR 98.393(e). |
| | | Blended feedstock and products:<br>(1) Producers, exporters, and importers must report the following information for each blended product and feedstock where emissions were calculated according to 40 CFR 98.393(i): (i) Volume or mass of each blending component; (ii) The $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each blended feedstock or product, using Equation MM–12 or Equation MM–13 of 40 CFR 98.393; and (iii) Whether it is a blended feedstock or a blended product.<br>(2) For a product that enters the facility to be further refined or otherwise used on site that is a blended feedstock, producers must meet the reporting requirements of paragraphs (a)(1) and (a)(2) of this section by reflecting the individual components of the blended feedstock.<br>(3) For a product that is produced, imported, or exported that is a blended product, producers, importers, and exporters must meet the reporting requirements of paragraphs (a)(5), (a)(6), (b)(1), (b)(2), (c)(1), and (c)(2) of this section, as applicable, by reflecting the individual components of the blended product. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| MM—Suppliers of Petroleum Products (§98.390) | (A) All petroleum refineries that distill crude oil.<br>(B) Importers of an annual quantity of petroleum products and natural gas liquids that is equivalent to 25,000 metric tons $CO_2$e or more.<br>(C) Exporters of an annual quantity of petroleum products and natural gas liquids that is equivalent to 25,000 metric tons $CO_2$e or more. | **Refiners:**<br>(1) For each petroleum product or natural gas liquid listed in table MM-1 that enters the refinery to be further refined or otherwise used on site: The annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, shall reflect the individual components of the product.<br>(2) For each petroleum product or natural gas liquid listed in table MM-1 that enters the refinery to be further refined or otherwise used on site: The annual quantity in metric tons or barrels. For natural gas liquids, quantity shall reflect the individual components of the product.<br>(3) For each feedstock reported in (2) that was produced by blending a petroleum-based product with a biomass-based product: The percent of the volume reported in (2) that is petroleum-based (excluding any denaturant that may be present in any ethanol product).<br>(4) Each standard method or other industry standard practice used to measure each quantity reported in (1).<br>(5) For each petroleum product and natural gas liquid (ex refinery gate) listed in table MM-1: The annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, quantity shall reflect the individual components of the product. Petroleum products and natural gas liquids that enter the refinery, but are not reported in (1), shall not be reported under this paragraph.<br>(6) For each petroleum product and natural gas liquid (ex refinery gate) listed in table MM-1 of subpart MM: The annual quantity in metric tons or barrels. For natural gas liquids, quantity shall reflect the individual components of the product. Petroleum products and natural gas liquids that enter the refinery, but are not reported in (2), shall not be reported under this paragraph.<br>(7) For each product reported in (6) that was produced by blending a petroleum-based product with a biomass-based product: The percent of the volume reported in (6) that is petroleum-based (excluding any denaturant that may be present in any ethanol product).<br>(8) Each standard method or other industry standard practice used to measure each quantity reported in (5).<br>(9) For every feedstock reported in (2) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The number of samples collected according to 40 CFR 98.394(c); (ii) The sampling standard method used; (iii) The carbon share test results in percent mass; (iv) The standard method used to test carbon share; and (v) The calculated $CO_2$ emissions factor in metric tons.<br>(10) For every non-solid feedstock reported in (2) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The density test results in metric tons per barrel and (ii) The standard method used to test density.<br>(11) For every petroleum product and natural gas liquid reported in (6) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The number of samples collected according to 40 CFR 98.394(c); (ii) The sampling standard method used; (iii) The carbon share test results in percent mass; (iv) The standard method used to test carbon share; and (v) The calculated $CO_2$ emissions factor in metric tons $CO_2$ per barrel or per metric ton of product.<br>(12) For every non-solid petroleum product and natural gas liquid reported in paragraph (6) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The density test results in metric tons per barrel and (ii) The standard method used to test density.<br>(13) For each specific type of biomass that enters the refinery to be co-processed with petroleum feedstocks to produce a petroleum product reported in (6): The annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used.<br>(14) For each specific type of biomass that enters the refinery to be co-processed with petroleum feedstocks to produce a petroleum product reported in (6): The annual quantity in metric tons or barrels.<br>(15) Each standard method or other industry standard practice used to measure each quantity reported in (13).<br>(16) The $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each petroleum product and natural gas liquid (ex refinery gate) reported in (6).<br>(17) The $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each feedstock reported in (2) that were calculated according to 40 CFR 98.393(b) or (h).<br>(18) The $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each type of biomass feedstock co-processed with petroleum feedstocks reported in (13), calculated according to 40 CFR 98.393(c).<br>(19) The sum of $CO_2$ emissions that would result from the complete combustion or oxidation of all products, calculated according to 40 CFR 98.393(d).<br>(20) All of the following information for all crude oil feedstocks used at the refinery: (i) Batch volume in barrels; (ii) Weighted average API gravity of the batch at the point of entry at the refinery; (iii) Weighted average sulfur content of the batch at the point of entry at the refinery; (iv) Country of origin, of the batch, if known and data in (v) and (vi) are unknown; (v) EIA crude stream code and crude stream name of the batch, if known; and (vi) Generic name for the crude stream and the appropriate EIA two-letter country or state and production area code of the batch, if known and no appropriate EIA crude stream code exists.<br>(21) The quantity of bulk NGLs in metric tons or barrels received for processing during the reporting year.<br>(22) Volume of crude oil in barrels injected into a crude oil supply or reservoir. A volume of crude oil that entered the refinery, but was not reported in paragraphs (2) or (20), shall not be reported under this paragraph.<br>(23) Special provisions for 2010. For reporting year 2010 only, a refiner that knows the information under a specific tier of the batch definition in 40 CFR 98.398, but does not have the necessary data collection and management in place to readily report this information, can use the next most appropriate tier of the batch definition for reporting batch information under paragraph 98.396(a)(20). |

| Subpart | Reporting Threshold | Reporting and Verification |
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| MM—Suppliers of Petroleum Products (§98.390) (continued) | (A) All petroleum refineries that distill crude oil.<br>(B) Importers of an annual quantity of petroleum products and natural gas liquids that is equivalent to 25,000 metric tons $CO_2$e or more.<br>(C) Exporters of an annual quantity of petroleum products and natural gas liquids that is equivalent to 25,000 metric tons $CO_2$e or more. | **Importers (at the corporate level):**<br>(1) For each petroleum product and natural gas liquid listed in table MM-1: The annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, quantity shall reflect the individual components of the product.<br>(2) For each petroleum product and natural gas liquid listed in table MM-1: The annual quantity in metric tons or barrels. For natural gas liquids, quantity must reflect the individual components of the product as listed in table MM-1 of subpart MM.<br>(3) For each product reported in (2) that was produced by blending a petroleum-based product with a biomass-based product: The percent of the volume reported in (2) that is petroleum-based (excluding any denaturant that may be present in any ethanol product).<br>(4) Each standard method or other industry standard practice used to measure each quantity reported in (1).<br>(5) For each product reported in (2) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The number of samples collected according to 40 CFR 98.394(c); (ii) The sampling standard method used; (iii) The carbon share test results in percent mass; (iv) The standard method used to test carbon share; and (v) The calculated $CO_2$ emissions factor in metric tons $CO_2$ per barrel or per metric ton of product.<br>(6) For each non-solid product reported in (2) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The density test results in metric tons per barrel and (ii) The standard method used to test density.<br>(7) The $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each imported petroleum product and natural gas liquid reported in (2), calculated according to 40 CFR 98.393(a).<br>(8) The sum of $CO_2$ emissions that would result from the complete combustion or oxidation of all imported products, calculated according to 40 CFR 98.393(e). |
| | | **Exporters (at the corporate level):**<br>(1) For each petroleum product and natural gas liquid listed in table MM-1 of subpart MM: The annual quantity in metric tons or barrels by each quantity measurement standard method or other industry standard practice used. For natural gas liquids, quantity shall reflect the individual components of the product.<br>(2) For each petroleum product and natural gas liquid listed in table MM-1 of subpart MM: The annual quantity in metric tons or barrels. For natural gas liquids, quantity shall reflect the individual components of the product.<br>(3) For each product reported in (2) that was produced by blending a petroleum-based product with a biomass-based product: The percent of the volume reported in (2) that is petroleum based (excluding any denaturant that may be present in any ethanol product).<br>(4) Each standard method or other industry standard practice used to measure each quantity reported in (1).<br>(5) For each product reported in (2) for which Calculation Method 2 of subpart MM was used to determine an emissions factor: (i) The number of samples collected according to 40 CFR 98.394(c); (ii) The sampling standard method used; (iii) The carbon share test results in percent mass; (iv) The standard method used to test carbon share; and (v) The calculated $CO_2$ emissions factor in metric tons $CO_2$ per barrel or per metric ton of product.<br>(6) For each non-solid product reported in (2) for which Calculation Method 2 of subpart MM used was used to determine an emissions factor: (i) The density test results in metric tons per barrel and (ii) The standard method used to test density.<br>(7) The $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each exported petroleum product and natural gas liquid reported in (2), calculated according to 40 CFR 98.393(a).<br>(8) The sum of $CO_2$ emissions that would result from the complete combustion or oxidation of all exported products, calculated according to 40 CFR 98.393(e). |
| | | **Blended non-crude feedstock and products:**<br>(1) Refineries, exporters, and importers must report the following information for each blended product and non-crude feedstock where emissions were calculated according to 40 CFR 98.393(i): (i) Volume or mass of each blending component; (ii) The $CO_2$ emissions in metric tons that would result from the complete combustion or oxidation of each blended non-crude feedstock or product, using Equation MM–12 or Equation MM–13 of subpart MM; and (iii) Whether it is a blended non-crude feedstock or a blended product.<br>(2) For a product that enters the refinery to be further refined or otherwise used on site that is a blended non-crude feedstock, refiners must meet the reporting requirements of paragraphs (a)(1) and (a)(2) of 40 CFR 98.396 by reflecting the individual components of the blended non-crude feedstock.<br>(3) For a product that is produced, imported, or exported that is a blended product, refiners, importers, and exporters must meet the reporting requirements of paragraphs (a)(5), (a)(6), (b)(1), (b)(2), (c)(1), and (c)(2) of 40 CFR 98.396, as applicable, by reflecting the individual components of the blended product. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| NN—Suppliers of Natural Gas and Natural Gas Liquids (§98.400) | (A) All fractionators.<br>(B) Local natural gas distribution companies that deliver 460,000 thousand standard cubic feet or more of natural gas per year. | **For each NGL fractionator:**<br>(1) Annual quantity (in barrels) of each NGL product supplied to downstream facilities in the following product categories: ethane, propane, normal butane, isobutane, and pentanes plus.<br>(2) Annual quantity (in barrels) of each NGL product received from other NGL fractionators in the following categories: ethane, propane, normal butane, isobutane, and pentanes plus.<br>(3) Annual volumes in Mscf of natural gas received for processing.<br>(4) Annual quantity (in barrels) of y-grade, bulk NGLs received from others for fractionation.<br>(5) Annual quantity (in barrels) of propane that the NGL fractionator odorizes at the facility and delivers to others.<br>(6) Annual $CO_2$ emissions (in metric tons) that would result from the complete combustion or oxidation of the quantities in (1) and (2), calculated in accordance with 40 CFR 98.403(a) and (c)(1).<br>(7) Annual $CO_2$ mass emissions (metric tons) that would result from the combustion or oxidation of fractionated NGLs supplied less the quantity received by other fractionators, calculated in accordance with 40 CFR 98.403(c)(2).<br>(8) The specific industry standard used to measure each quantity reported in (1).<br>(9) If the NGL fractionator developed reporter-specific EFs or HHVs: (i) The specific industry standard(s) used to develop reporter-specific higher heating value(s) and/or emission factor(s), pursuant to 40 CFR 98.404(b)(2) and (c)(3); (ii) The developed HHV(s); and (iii) The developed EF(s). |
| | | **Local distribution companies:**<br>(1) Annual volume in Mscf of natural gas received by the LDC at its city gate stations for redelivery on the LDC's distribution system, including for use by the LDC.<br>(2) Annual volume in Mscf of natural gas placed into storage.<br>(3) Annual volume in Mscf of vaporized liquefied natural gas (LNG) produced at on-system vaporization facilities for delivery on the distribution system that is not accounted for in (1).<br>(4) Annual volume in Mscf of natural gas withdrawn from on-system storage (that is not delivered to the city gate) for delivery to on the distribution system.<br>(5) Annual volume in Mscf of natural gas delivered directly to LDC systems from producers or natural gas processing plants from local production.<br>(6) Annual volume in Mscf of natural gas delivered to downstream gas transmission pipelines and other local distribution companies.<br>(7) Annual volume in Mscf of natural gas delivered by LDC to each meter registering supply equal to or greater than 460,000 Mcsf during the calendar year.<br>(8) The total annual $CO_2$ mass emissions (metric tons) associated with the volumes in (1) - (7), calculated in accordance with 40 CFR 98.403.<br>(9) Annual $CO_2$ emissions (metric tons) that would result from the complete combustion or oxidation of the annual supply of natural gas to end-users registering less than 460,000 Mcsf, calculated in accordance with 40 CFR 98.403(b)(4).<br>(10) The specific industry standard used to develop the volume reported in (1).<br>(11) If the LDC developed reporter-specific EFs or HHVs: (i) The specific industry standard(s) used to develop reporter-specific higher heating value(s) and/or emission factor(s), pursuant to 40 CFR 98.404(b)(2) and (c)(3); (ii) The developed HHV(s); and (iii) The developed EF(s).<br>(12) The customer name, address, and meter number of each meter reading used to report in (7). If known, the EIA identification number of each LDC customer.<br>(13) The annual volume in Mscf 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 (Annual Report of Natural Gas and Supplemental Gas Supply & Disposition) and Instructions. (i) Residential consumers; (ii) Commercial consumers; (iii) Industrial consumers; and (iv) Electricity generating facilities. |
| | | **All:** Each reporter must report the number of days in the reporting year that substitute data procedures were used for the following purpose: (i) To measure quantity; (ii) To develop HHV(s); and (iii) To develop EF(s). |

| Subpart | Reporting Threshold | Reporting and Verification |
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| OO—Suppliers of Industrial Greenhouse Gases (§98.410) | Producers: All in<br><br>Importers & Exporters with annual bulk imports or exports of $N_2O$, fluorinated GHG, and $CO_2$that in combination are equivalent to 25,000 metric tons $CO_2e$ or more. | **Each fluorinated GHG or nitrous oxide production facility:**<br>(1) Mass in metric tons of each fluorinated GHG or nitrous oxide produced at that facility by process, except for amounts that are captured solely to be shipped off site for destruction.<br>(2) Mass in metric tons of each fluorinated GHG or nitrous oxide transformed at that facility, by process.<br>(3) Mass in metric tons of each fluorinated GHG that is destroyed at that facility and that was previously produced as defined at 40 CFR 98.410(b). Quantities to be reported include but are not limited to quantities that are shipped to the facility by another facility for destruction and quantities that are returned to the facility for reclamation but are found to be irretrievably contaminated and are therefore destroyed.<br>(4) Total mass in metric tons of each fluorinated GHG or nitrous oxide sent to another facility for transformation.<br>(5) Total mass in metric tons of each fluorinated GHG sent to another facility for destruction, except fluorinated GHGs that are not included in the mass produced in 40 CFR 98.413(a) because they are removed from the production process as by-products or other wastes. Quantities to be reported could include, for example, fluorinated GHGs that are returned to the facility for reclamation but are found to be irretrievably contaminated and are therefore sent to another facility for destruction.<br>(6) Total mass in metric tons of each fluorinated GHG that is sent to another facility for destruction and that is not included in the mass produced in 40 CFR 98.413(a) because it is removed from the production process as a byproduct or other waste.<br>(8) Mass in metric tons of any fluorinated GHG or nitrous oxide fed into the transformation process, by process.<br>(9) Mass in metric tons of each fluorinated GHG fed into the destruction device and that was previously produced as defined at 40 CFR 98.410(b). Quantities to be reported include but are not limited to quantities that are shipped to the facility by another facility for destruction and quantities that are returned to the facility for reclamation but are found to be irretrievably contaminated and are therefore destroyed.<br>(10) Mass in metric tons of each fluorinated GHG or nitrous oxide that is measured coming out of the production process, by process.<br>(11) Mass in metric tons of each fluorinated GHG or nitrous oxide added back into the production process (e.g., for reclamation), including returned heels in containers that are weighed to measure the mass in 98.414(a), by process.<br>(12) 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.<br>(13) Names and addresses of facilities to which any fluorinated GHGs were sent for destruction, and the quantities (metric tons) of each fluorinated GHG that were sent to each for destruction.<br>(14) Where missing data have been estimated pursuant to 40 CFR 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. |
| | | **Fluorinated GHG production facilities that destroy fluorinated GHGs (one-time report) for each destruction process:**<br>(1) Destruction efficiency (DE).<br>(2) Methods used to determine the destruction efficiency.<br>(3) Methods used to record the mass of fluorinated GHG destroyed.<br>(4) Chemical identity of the fluorinated GHG(s) used in the performance test conducted to determine DE.<br>(5) Name of all applicable federal or state regulations that may apply to the destruction process.<br>(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 importer of fluorinated GHGs or $N_2O$ :**<br>For each import (except for shipments including less than 25 kilograms of fluorinated GHGs or nitrous oxide, transshipments, and heels that meet the conditions set forth at 98.417(e)):<br>(1) Total mass in metric tons of nitrous oxide and each fluorinated GHG imported in bulk, including each fluorinated GHG constituent of the fluorinated GHG product that makes up between 0.5 percent and 100 perfecnt of the product by mass.<br>(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.<br>(3) Date on which the fluorinated GHGs or nitrous oxide were imported.<br>(4) Port of entry through which the fluorinated GHGs or nitrous oxide passed.<br>(5) Country from which the imported fluorinated GHGs or nitrous oxide were imported.<br>(6) Commodity code of the fluorinated GHGs or nitrous oxide shipped.<br>(7) Importer number for the shipment.<br>(8) Total mass in metric tons of each fluorinated GHG destroyed by the importer.<br>(9) 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 transformation.<br>(10) If applicable, the names and addresses of the persons and facilities to which the fluorinated GHGs were sold or transferred for destruction, and the quantities (metric tons) of each fluorinated GHG that were sold or transferred to each facility for destruction. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| OO—Suppliers of Industrial Greenhouse Gases (§98.410) (cont'd) | Producers: All in<br><br>Importers & Exporters with annual bulk imports or exports of $N_2O$, fluorinated GHG, and $CO_2$that in combination are equivalent to 25,000 metric tons $CO_2e$ or more. | **Bulk exporter of fluorinated GHGs or $N_2O$:**<br>For each export (except for shipments including less than 25 kilograms of fluorinated GHGs or nitrous oxide, transshipments, and heels):<br>(1) Total mass in metric tons of nitrous oxide and each fluorinated GHG exported in bulk.<br>(2) Names and addresses of the exporter and the recipient of the exports.<br>(3) Exporter's Employee Identification Number.<br>(4) Commodity code of the fluorinated GHGs and nitrous oxide shipped.<br>(5) Date on which, and the port from which, fluorinated GHGs and nitrous oxide were exported from the United States or its territories.<br>(6) Country to which the fluorinated GHGs or nitrous oxide were exported. |
| | | **A fluorinated GHG production facility must submit a one-time report within 60 days of commencing fluorinated GHG production describing:**<br>(1) The method(s) by which the producer in practice measures the mass of fluorinated GHGs produced, including the instrumentation used (Coriolis flowmeter, other flowmeter, weigh scale, etc.) and its accuracy and precision.<br>(2) The method(s) by which the producer in practice estimates the mass of fluorinated GHGs fed into the transformation process, including the instrumentation used (Coriolis flowmeter, other flowmeter, weigh scale, etc.) and its accuracy and precision.<br>(3) The method(s) by which the producer in practice estimates the fraction of fluorinated GHGs fed into the transformation process that is actually transformed, and the estimated precision and accuracy of this estimate.<br>(4) The method(s) by which the producer in practice estimates the masses of fluorinated GHGs fed into the destruction device, including the method(s) used to estimate the concentration of the fluorinated GHGs in the destroyed material, and the estimated precision and accuracy of this estimate.<br>(5) The estimated percent efficiency of each production process for the fluorinated GHG produced. |
| PP—Suppliers of Carbon Dioxide ($CO_2$) (§98.420) | Producers: All in<br><br>Bulk importers & exporters with annual bulk imports or exports of $N_2O$, fluorinated GHG, and $CO_2$that in combination are equivalent to 25,000 metric tons $CO_2e$ or more | **Facilities that use Equation PP-1 of 40 CFR 98.423:**<br>For each mass flow meter or $CO_2$ stream that delivers $CO_2$ to containers:<br>(1) Annual mass in metric tons of the $CO_2$.<br>(2) Quarterly mass in metric tons of $CO_2$.<br>(3) Quarterly concentration of the $CO_2$ stream.<br>(4) The standard used to measure $CO_2$ concentration.<br>(5) The location of the flow meter in the process chain in relation to the points of $CO_2$ stream capture, dehydration, compression, and other processing. |
| | | **Facilities that use Equation PP-2 of 40 CFR 98.423:**<br>For each volumetric flow meter or $CO_2$ stream that delivers $CO_2$ to containers:<br>(1) Annual mass in metric tons of $CO_2$.<br>(2) Quarterly volume in standard cubic meters of $CO_2$.<br>(3) Quarterly concentration of the $CO_2$ stream in volume or weight percent.<br>(4) Report density as follows: (i) Quarterly density of $CO_2$ in metric tons per standard cubic meter if reporting the concentration of the $CO_2$ stream in (3) and (ii) Quarterly density of the $CO_2$ stream in metric tons per standard cubic meter if reporting the concentration of the $CO_2$ stream in (3) in volume percent.<br>(5) The method used to measure density.<br>(6) The standard used to measure $CO_2$ concentration.<br>(7) The location of the flow meter in the process chain in relation to the points of $CO_2$ stream capture, dehydration, compression, and other processing. |
| | | **Facilities that use Equation PP-3a or PP-3b of 40 CFR 98.423 for calculating the aggregated annual mass of $CO_2$ emissions:**<br>(1) If Equation PP-3a is used, Annual $CO_2$ mass in metric tons from all flow meters and $CO_2$ streams that deliver $CO_2$ to containers.<br>(2) If Equation PP–3b is used, report: (i) The total annual $CO_2$ mass through main flow meter(s) in metric tons; (ii) The total annual $CO_2$ mass through subsequent flow meter(s) in metric tons; (iii) The total annual $CO_2$ mass supplied in metric tons; and (iv) The location of each flow meter in relation to the point of segregation. |
| | | **Facilities that use Equation PP-4 of 40 CFR 98.423:**<br>1) Annual mass of $CO_2$in metric tons in all $CO_2$ containers imported or exported at the corporate level. |
| | | **All:**<br>(1) The type of equipment used to measure the total flow of the $CO_2$ stream or the total mass or volume in $CO_2$ containers.<br>(2) The standard used to operate and calibrate the equipment reported in (1).<br>(3) The number of days in the reporting year for which substitute data procedures were used for the following purposes: (i) To measure quantity; (ii) To measure concentration; and (iii) To measure density.<br>(4) The aggregated annual quantity of $CO_2$ in metric tons that is transferred to each of the following end use applications, 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; (xiii) Other.<br>(5) Each production process unit that captures a $CO_2$ stream for purposes of supplying $CO_2$ for commercial applications or in order to sequester or otherwise inject it underground when custody of the $CO_2$ is maintained shall report the percentage of that stream, if any, that is biomass-based during the reporting year. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| Subpart QQ—Importers and Exporters of Fluorinated Greenhouse Gases Contained in Pre-Charged Equipment or Closed-Cell Foams (§98.430) | Importers and exporters of an annual quantity of fluorinated greenhouse gases contained in pre-charged equipment or closed-cell foams that is equivalent to 25,000 metric tons $CO_2$e or more. | **Each importer of fluorinated GHGs contained in pre-charged equipment or closed-cell foams:**<br>An annual report that summarizes its imports at the corporate level, except for transshipments, as specified:<br>(1) Total mass in metric tons of each fluorinated GHG imported in pre-charged equipment or closed-cell foams.<br>(2) For each type of pre-charged equipment with a unique combination of charge size and charge type, the identity of the fluorinated GHG used as a refrigerant or electrical insulator, charge size (holding charge, if applicable), and number imported.<br>(3) For closed-cell foams that are imported inside of appliances, the identity of the fluorinated GHG contained in the foam in each appliance, the mass of the fluorinated GHG contained in the foam in each appliance, and the number of appliances imported with each unique combination of mass and identity of fluorinated GHG within the closed-cell foams.<br>(4) For closed cell-foams that are not imported inside of appliances, the identity of the fluorinated GHG in the foam, the density of the fluorinated GHG in the foam (kg fluorinated GHG/cubic foot), and the volume of foam imported (cubic feet) for each type of closed-cell foam with a unique combination of fluorinated GHG density and identity.<br>(5) Dates on which the pre-charged equipment or closed-cell foams were imported.<br>(6) If the importer does not know the identity and mass of the fluorinated GHGs within the closed-cell foam, the importer must report the following: (i) Total mass in metric tons of $CO_2$e of the fluorinated GHGs imported in closed-cell foams; (ii) For closed-cell foams that are imported inside of appliances, the mass of the fluorinated GHGs in $CO_2$ e contained in the foam in each appliance and the number of appliances imported for each type of appliance; (iii) For closed-cell foams that are not imported inside of appliances, the mass in $CO_2$e of the fluorinated GHGs in the foam (kg $CO_2$e/cubic foot) and the volume of foam imported (cubic feet) for each type of closed-cell foam; (iv) Dates on which the closed-cell foams were imported; (v) Name of the foam manufacturer for each type of closed-cell foam where the identity and mass of the fluorinated GHGs is unknown; and (vi) Certification that the importer was unable to obtain information on the identity and mass of the fluorinated GHGs within the closed-cell foam from the closed-cell foam manufacturer or manufacturers. |
| | | **Each exporter of fluorinated GHGs contained in pre-charged equipment of closed-cell foams:**<br>An annual report that summarizes its exports at the corporate level, except for transshipments, as specified:<br>(1) Total mass in metric tons of each fluorinated GHG exported in pre-charged equipment or closed-cell foams.<br>(2) For each type of pre-charged equipment with a unique combination of charge size and charge type, the identity of the fluorinated GHG used as a refrigerant or electrical insulator, charge size (including holding charge, if applicable), and number exported.<br>(3) For closed-cell foams that are exported inside of appliances, the identity of the fluorinated GHG contained in the foam in each appliance, the mass of the fluorinated GHG contained in the foam in each appliance, and the number of appliances exported with each unique combination of mass and identity of fluorinated GHG within the closed-cell foams.<br>(4) For closed-cell foams that are not exported inside of appliances, the identity of the fluorinated GHG in the foam, the density of the fluorinated GHG in the foam (kg fluorinated GHG/cubic foot), and the volume of foam exported (cubic feet) for each type of closed-cell foam with a unique combination of fluorinated GHG density and identity.<br>(5) Dates on which the pre-charged equipment or closed-cell foams were exported.<br>(6) If the exporter does not know the identity and mass of the fluorinated GHG within the closed-cell foam, the exporter must report the following:<br>(i) Total mass in metric tons of $CO_2$e of the fluorinated GHGs exported in closed-cell foams.<br>(ii) For closed-cell foams that are exported inside of appliances, the mass of the fluorinated GHGs in $CO_2$e contained in the foam in each appliance and the number of appliances imported for each type of appliance.<br>(iii) For closed-cell foams that are not exported inside of appliances, the mass in $CO_2$e of the fluorinated GHGs in the foam (kg $CO_2$e/cubic foot) and the volume of foam imported (cubic feet) for each type of closed-cell foam.<br>(iv) Dates on which the closed-cell foams were exported.<br>(v) Name of the foam manufacturer for each type of closed-cell foam where the identity and mass of the fluorinated GHG is unknown.<br>(vi) Certification that the exporter was unable to obtain information on the identity and mass of the fluorinated GHGs within the closed-cell foam from the closed-cell foam manufacturer or manufacturers. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| Subpart RR—Geologic Sequestration of Carbon Dioxide (§98.440) | All in | **If $CO_2$ is received by pipeline:**<br>For each receiving flow meter:<br>(1) The total net mass of $CO_2$ received (metric tons) annually.<br>(2) If a volumetric flow meter is used to receive $CO_2$ report the following unless reporting yes to paragraph (4): (i) The volumetric flow through a receiving flow meter at standard conditions (in standard cubic meters) in each quarter.<br>(ii) The volumetric flow through a receiving flow meter that is redelivered to another facility without being injected into the well (in standard cubic meters) in each quarter.<br>(iii) The $CO_2$ concentration in the flow (volume percent $CO_2$ expressed as a decimal fraction) in each quarter.<br>(3) If a mass flow meter is used to receive $CO_2$ report the following unless reporting yes to (4): (i) The mass flow through a receiving flow meter (in metric tons) in each quarter; (ii) The mass flow through a receiving flow meter that is redelivered to another facility without being injected into the well (in metric tons) in each quarter; (iii) The $CO_2$ concentration in the flow (weight percent $CO_2$ expressed as a decimal fraction) in each quarter.<br>(4) If the $CO_2$ received is wholly injected and not mixed with any other supply of $CO_2$, report whether the procedures in 40 CFR 98.444(a)(4) were followed.<br>(5) The standard or method used to calculate each value in (2) through (3) of this section.<br>(6) The number of times in the reporting year for which substitute data procedures were used to calculate values reported in (2) through (3) of this section.<br>(7) Whether the flow meter is mass or volumetric.<br>(8) A numerical identifier for the flow meter. |
| | | **If $CO_2$ is received in containers**:<br>(1) The mass (in metric tons) or volume at standard conditions (in standard cubic meters) of contents in containers received in each quarter.<br>(2) The concentration of $CO_2$ of contents in containers (volume or wt. percent $CO_2$ expressed as a decimal fraction) in each quarter.<br>(3) The mass (in metric tons) or volume (in standard cubic meters) of contents in containers that is redelivered to another facility without being injected into the well in each quarter.<br>(4) The net mass of $CO_2$ received (in metric tons) annually.<br>(5) The standard or method used to calculate each value in (1) and (2).<br>(6) The number of times in the reporting year for which substitute data procedures were used to calculate values reported in (1) and (2). |
| | | **If more than one receiving flow meter is used:** The total net mass of $CO_2$ received (metric tons) through all flow meters annually. |
| | | **All:**<br>(1) The source of the $CO_2$ received according to the following categories: (i) $CO_2$ production wells; (ii) Electric generating unit; (iii) Ethanol plant; (iv) Pulp and paper mill; (v) Natural gas processing; (vi) Gasification operations; (vii) Other anthropogenic source; (viii) Discontinued enhanced oil and gas recovery project; (ix) Unknown.<br>(2) The date that data collection began for calculating total amount sequestered according to 40 CFR 98.448(a)(7) of 40 CFR 98.<br>(3) If the date specified in (2) is during the reporting year for this annual report, report the following starting on the date specified in (2):<br>(a) For each injection flow meter (mass or volumetric): (i) The mass of $CO_2$ injected (metric tons) annually; (ii) The $CO_2$ concentration in flow (volume or weight percent $CO_2$ expressed as a decimal fraction) in each quarter; (iii) If a volumetric flow meter is used, the volumetric flow rate at standard conditions (in standard cubic meters) in each quarter; (iv) If a mass flow meter is used, the mass flow rate (in metric tons) in each quarter; (v) A numerical identifier for the flow meter; (vi) Whether the flow meter is mass or volumetric; (vii) The standard used to calculate each value in (ii) through (iv) of this section; (viii) The number of times in the reporting year for which substitute data procedures were used to calculate values reported in (ii) through (iv) of this section; (ix) The location of the flow meter.<br>The total $CO_2$ injected (metric tons) in the reporting year as calculated in Equation RR–6 of subpart RR.<br>(b) For $CO_2$ emissions from equipment leaks and vented emissions of $CO_2$, report the following: (i) The mass of $CO_2$ emitted (in metric tons) annually from equipment leaks and vented emissions of $CO_2$ from equipment located on the surface between the flow meter used to measure injection quantity and the injection wellhead and (ii) The mass of $CO_2$ emitted (in metric tons) annually from equipment leaks and vented emissions of $CO_2$ from equipment located on the surface between the production wellhead and the flow meter used to measure production quantity.<br>(c) For each separator flow meter (mass or volumetric): (i) $CO_2$<br>mass produced (metric tons) annually; (ii) $CO_2$ concentration in flow (volume or weight percent $CO_2$ expressed as a decimal fraction) in each quarter; (iii) If a volumetric flow meter is used, volumetric flow rate at standard conditions (standard cubic meters) in each quarter; (iv) If a mass flow meter, mass flow rate (metric tons) in each quarter; (v) A numerical identifier for the flow meter; (vi) Whether the flow meter is mass or volumetric; (vii) The standard used to calculate each value in (ii) through (iv); and (viii) The number of times in the reporting year for which substitute data procedures were used to calculate values reported in(ii) through (iv).<br>(d) The entrained $CO_2$ in produced oil or other fluid divided by the $CO_2$ separated through all separators in the reporting year (weight percent $CO_2$ expressed as a decimal fraction) used as the value for X in Equation RR–9 of subpart RR and as determined according to the EPA-approved MRV plan.<br>(e) Annual $CO_2$ produced in the reporting year as calculated in Equation RR–9 of subpart RR.<br>(f) For each leakage pathway through which $CO_2$ emissions occurred: (i) A numerical identifier for the leakage pathway and (ii) The $CO_2$ (metric tons) emitted through that pathway in the reporting year.<br>(g) Annual $CO_2$ mass emitted (metric tons) by surface leakage in the reporting year as calculated by Equation RR–10 of subpart RR. |

| Subpart | Reporting Threshold | Reporting and Verification |
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| Subpart RR—Geologic Sequestration of Carbon Dioxide (§98.440) (cont'd) | All In | (h) Annual $CO_2$ (metric tons) sequestered in subsurface geologic formations in the reporting year as calculated by Equation RR–11 or RR–12 of subpart RR.<br>(i) Cumulative mass of $CO_2$ (metric tons) reported as sequestered in subsurface geologic formations in all years since the well or group of wells became subject to reporting requirements under subpart RR.<br>(j) Date that the most recent MRV plan was approved by EPA and the MRV plan approval number that was issued by EPA.<br>(k) An annual monitoring report that contains the following components: (i) A narrative history of the monitoring efforts conducted over the previous calendar year, including a listing of all monitoring equipment that was operated, its period of operation, and any relevant tests or surveys that were conducted; (ii) A description of any changes to the monitoring program that were concluded to not be material changes warranting submission of a revised MRV plan under 40 CFR 98.448(d); (iii) A narrative history of any monitoring anomalies that were detected in the previous calendar year and how they were investigated and resolved; and (iv) A description of any surface leakages of $CO_2$, including a discussion of all methodologies and technologies involved in detecting and quantifying the surface leakages and any assumptions and uncertainties involved in calculating the amount of $CO_2$ emitted.<br>(l) If a well is permitted under the Underground Injection Control program, for each injection well: (i) The well identification number used for the Underground Injection Control permit and (ii) The Underground Injection Control permit class.<br>(m) If an offshore well is not subject to the Safe Drinking Water Act, for each injection well, report any well identification number and any identification number used for the legal instrument authorizing geologic sequestration. |

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| Subpart SS—Electrical Equipment Manufacture or Refurbishment (§98.450) | total annual purchases of $SF_6$ and PFCs that exceed 23,000 pounds | **All:**<br>For each chemical at the facility level:<br>(1) Pounds of $SF_6$ and PFCs stored in containers at the beginning of the year.<br>(2) Pounds of $SF_6$ and PFCs stored in containers at the end of the year.<br>(3) Pounds of $SF_6$ and PFCs purchased in bulk.<br>(4) Pounds of $SF_6$ and PFCs returned by equipment users with or inside equipment.<br>(5) Pounds of $SF_6$ and PFCs returned to site from off site after recycling.<br>(6) Pounds of $SF_6$ and PFCs inside new equipment delivered to customers.<br>(7) Pounds of $SF_6$ and PFCs delivered to equipment users in containers.<br>(8) Pounds of $SF_6$ and PFCs returned to suppliers.<br>(9) Pounds of $SF_6$ and PFCs sent off site for destruction.<br>(10) Pounds of $SF_6$ and PFCs sent off site to be recycled.<br>(11) The nameplate capacity of the equipment, in pounds, delivered to customers with $SF_6$ or PFCs inside, if different from the quantity in paragraph (6) of this section.<br>(12) A description of the engineering methods and calculations used to determine emissions from hoses or other flow lines that connect the container to the equipment that is being filled.<br>(13) The values for $EF_C$ for each hose and valve combination and the associated valve fitting sizes and hose diameters.<br>(14) The total number of fill operations for each hose and valve combination, or, $F_{Ci}$ of Equation SS–5 of subpart SS.<br>(15) The mean value for each make, model, and group of conditions if the mass of $SF_6$ or the PFC disbursed to customers in new equipment over the period p is determined by assuming that it is equal to the equipment's nameplate capacity or, in cases where equipment is shipped with a partial charge, equal to its partial shipping charge.<br>(16) The number of samples and the upper and lower bounds on the 95 percent confidence interval for each make, model, and group of conditions if the mass of $SF_6$ or the PFC disbursed to customers in new equipment over the period p is determined by assuming that it is equal to the equipment's nameplate capacity or, in cases where equipment is shipped with a partial charge, equal to its partial shipping charge.<br>(17) Pounds of $SF_6$ and PFCs used to fill equipment at off-site electric power transmission or distribution locations, or $M_F$, of Equation SS–6 of subpart SS.<br>(18) Pounds of $SF_6$ and PFCs used to charge the equipment prior to leaving the electrical equipment manufacturer or refurbishment facility, or $M_C$, of Equation SS–6 of subpart SS.<br>(19) The nameplate capacity of the equipment, in pounds, installed at off-site electric power transmission or distribution locations used to determine emissions from installation, or $N_I$, of Equation SS–6 of subpart SS.<br>(20) For any missing data, report the reason the data were missing, the parameters for which the data were missing, the substitute parameters used to estimate emissions in their absence, and the quantity of emissions thereby estimated. |

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| TT—Industrial Waste Landfills (§98.460) | 25,000 metric tons $C0_2e$/year | **All:**<br>(a) General landfill information:<br>(1) A classification of the landfill as “open” (actively received waste in the reporting year) or “closed” (no longer receiving waste).<br>(2) The year in which the landfill first started accepting waste for disposal.<br>(3) The last year the landfill accepted waste (for open landfills, enter the estimated year of landfill closure).<br>(4) The capacity (in metric tons) of the landfill.<br>(5) An indication of whether leachate recirculation is used during the reporting year and its typical frequency of use over the past 10 years (e.g., used several times a year for the past 10 years, used at least once a year for the past 10 years, used occasionally but not every year over the past 10 years, not used).<br>(b) Waste characterization and modeling information:<br>(1) The number of waste steams (including “Other Industrial Solid Waste (not otherwise listed)”) for which Equation TT–1 of subpart TT is used to calculate modeled $CH_4$ generation.<br>(2) A description of each waste stream (including the types of materials in each waste stream) for which Equation TT–1 of subpart TT is used to calculate modeled $CH_4$ generation.<br>(3) The fraction of $CH_4$ in the landfill gas, F, (volume fraction, dry basis, corrected to 0% oxygen) for the reporting year and an indication as to whether this was the default value or a value determined through measurement data.<br>(4) The methane correction factor (MCF) value used in the calculations. If an MCF value other than the default of 1 is used, provide a description of the aeration system, including aeration blower capacity, the fraction of the landfill containing waste affected by the aeration, the total number of hours during the year the aeration blower was operated, and other factors used as a basis for the selected MCF value.<br>(c) For each waste stream identified in (b):<br>(1) The decay rate (k) value used in the calculations.<br>(2) The method(s) for estimating historical waste disposal quantities and the range of years for which each method applies.<br>(3) If Equation TT–2 of subpart TT is used: (i) The total number of years (N) for which disposal and production data are both available; (ii) The year, the waste disposal quantity and production quantity for each year used in Equation TT–2 of subpart TT to calculate the average waste disposal factor (WDF); and (iii) The average waste disposal factor (WDF) calculated for the waste stream.<br>(4) If Equation TT–4 of subpart TT is used: (i) The value of landfill capacity (LFC); (ii) YrData; and (iii) YrOpen.<br>(d) For each year of landfilling starting with the “Start Year” (S) and each year thereafter up to the current reporting year:<br>(1) The calendar year for which the following data elements apply.<br>(2) The quantity of waste ($W_X$) disposed of in the landfill (metric tons, wet weight) for the specified year for each waste stream identified in (b).<br>(3) The degradable organic carbon ($DOC_X$) value (mass fraction) for the specified year and an indication as to whether this was the default value from Table TT–1 to subpart TT, a measured value using a 60-day anaerobic biodegradation test as specified in 40 CFR 98.464(b)(4)(i), or a value based on total and volatile solids measurements as specified in 40 CFR 98.464(b)(4)(ii). If $DOC_X$ was determined by a 60-day anaerobic biodegradation test, specify the test method used.<br>(e) Report the following information describing the landfill cover material:<br>(1) The type of cover material used (as either organic cover, clay cover, sand cover, or other soil mixtures).<br>(2) For each type of cover material used, the surface area (in square meters) at the start of the reporting year for the landfill sections that contain waste and that are associated with the selected cover type.<br>(f) The modeled annual methane generation ($G_{CH4}$) for the reporting year (metric tons $CH_4$) calculated using Equation TT–1 of subpart TT.<br>(g) For landfills without gas collection systems, provide:<br>(1) The annual methane emissions (i.e. , the methane generation (MG), adjusted for oxidation, calculated using Equation TT–6 of subpart TT), reported in metric tons $CH_4$.<br>(2) An indication of whether passive vents and/or passive flares (vents or flares that are not considered part of the gas collection system as defined in 40 CFR 98.6) are present at this landfill.<br>(h) For landfills with gas collection systems, in addition to the reporting requirements in (a) through (f), report according to 40 CFR 98.346(i). |

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| UU—Injection of Carbon Dioxide (§98.470) | All In | If subject to this part and report under subpart UU, the facility is not required to report the information in 40 CFR 98.3(c)(4) for subpart UU. Report the information required by 40 CFR 98.3(c)(1) through 40 CFR 98.3(c)(3) and by 40 CFR 98.3(c)(5) through 40 CFR 98.3(c)(9), plus the information below. |
| | | **If $CO_2$ is received by pipeline, for each receiving flow meter:**<br>(1) The total net mass of $CO_2$ received (metric tons) annually.<br>(2) If a volumetric flow meter is used to receive $CO_2$: (i) The volumetric flow through a receiving flow meter at standard conditions (in standard cubic meters) in each quarter; (ii) The volumetric flow through a receiving flow meter that is redelivered to another facility without being injected into the well (in standard cubic meters) in each quarter; and (iii) The $CO_2$ concentration in the flow (volume percent $CO_2$ expressed as a decimal fraction) in each quarter.<br>(3) If a mass flow meter is used to receive $CO_2$: (i) The mass flow through a receiving flow meter (in metric tons) in each quarter; (ii) The mass flow through a receiving flow meter that is redelivered to another facility without being injected into the well (in metric tons) in each quarter; and (iii) The $CO_2$ concentration in the flow (weight percent $CO_2$ expressed as a decimal fraction) in each quarter.<br>(4) The standard or method used to calculate each value in (2) through (3).<br>(5) The number of times in the reporting year for which substitute data procedures were used to calculate values reported in paragraphs (2) through (3).<br>(6) Whether the flow meter is mass or volumetric. |
| | | **If $CO_2$ is received in containers:**<br>(1) The mass (in metric tons) or volume at standard conditions (in standard cubic meters) of contents in containers in each quarter.<br>(2) The concentration of $CO_2$ of contents in containers (volume or weight percent $CO_2$ expressed as a decimal fraction) in each quarter.<br>(3) The mass (in metric tons) or volume (in standard cubic meters) of contents in containers that is redelivered to another facility without being injected into the well in each quarter.<br>(4) The net total mass of $CO_2$ received (in metric tons) annually.<br>(5) The standard or method used to calculate each value in paragraphs (1) and (2) of this section.<br>(6) The number of times in the reporting year for which substitute data procedures were used to calculate values reported in (1) and (2). |
| | | **If more than one receiving flow meter is used:**<br>The net total mass of $CO_2$ received (metric tons) through all flow meters annually. |
| | | **All:**<br>The source of the $CO_2$ received according to the following categories:<br>(1) $CO_2$ production wells.<br>(2) Electric generating unit.<br>(3) Ethanol plant.<br>(4) Pulp and paper mill.<br>(5) Natural gas processing.<br>(6) Gasification operations.<br>(7) Other anthropogenic source.<br>(8) Discontinued enhanced oil and gas recovery project.<br>(9) Unknown. |

Note: Many facilities that would be affected by the 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.