



Mandatory Greenhouse Gas Reporting Rule: EPA's Response to Public Comments

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Subpart E—Adipic Acid Production

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Subpart E—Adipic Acid Production

**U. S. Environmental Protection Agency
Office of Atmosphere Programs
Climate Change Division
Washington, D.C.**

FOREWORD

This document provides EPA's responses to public comments on EPA's Proposed Mandatory Greenhouse Gas Reporting Rule. EPA published a Notice of Proposed Rulemaking in the Federal Register on April 10, 2009 (74 FR 16448). EPA received comments on this proposed rule via mail, e-mail, facsimile, and at two public hearings held in Washington, DC and Sacramento, California in April 2009. Copies of all comments submitted are available at the EPA Docket Center Public Reading Room. Comments letters and transcripts of the public hearings are also available electronically through <http://www.regulations.gov> by searching Docket ID *EPA-HQ-OAR-2008-0508*.

Due to the size and scope of this rulemaking, EPA prepared this document in multiple volumes, with each volume focusing on a different subject area of the rule. This volume of the document provides EPA's responses to significant public comments received for 40 CFR Part 98, Subpart E—Adipic Acid Production.

Each volume provides the verbatim text of comments extracted from the original letter or public hearing transcript. For each comment, the name and affiliation of the commenter, the document control number (DCN) assigned to the comment letter, and the number of the comment excerpt is provided. In some cases the same comment excerpt was submitted by two or more commenters either by submittal of a form letter prepared by an organization or by the commenter incorporating by reference the comments in another comment letter. Rather than repeat these comment excerpts for each commenter, EPA has listed the comment excerpt only once and provided a list of all the commenters who submitted the same form letter or otherwise incorporated the comments by reference in table(s) at the end of each volume (as appropriate).

EPA's responses to comments are generally provided immediately following each comment excerpt. However, in instances where several commenters raised similar or related issues, EPA has grouped these comments together and provided a single response after the first comment excerpt in the group and referenced this response in the other comment excerpts. In some cases, EPA provided responses to specific comments or groups of similar comments in the preamble to the final rulemaking. Rather than repeating those responses in this document, EPA has referenced the preamble.

While every effort was made to include significant comments related to 40 CFR Part 98, Subpart E—Adipic Acid Production in this volume, some comments inevitably overlap multiple subject areas. For comments that overlapped two or more subject areas, EPA assigned the comment to a single subject category based on an assessment of the principle subject of the comment. For this reason, EPA encourages the public to read the other volumes of this document with subject areas that may be relevant to 40 CFR Part 98, Subpart E—Adipic Acid Production.

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SUBPART E—ADIPIC ACID PRODUCTION

1.0 REPORTING THRESHOLD

Commenter Name: Matthew Frank

Commenter Affiliation: Wisconsin Department of Natural Resources

Document Control Number: EPA-HQ-OAR-2008-0508-1062.1

Comment Excerpt Number: 7

Comment: In the proposed rule, affected facilities are expected to report nitrous oxide process emissions. However, EPA does not have adipic acid emission factors in its WebFire database and there is no reporting threshold for N₂O from adipic acid production. The Department recommends that EPA provide representative emission factors for N₂O from an adipic acid process to give facilities representative values for assessing their emissions in relation to the reporting threshold.

Response: A site-specific emission factor must be determined for each adipic acid facility. Thus, although a default emission factor for N₂O emissions from adipic acid production is available from The 2006 IPCC Guidelines for National Greenhouse Gas Inventories, this number is included as a guideline only. The factor is 300 kg N₂O per metric ton of adipic acid produced (approximately 600 lb N₂O per ton of adipic acid produced). This number does not include use of any abatement technology.

As the commenter notes, there is not a threshold; all adipic acid facilities must report their emissions under the GHG reporting rule.

2.0 GHGS TO REPORT

Commenter Name: W. Walter Tyler

Commenter Affiliation: INVISTA S.a r.l. (INVISTA)

Document Control Number: EPA-HQ-OAR-2008-0508-0481.2

Comment Excerpt Number: 7

Comment: Clarification of emissions from sources 100% dedicated to adipic acid production: Section 98.52(b) indicates that reporting is required for emissions from “each stationary combustion unit that uses a carbon-based fuel, following the requirements of subpart C of this part.” INVISTA has adipic acid production facilities that are part of integrated chemical complexes served by common steam generation boilers that are not entirely related to adipic acid production. Because these common boilers serve the steam needs of the entire plant, it is not clear if the emissions from these boilers should be included as emissions that are part of the Adipic Acid Production source category. EPA notes in their Technical Support Document for Adipic Acid, dated January 22, 2009, that: “It was assumed that 100 percent of the emissions from the stationary combustion sources are attributed to adipic acid production, even though

there are other processes at the adipic acid plants that may be using steam or electricity from the stationary combustion equipment.” The EPA Technical Support Document states that there are only four US sites subject to subpart E and that each of these sites falls under section 98.2(a)(1) for named source categories. Thus, these sites are already required to report all combustion emissions under section 98.31. To avoid double counting of emissions, INVISTA suggests that the language in section 98.52(b) be clarified to include emissions under subpart E only from units that are 100% dedicated to adipic acid production as follows: You must report CO₂, CH₄, and N₂O emissions from each stationary combustion unit that uses a carbon-based fuel, following the requirements of subpart C of this part. Only the emissions from combustion units that are 100% dedicated to Adipic Acid Production should be reported under subpart E; combustion emissions from common combustion units should be reported under subpart C for General Stationary Fuel Combustion.

Response: A response has been provided in section III of the preamble to this rule (see section E, Adipic Acid Production).

3.0 SELECTION OF PROPOSED GHG EMISSIONS CALCULATION AND MONITORING METHODS

Commenter Name: Gary Moore

Commenter Affiliation: Pensacola Plant of Ascend Performance Materials LLC

Document Control Number: EPA-HQ-OAR-2008-0508-0366.1

Comment Excerpt Number: 14

Comment: The proposed N₂O emission calculation method will not work for the Ascend Performance Materials LLC adipic acid production unit. Emissions of N₂O do not correlate with production for the following reasons. A portion of the process off gas, containing N₂O, is sold to an offsite facility via dedicated off gas piping for purification and sale as N₂O. The amount sold to our customer depends on customer production needs. (The customer meters the amount they receive.) Additionally, Ascend Performance Materials LLC has the capability to alter the ratio of cyclohexanone to cyclohexanol that is subsequently oxidized into adipic acid. Changes in this ratio cause the N₂O content in the off gas to vary from approximately 10% to over 50%. The simplified calculation of N₂O emissions as proposed will not accurately estimate N₂O emissions. Two alternatives are proposed: (1) Allow the use of N₂O and Flow CEMS to directly measure N₂O emissions and use the performance test to evaluate the CEMS accuracy and (2) allow use of existing process flow meters, process N₂O analyzers to determine the amount of N₂O sent to control devices and conduct a performance test measuring control device destruction efficiency for each control device and then calculate N₂O emissions.

Response: A response has been provided in section III of the preamble to this rule (see section E, Adipic Acid Production).

In addition to the alternative methods referenced in the preamble, the facility can also conduct multiple performance tests to account for the variation in N₂O emissions due to changes in the

ratio of cyclohexanone to cyclohexanol. The facility would be responsible for using the appropriate emission factor depending on operating conditions, specifically the ratio of cyclohexanone to cyclohexanol.

4.0 DETAILED GHG EMISSION CALCULATION PROCEDURES/EQUATIONS IN THE RULE

Commenter Name: W. Walter Tyler

Commenter Affiliation: INVISTA S.a r.l. (INVISTA)

Document Control Number: EPA-HQ-OAR-2008-0508-0481.2

Comment Excerpt Number: 8

Comment: Clarification of waste gas streams from adipic acid oxidation process: Section 98.53(a) indicates that an annual performance test is required to “measure N₂O emissions from the waste gas streams of each adipic acid oxidation process.” N₂O emissions are actually generated from the nitric acid oxidation step. In addition, the language of this provision indicates that there are or may be multiple streams from this oxidation process which are required to be tested. The “Industry Description” section of the EPA Technical Support Document clarifies that N₂O is “generated as a by-product of the nitric acid oxidation stage and is emitted in the waste gas stream.” Thus, there is actually just a single waste gas stream from nitric acid oxidation to be tested. INVISTA requests that the language of §98.53(a) be clarified to correct the language of this provision and to avoid testing other waste gas streams that do not contain N₂O (e.g., the vent stream from the first stage air oxidation of cyclohexane), as follows. §98.53(a) Should read: You must conduct an annual performance test to measure N₂O emissions from the waste gas stream of the nitric acid oxidation step. You must conduct the performance test under normal operating conditions.

Response: We appreciate the language clarification. The final rule has been changed to specify that N₂O testing will occur on the waste streams from the nitric acid oxidation processes.

Commenter Name: W. Walter Tyler

Commenter Affiliation: INVISTA S.a r.l. (INVISTA)

Document Control Number: EPA-HQ-OAR-2008-0508-0481.2

Comment Excerpt Number: 9

Comment: Modify stack test requirement to allow alternative methods. Section 98.53(b) indicates that the annual stack test for N₂O is to be conducted using the methods set forth in section 98.54(b), which specifies EPA Method 320 in 40 CFR part 63, Appendix A to measure the N₂O concentration. EPA Method 320 is an elaborate FTIR method that is not widely used in industry. Stack testing contractors employed to determine N₂O concentration generally employ an IR method that yields results that are an accurate estimate by current industry standards. INVISTA suggests that section 98.53(b) be modified to authorize alternative monitoring methods approved by the Administrator, similar to the authorization for alternative methods for Relative

Accuracy tests set forth in section 60.13(j) of the CAA New Source Performance Standard section 60.13(j). Section 98.53(b) should read: You must conduct the emissions test using the methods specified in §98.54(b) or an alternative method approved by the Administrator. Alternative methods currently in use (including CEMS) at facilities may continue to be used until reviewed by the Administrator.

Response: A response has been provided in section III of the preamble to this rule (see section E, Adipic Acid Production).

Commenter Name: W. Walter Tyler

Commenter Affiliation: INVISTA S.a r.l. (INVISTA)

Document Control Number: EPA-HQ-OAR-2008-0508-0481.2

Comment Excerpt Number: 10

Comment: Section 98.53(d) indicates that a facility-specific emission factor is to be calculated according to Equation E-1. Parameters for the equation provided include the N₂O concentration and the adipic acid production rate during the performance test runs. Although not explicitly stated, section 98.53(d) and (e) clearly indicate that the performance testing required in section 98.53(a) is to be conducted on the waste gas stream prior to abatement and that the “emission factor” actually represents the amount of N₂O generated by the process, not the amount released after abatement. To avoid potential confusion, we suggest that Equation E-1 state: EF N₂O = Average facility-specific N₂O emissions factor (lb N₂O generated/ton adipic acid produced).

Response: We agree that the units of the site-specific N₂O emissions factor should be “lb N₂O generated/ton adipic acid” to avoid confusion between N₂O generated by the process and N₂O emitted after control (if any). This has been changed in the final rule.

The final rule also contains clarification that the performance test must be conducted before any abatement technologies that are being used at the facility.

Commenter Name: W. Walter Tyler

Commenter Affiliation: INVISTA S.a r.l. (INVISTA)

Document Control Number: EPA-HQ-OAR-2008-0508-0481.2

Comment Excerpt Number: 12

Comment: Section 98.53(e) indicates that annual process emissions of N₂O are to be calculated according to Equation E-2. Parameters for the equation provided include the N₂O emission factor, a destruction factor and an abatement device on-stream factor. The equation appears to have been derived from the equation for the IPCC Guidelines Tier 2 methodology shown in the Technical Support Document. The IPCC Tier 2 equation is a summation of overall abatement technology types used (including the possibility of no abatement), unlike Equation E-2, which is structured only to represent a single abatement technology. The resulting flaw can be demonstrated by examining the case where AFN is set equal to zero, i.e., the abatement technology was used 0% of the year. The net calculation would yield an EN₂O (annual mass

emissions) of 0 metric tons of N₂O. We suggest that Equation E-2 be corrected by following the summation format used in the IPCC Tier 2 methodology.

Response: A response has been provided in section III of the preamble to this rule (see section E, Adipic Acid Production).

Commenter Name: W. Walter Tyler

Commenter Affiliation: INVISTA S.a r.l. (INVISTA)

Document Control Number: EPA-HQ-OAR-2008-0508-0481.2

Comment Excerpt Number: 13

Comment: Section 98.53(e) utilizes a parameter DFN for the destruction factor for an N₂O abatement technology, which is the efficiency factor specified by the manufacturer of the abatement device. INVISTA uses an abatement technology developed specifically for a particular facility and, therefore, is not covered by a manufacturer's performance representation or specified efficiency factor. To cover these types of situations and to specify that N₂O is removed from the waste gas stream, not the air stream, INVISTA suggests that 98.53(e) read as follows: DFN = Destruction factor of N₂O abatement technology (abatement device manufacturer's specified destruction efficiency or other process knowledge, percent of N₂O removed from waste gas stream).

Response: We agree that process knowledge is a valid method for determining the destruction factor for N₂O abatement technologies. The final rule has been changed to include the use of process knowledge in determining the destruction factor for N₂O abatement technologies. 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.

The final rule also includes a provision to document how process knowledge was used to determine the destruction factor.

Commenter Name: duplicate of 0481.2

Commenter Affiliation: duplicate of 0481.2

Document Control Number: EPA-HQ-OAR-2008-0508-0506.2

Comment Excerpt Number: 9

Comment: Section 98.53(d) indicates that a facility-specific emission factor is to be calculated according to Equation E-1. Parameters for the equation provided include the N₂O concentration and the adipic acid production rate during the performance test runs. Although not explicitly stated, section 98.53(d) and (e) clearly indicate that the performance testing required in section 98.53(a) is to be conducted on the waste gas stream prior to abatement and that the "emission factor" actually represents the amount of N₂O generated by the process, not the amount released after abatement. To avoid potential confusion, we suggest that Equation E-1 be modified as follows (in bold, italics): $EF_{N_2O} = \text{Average facility-specific } N_2O \text{ emissions factor (lb } N_2O$

generated/ton adipic acid produced).

Response: See the response to comment EPA-HQ-OAR-2008-0508-0481.2, excerpt 10.

5.0 MONITORING AND QA/QC REQUIREMENTS

Commenter Name: W. Walter Tyler

Commenter Affiliation: INVISTA S.a r.l. (INVISTA)

Document Control Number: EPA-HQ-OAR-2008-0508-0481.2

Comment Excerpt Number: 11

Comment: Equation E-1 in section 98.53(d) utilizes a parameter “P” for the adipic acid production rate during the performance test. Section 98.54(c)(3) indicates that the production rate can be “determined through sales records, or through direct measurement using flow meters or weigh scales.” In practice, production rates are not always determined by one or more of these methods. INVISTA uses the flow of feed to the nitric oxidation reactor and estimates an adipic acid production rate based on typical yields. In many situations, “sales records” are not generated because the product is shipped internally to other sites for further processing. To better reflect industry practice, INVISTA suggests that the acceptable rate determination methods incorporate the concept of “process knowledge” as an alternative to the methods currently specified, as follows: The production rate during the test and how it was determined. The production rate can be determined through sales records, process knowledge, or through direct measurement using flow meters or weigh scales.

Response: We agree that certain types of process knowledge or engineering calculations can be valid for determining operating parameters, such as production rate, based on industry consensus standards. However, generally allowing process knowledge as proposed in the comment can introduce significant error into the N₂O estimates.

We believe that direct measurements, like the ones outlined by the commenter, will improve the accuracy of the production rate. Therefore, we are not allowing a generic statement of process knowledge to be the basis of the production rate.

Commenter Name: Gary Moore

Commenter Affiliation: Pensacola Plant of Ascend Performance Materials LLC

Document Control Number: EPA-HQ-OAR-2008-0508-0366.1

Comment Excerpt Number: 13

Comment: Currently in §98.54(a) a new performance test is required for Adipic Acid plants whenever the production rate changes by greater than 10% from the previous test rate. Chemical manufacturing facilities do not operate at constant production rates like a base loaded electric utility or a petroleum refinery. Adipic acid production rates are based on demand and vary significantly throughout the year. The requirement for Adipic Acid production facilities in

98.54(a) mandating reestablishing a new emission factor through source testing when the production rate changes by more than 10% would require frequent testing during every year and does not explain how to handle production startup and shutdown. In 2006 and 2007 historical data from Ascend Performance Materials LLC Pensacola Plant's adipic acid facility indicate there were 110 and 82 days respectively where daily production rates changed by more than 10% from the previous days total production. If a monthly average change of 10% was chosen as the threshold for requiring additional testing, eight (8) sampling events would have been required in 2006-2007. Again, based on actual testing costs, a single day of testing at our site costs a minimum of \$8,600 (two consecutive days of testing costs a minimum of \$11,000). The adipic acid facility has two NO_x control devices which doubles the required testing. This requirement would add unreasonable costs to compliance with this rule as proposed. One alternative to this retesting problem issue as proposed would be to require a single annual test. The source would be required to retest for N₂O if production rates increased by 10% above the previous test rate.

Response: A response has been provided in section III of the preamble to this rule (see section E, Adipic Acid Production).

Commenter Name: W. Walter Tyler

Commenter Affiliation: INVISTA S.a r.l. (INVISTA)

Document Control Number: EPA-HQ-OAR-2008-0508-0481.2

Comment Excerpt Number: 14

Comment: Revise Performance Test requirements to require annual tests only. Section 98.54(a) indicates that the performance test must be conducted at least annually or more often whenever the adipic acid production rate is changed by 10 percent from the rate measured during the most recent test. Since the annual performance test is performed under a range of conditions, INVISTA believes that the annual test will account for these variations. The requirement to perform additional performance tests when rates change by 10% is unnecessary and will not lead to more accurate data collection. INVISTA suggests section 98.54(a) to read as: You must calculate a new facility-specific emissions factor at least annually. The new emissions factor may be calculated using all available performance test data (i.e., average with the data from previous years). Where process modifications have occurred or operating conditions have changed, only the data consistent with the reporting period after the changes were implemented shall be used.

Response: A response has been provided in section III of the preamble to this rule (see section E, Adipic Acid Production).

6.0 OTHER SUBPART E COMMENTS

Comment: Generally across the rule, commenters requested clarification on use of standards and in some cases proposed alternative standards for determining particular parameters used to estimate emissions.

Response: For Subpart E, we wanted to note that there is an EPA approved method and an

ASTM method that have been developed for estimating N₂O emissions; however, facilities have indicated that other methods such as N₂O CEMS are also being used that can provide more accurate estimates of emissions. Therefore, after review and consideration, EPA agrees and is allowing Administrator approval for methods used by adipic acid facilities so that EPA will have a list of the most up-to-date standards/methods and protocols being used by industry. This flexibility will help inform future EPA rulemakings related to monitoring of N₂O emissions from adipic acid production. After review of submitted methods, EPA may amend this rule with one or more alternative methods.