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

Unofficial Electronic Compilation

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

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**40 CFR Part 98
Subpart V**

Mandatory Reporting of Greenhouse Gases

PART 98—MANDATORY GREENHOUSE GAS REPORTING

Subpart V—Nitric Acid Production

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A nitric acid production facility uses one or more trains to produce weak nitric acid (30 to 70 percent in strength). A nitric acid train produces weak nitric acid through the catalytic oxidation of ammonia.

§98.221 Reporting threshold.

You must report GHG emissions under this subpart if your facility contains a nitric acid train and the facility meets the requirements of either §98.2(a)(1) or (a)(2).

§98.222 GHGs to report.

(a) You must report N₂O process emissions from each nitric acid production train as required by this subpart.

(b) You must report under subpart C of this part (General Stationary Fuel Combustion Sources) the emissions of CO₂, CH₄, and N₂O from each stationary combustion unit by following the requirements of subpart C.

§98.223 Calculating GHG emissions.

(a) You must determine annual N₂O process emissions from each nitric acid train according to paragraphs (a)(1) or (a)(2) of this section.

(1) Use a site-specific emission factor and production data according to paragraphs (b) through (i) of this section.

(2) Request Administrator approval for an alternative method of determining N₂O emissions according to paragraphs (a)(2)(i) and (a)(2)(ii) of this section.

- (i) You must submit the request within 45 days following promulgation of this subpart or within the first 30 days of each subsequent reporting year.
- (ii) If the Administrator does not approve your requested alternative method within 150 days of the end of the reporting year, you must determine the N₂O emissions for the current reporting period using the procedures specified in paragraph (a)(1) of this section.

(b) You must conduct an annual performance test for each nitric acid train according to paragraphs (b)(1) through (3) of this section.

(1) You must conduct the performance test at the absorber tail gas vent, referred to as the test point, for each nitric acid train according to §98.224(b) through (f). If multiple nitric acid production units exhaust to a common abatement technology and/or emission point, you must sample each process in the ducts before the emissions are combined, sample each process when only one process is operating, or sample the combined emissions when multiple processes are operating and base the site-specific emission factor on the combined production rate of the multiple nitric acid production units.

(2) You must conduct the performance test under normal process operating conditions.

(3) You must measure the production rate during the performance test and calculate the production rate for the test period in metric tons (100 percent acid basis) per hour.

(c) Using the results of the performance test in paragraph (b) of this section, you must calculate an average site-specific emission factor for each nitric acid train “t” according to Equation V-1 of this section:

$$EF_{N_2O_t} = \frac{\sum_1^n C_{N_2O} * 1.14 \times 10^{-7} * Q}{P} \quad (\text{Eq. V-1})$$

Where:

- EF_{N₂O_t} = Average site-specific N₂O emissions factor for nitric acid train “t” (lb N₂O/ton nitric acid produced, 100 percent acid basis).
- C_{N₂O} = N₂O concentration for each test run during the performance test (ppm N₂O).
- 1.14x10⁻⁷ = Conversion factor (lb/dscf-ppm N₂O).
- Q = Volumetric flow rate of effluent gas for each test run during the performance test (dscf/hr).
- P = Production rate for each test run during the performance test (tons nitric acid produced per hour, 100 percent acid basis).
- n = Number of test runs.

(d) If nitric acid train “t” exhausts to any N₂O abatement technology “N” after the test point, you must determine the destruction efficiency for each N₂O abatement technology according to paragraphs (d)(1), (d)(2), or (d)(3) of this section.

(1) Use the manufacturer’s specified destruction efficiency.

(2) Estimate the destruction efficiency through process knowledge. Examples of information that could constitute process knowledge include calculations based on material balances, process stoichiometry, or previous test results provided the results are still relevant to the current vent stream conditions. You must document how process knowledge (if applicable) was used to determine the destruction efficiency.

(3) Calculate the destruction efficiency by conducting an additional performance test on the emissions stream following the N₂O abatement technology.

(e) If nitric acid train “t” exhausts to any N₂O abatement technology “N” after the test point, you must determine the annual amount of nitric acid produced on train “t” while N₂O abatement technology “N” is operating according to §98.224(f). Then you must calculate the abatement utilization factor for each N₂O abatement technology “N” for each nitric acid train “t” according to Equation V-2 of this section.

$$AF_{t,N} = \frac{P_{t,N}}{P_t} \quad (\text{Eq. V-2})$$

Where:

- AF_{t,N} = Abatement factor of N₂O abatement technology “N” at nitric acid train “t” (fraction of annual production that abatement technology is operating).
- P_t = Total annual nitric acid production from nitric acid train “t” (ton acid produced, 100 percent acid basis).
- P_{a,t,N} = Annual nitric acid production from nitric acid train “t” during which N₂O abatement technology “N” was operational (ton acid produced, 100 percent acid basis).

(f) [Reserved]

(g) You must calculate N₂O emissions for each nitric acid train “t” according to paragraph (g)(1), (g)(2), (g)(3), or (g)(4) of this section.

(1) If nitric acid train “t” exhausts to one N₂O abatement technology “N” after the test point, you must use the emissions factor (determined in Equation V-1 of this section), the destruction efficiency (determined in paragraph (d) of this section), the annual nitric acid production (determined in paragraph (i) of this section), and the abatement utilization factor (determined in paragraph (e) of this section) according to Equation V-3a of this section:

$$E_{N_2O_t} = \frac{EF_{N_2O_t} * P_t}{2205} * (1 - (DF * AF)) \quad (\text{Eq. V-3a})$$

Where:

- EN₂O_t = Annual N₂O mass emissions from nitric acid production unit “t” according to this Equation V-3a (metric tons).
- EF_{N₂O_t} = Average site-specific N₂O emissions factor for nitric acid train “t” (lb N₂O/ton acid produced, 100 percent acid basis).
- P_t = Annual nitric acid production from the train “t” (ton acid produced, 100 percent acid basis).
- DF = Destruction efficiency of N₂O abatement technology N that is used on nitric acid train “t” (percent of N₂O removed from vent stream).
- AF = Abatement utilization factor of N₂O abatement technology “N” for nitric acid train “t” (percent of time that the abatement technology is operating).
- 2205 = Conversion factor (lb/metric ton).

(2) If multiple N₂O abatement technologies are located in series after your test point, you must use the emissions factor (determined in Equation V-1 of this section), the destruction efficiency (determined in paragraph (d) of this section), the annual nitric acid production (determined in paragraph (f) of this section), and the abatement utilization factor (determined in paragraph (e) of this section), according to Equation V-3b of this section:

$$E_{N_2O_t} = \frac{EF_{N_2O,t} * P_t}{2205} * (1 - (DF_1 * AF_1)) * (1 - (DF_2 * AF_2)) * \dots * (1 - (DF_N * AF_N)) \quad (\text{Eq. V-3b})$$

Where:

- E_{N₂O_t} = Annual N₂O mass emissions from nitric acid production unit “t” according to this Equation V-3b (metric tons).
- EF_{N₂O,t} = N₂O emissions factor for unit “t” (lb N₂O/ton nitric acid produced).
- P_t = Annual nitric acid produced from unit “t” (ton acid produced, 100 percent acid basis).
- DF₁ = Destruction efficiency of N₂O abatement technology 1 (percent of N₂O removed from vent stream).
- AF₁ = Abatement utilization factor of N₂O abatement technology 1 (percent of time that abatement technology 1 is operating).
- DF₂ = Destruction efficiency of N₂O abatement technology 2 (percent of N₂O removed from vent stream).
- AF₂ = Abatement utilization factor of N₂O abatement technology 2 (percent of time that abatement technology 2 is operating).
- DF_N = Destruction efficiency of N₂O abatement technology N (percent of N₂O removed from vent stream).
- AF_N = Abatement utilization factor of N₂O abatement technology N (percent of time that abatement technology N is operating).
- 2205 = Conversion factor (lb/metric ton).
- N = Number of different N₂O abatement technologies.

(3) If multiple N₂O abatement technologies are located in parallel after your test point, you must use the emissions factor (determined in Equation V-1 of this section), the destruction efficiency (determined in paragraph (d) of this section), the annual nitric acid production (determined in paragraph (f) of this section), and the abatement utilization factor (determined in paragraph (e) of this section), according to Equation V-3c of this section:

$$E_{N_2O_t} = \frac{EF_{N_2O,t} * P_t}{2205} * \sum_1^N ((1 - (DF_N * AF_N)) * FC_N) \quad (\text{Eq. V-3c})$$

Where:

- E_{N₂O_t} = Annual N₂O mass emissions from nitric acid production unit “t” according to this Equation V-3c (metric tons).
- EF_{N₂O,t} = N₂O emissions factor for unit “t” (lb N₂O/ton nitric acid produced).
- P_t = Annual nitric acid produced from unit “t” (ton acid produced, 100 percent acid basis).

- DF_N = Destruction efficiency of N₂O abatement technology “N” (percent of N₂O removed from vent stream).
- AF_N = Abatement utilization factor of N₂O abatement technology “N” (percent of time that abatement technology “N” is operating).
- FC_N = Fraction control factor of N₂O abatement technology “N” (percent of total emissions from unit “t” that are sent to abatement technology “N”).
- 2205 = Conversion factor (lb/metric ton).
- N = Number of different N₂O abatement technologies with a fraction control factor.

(4) If nitric acid train “t” does not exhaust to any N₂O abatement technology after the test point, you must use the emissions factor (determined in Equation V–1 of this section), and the annual nitric acid production (determined in paragraph (i) of this section) according to Equation V–3b of this section:

$$E_{N_2O_t} = \frac{EF_{N_2O_t} * P_t}{2205} \quad (\text{Eq. V-3d})$$

Where:

- E_{N₂O_t} = Annual N₂O mass emissions from nitric acid production unit “t” according to this Equation V–3d (metric tons).
- EF_{N₂O_t} = Average site-specific N₂O emissions factor for nitric acid train “t” (lb N₂O/ton acid produced, 100 percent acid basis).
- P_t = Annual nitric acid production from nitric acid train “t” (ton acid produced, 100 percent acid basis).
- 2205 = Conversion factor (lb/metric ton).

(h) You must determine the annual nitric acid production emissions combined from all nitric acid trains at your facility using Equation V-4 of this section:

$$N_2O = \sum_{t=1}^m E_{N_2O_t} \quad (\text{Eq. V-4})$$

Where:

- N₂O = Annual process N₂O emissions from nitric acid production facility (metric tons)
- E_{N₂O_t} = N₂O mass emissions per year for nitric acid train “t” (metric tons).
- m = Number of nitric acid trains.

(i) You must determine the total annual amount of nitric acid produced on nitric acid train “t” for each nitric acid train (tons acid produced, 100 percent acid basis), according to §98.224(f).

§98.224 Monitoring and QA/QC requirements.

(a) You must conduct a new performance test according to a test plan as specified in paragraphs (a)(1) through (a)(3) of this section.

(1) Conduct the performance test annually. The test should be conducted at a point during the campaign which is representative of the average emissions rate from the nitric acid campaigns. Facilities must document the methods used to determine the representative point of the campaign when the performance test is conducted.

(2) Conduct the performance test when your nitric acid production process is changed, specifically when abatement equipment is installed.

(3) If you requested Administrator approval for an alternative method of determining N₂O emissions under §98.223(a)(2), you must conduct the performance test if your request has not been approved by the Administrator within 150 days of the end of the reporting year in which it was submitted.

(b) You must measure the N₂O concentration during the performance test using one of the methods in paragraphs (b)(1) through (b)(3) of this section.

(1) EPA Method 320 at 40 CFR part 63, appendix A, Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy.

(2) ASTM D6348-03 Standard Test Method for Determination of Gaseous Compounds by Extractive Direct Interface Fourier Transform Infrared (FTIR) Spectroscopy (incorporated by reference in §98.7).

(3) An equivalent method, with Administrator approval.

(c) You must determine the production rate(s) (100 percent basis) from each nitric acid train during the performance test according to paragraphs (c)(1) or (c)(2) of this section.

(1) Direct measurement of production and concentration (such as using flow meters, weigh scales, for production and concentration measurements).

(2) Existing plant procedures used for accounting purposes (i.e. dedicated tank-level and acid concentration measurements).

(d) You must determine the volumetric flow rate during the performance test in conjunction with the applicable EPA methods in 40 CFR part 60, appendices A-1 through A-4. Conduct three emissions test runs of 1 hour each. All QA/QC procedures specified in the reference test methods and any associated performance specifications apply. For each test, the facility must prepare an emission factor determination report that must include the items in paragraphs (d)(1) through (d)(3) of this section.

(1) Analysis of samples, determination of emissions, and raw data.

(2) All information and data used to derive the emissions factor(s).

(3) The production rate during each test and how it was determined.

(e) You must determine the total monthly amount of nitric acid produced. You must also determine the monthly amount of nitric acid produced while N₂O abatement technology (located after the test point) is operating from each nitric acid train. These monthly amounts are determined according to the methods in paragraphs (c)(1) or (2) of this section.

(f) You must determine the annual amount of nitric acid produced. You must also determine the annual amount of nitric acid produced while N₂O abatement technology (located after the test point) is operating for each train. These annual amounts are determined by summing the respective monthly nitric acid production quantities determined in paragraph (e) of this section.

§98.225 Procedures for estimating missing data.

A complete record of all measured parameters used in the GHG emissions calculations is required. Therefore, whenever a quality-assured value of a required parameter is unavailable, a substitute data value for the missing parameter shall be used in the calculations as specified in paragraphs (a) and (b) of this section.

(a) For each missing value of nitric acid production, the substitute data shall be the best available estimate based on all available process data or data used for accounting purposes (such as sales records).

(b) For missing values related to the performance test, including emission factors, production rate, and N₂O concentration, you must conduct a new performance test according to the procedures in §98.224 (a) through (d).

§98.226 Data reporting requirements.

In addition to the information required by §98.3(c), each annual report must contain the information specified in paragraphs (a) through (p) of this section.

- (a) Train identification number.
- (b) Annual process N₂O emissions from each nitric acid train (metric tons).
- (c) Annual nitric acid production from each nitric acid train (tons, 100 percent acid basis).
- (d) Annual nitric acid production from each nitric acid train during which N₂O abatement technology is operating (ton acid produced, 100 percent acid basis)
- (e) Annual nitric acid production from the nitric acid facility (tons, 100 percent acid basis).
- (f) Number of nitric acid trains.
- (g) Number of different N₂O abatement technologies per nitric acid train “t”.
- (h) Abatement technologies used (if applicable).
- (i) Abatement technology destruction efficiency for each abatement technology (percent destruction).
- (j) Abatement utilization factor for each abatement technology (fraction of annual production that abatement technology is operating).
- (k) Type of nitric acid process used for each nitric acid train (low, medium, high, or dual pressure).
- (l) Number of times in the reporting year that missing data procedures were followed to measure nitric acid production (months).
- (m) If you conducted a performance test and calculated a site-specific emissions factor according to §98.223(a)(1), each annual report must also contain the information specified in paragraphs (m)(1) through (7) of this section.
 - (1) Emission factor calculated for each nitric acid train (lb N₂O/ ton nitric acid, 100 percent acid basis).
 - (2) Test method used for performance test.
 - (3) Production rate per test run during performance test (tons nitric acid produced/hr, 100 percent acid basis).
 - (4) N₂O concentration per test run during performance test (ppm N₂O).
 - (5) Volumetric flow rate per test run during performance test (dscf/hr).
 - (6) Number of test runs during performance test.
 - (7) Number of times in the reporting year that a performance test had to be repeated (number).

(n) If you requested Administrator approval for an alternative method of determining N₂O emissions under §98.223(a)(2), each annual report must also contain the information specified in paragraphs (n)(1) through (4) of this section.

- (1) Name of alternative method.
- (2) Description of alternative method.
- (3) Request date.
- (4) Approval date.

(o) [Reserved]

(p) 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.

§98.227 Records that must be retained.

In addition to the information required by §98.3(g), you must retain the records specified in paragraphs (a) through (g) of this section for each nitric acid production facility:

- (a) Records of significant changes to process.
- (b) Documentation of how process knowledge was used to estimate abatement technology destruction efficiency (if applicable).
- (c) Performance test reports.
- (d) Number of operating hours in the calendar year for each nitric acid train (hours).
- (e) Annual nitric acid permitted production capacity (tons).
- (f) Measurements, records, and calculations used to determine reported parameters.
- (g) Documentation of the procedures used to ensure the accuracy of the measurements of all reported parameters, including but not limited to, calibration of weighing equipment, flow meters, and other measurement devices. The estimated accuracy of measurements made with these devices must also be recorded, and the technical basis for these estimates must be provided.

§98.228 Definitions.

All terms used in this subpart have the same meaning given in the Clean Air Act and subpart A of this part.