



Nitric Acid Production Project Protocol, Version 1.0 ERRATA AND CLARIFICATIONS

March 17, 2011

The Climate Action Reserve ("Reserve") published its Nitric Acid Production Project Protocol, Version 1.0 in December 2009. While the Reserve intends for the Nitric Acid Production Project Protocol be a complete, transparent document, it recognizes that correction of errors and clarifications will be necessary as the protocol is implemented and issues are identified. This document is an official record of all errata and clarifications applicable to the Nitric Acid Production Project Protocol V1.0.¹

Both errata and clarifications are considered effective on the date they are first posted on the Reserve website. The effective date of each erratum or clarification is clearly designated below. All listed and registered Nitric Acid Production projects must incorporate and adhere to these errata and clarifications when they undergo verification. The Reserve will incorporate both errata and clarifications into future versions of the protocol.

All project developers and verification bodies must refer to this document to ensure that the most current guidance is adhered to in project design and verification. Verification bodies shall refer to this document immediately prior to uploading any Verification Opinion to assure all issues are properly addressed and incorporated into verification activities.

If you have any questions about the updates or clarifications in this document, please contact Policy at policy@climateactionreserve.org or (213) 891-1444 x3.

¹ See Section 4.3.4 of the Climate Action Reserve Program Manual (March 2010) for an explanation of the Reserve's policies on protocol errata and clarifications. "Errata" are issued to correct typographical errors. "Clarifications" are issued to ensure consistent interpretation and application of the protocol. For document management and program implementation purposes, both errata and clarifications are contained in this single document.

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Errata

Section 3

1. Execution of Attestation of Title (Effective Date: June 2, 2010)

Section: 3.2 (Project Start Date), Footnote 9

Context: Footnote 9 on page 7 states that “Projects are considered submitted for listing when the project developer has fully completed and filed the appropriate Project Submittal Form and Attestation of Title, available on the Reserve’s website.” With the issuance of the Climate Action Reserve Program Manual, March 2010, the Attestation of Title document is now required at the time of project verification rather than the time of project submittal.

Correction: Projects are considered submitted when the project developer has fully completed and filed the appropriate submittal documents for a nitric acid project, which include a Project Submittal form and a project diagram.

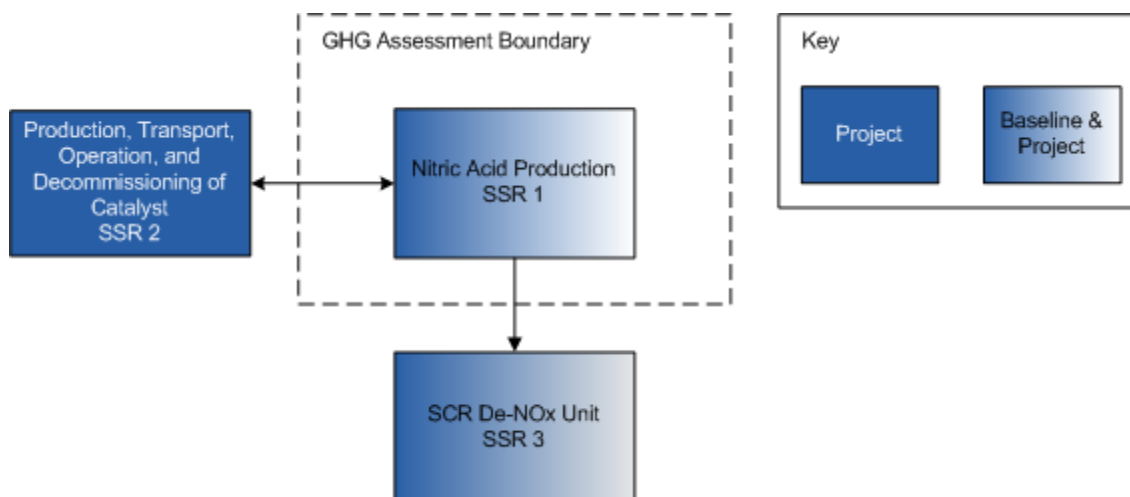
Section 4

2. Figure 4.1 (Effective Date: March 17, 2011)

Section: 4.1, Figure 4.1 - Secondary Catalysts Project, GHG Assessment Boundary

Context: Figure 4.1 provides a general illustration of the GHG Assessment Boundary for secondary catalyst projects, indicating which SSRs are included or excluded from the boundary. It includes SSR 3 – SCR De-NO_x Unit within the boundary, while the corresponding Table 4.1 correctly excludes SSR 3 from the boundary.

Correction: SSR 3 – SCR De-NO_x Unit was erroneously included within the boundary in Figure 4.1. SSR 3 should be excluded from the GHG Assessment Boundary in Figure 4.1, making it consistent with Table 4.1. The effect of SCR de-NO_x technology on N₂O emissions is not only small, but also equivalent in the baseline and project. The corrected Figure 4.1 appears below.

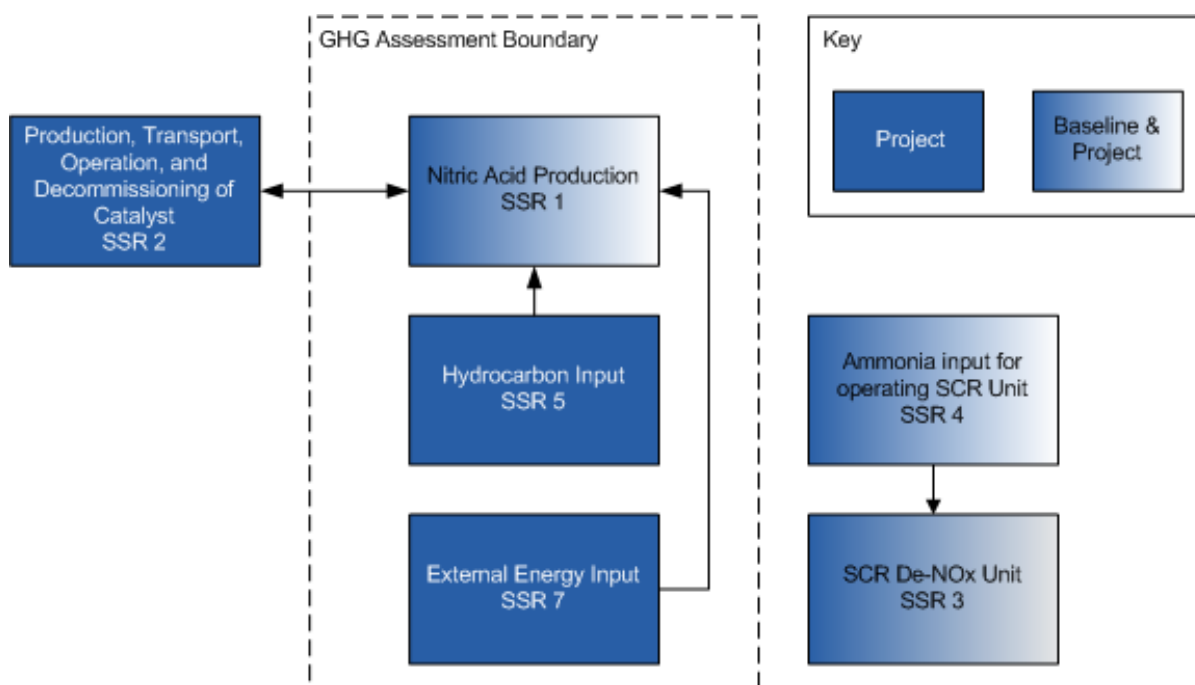


3. Figure 4.2 (Effective Date: March 17, 2011)

Section: 4.2, Figure 4.2 - Tertiary Catalyst Project with Existing SCR De-NO_x, GHG Assessment Boundary

Context: Figure 4.2 provides an illustration of the GHG Assessment Boundary for tertiary catalyst projects with existing SCR De-NO_x units operating prior to the project start date, indicating which SSRs are included or excluded from the boundary. It includes SSR 3 – SCR De-NO_x Unit within the boundary, while the corresponding Table 4.2 correctly excludes SSR 3 from the boundary.

Correction: SSR 3 – SCR De-NO_x Unit was erroneously included within the boundary in Figure 4.2. SSR 3 should be excluded from the GHG Assessment Boundary in Figure 4.2, making it consistent with Table 4.2. The effect of SCR de-NO_x technology on N₂O emissions is not only small, but also equivalent in the baseline and project. The corrected Figure 4.2 appears below.

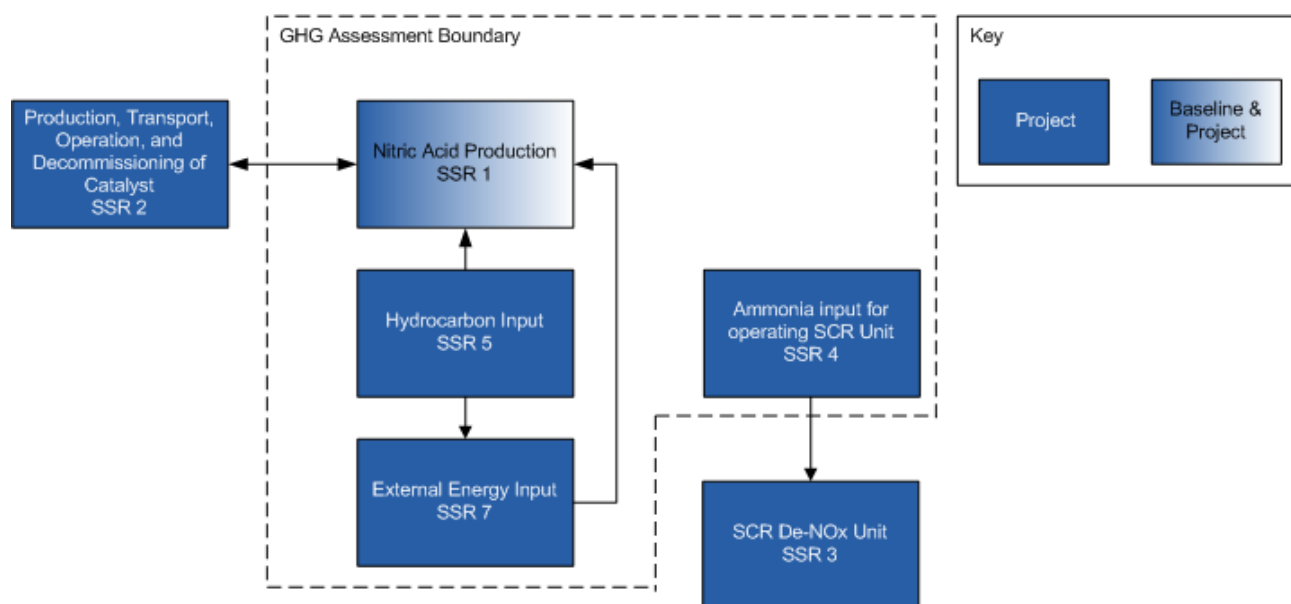


4. Figure 4.3 (Effective Date: March 17, 2011)

Section: 4.2, Figure 4.3 - Tertiary Catalyst Project without Existing SCR De-NO_x, GHG Assessment Boundary

Context: Figure 4.3 provides an illustration of the GHG Assessment Boundary for tertiary catalyst projects without existing SCR De-NO_x units operating prior to the project start date, indicating which SSRs are included or excluded from the boundary. It includes SSR 3 – SCR De-NO_x Unit within the boundary, while the corresponding Table 4.2 correctly excludes SSR 3 from the boundary. The effect of SCR de-NO_x technology on N₂O emissions is assumed to be minimal and therefore not necessary to include. Additionally, SSR 3 and SSR 4 – Ammonia Input for operating SCR Unit are both erroneously shaded to indicate emissions are relevant in both the baseline and the project.

Corrections: SSR 3 – SCR De-NO_x Unit was erroneously included within the boundary in Figure 4.3. SSR 3 should be excluded from the GHG Assessment Boundary in Figure 4.3, making it consistent with Table 4.2. In addition, SSR 3 and SSR 4 should both be colored solid blue, to indicate that emissions from these sources are only relevant in the project. The SCR de-NO_x unit and the ammonia used to operate it are added in conjunction with the tertiary catalyst, and are therefore not present in the baseline. The corrected Figure 4.3 appears below.



Section 5

5. New Term $\text{HNO}_{3\text{MAX}}^{\text{Scaled}}$ (Effective Date: June 2, 2010)

Section: 5 (Quantifying GHG Emission Reductions); Equations 5.1, 5.7, 5.9

Context: To avoid ambiguity and possible confusion in implementing the protocol's required method for calculating emission reductions, a new term is being introduced to specifically denote the scaled value of $\text{HNO}_{3\text{MAX}}$. The term $\text{HNO}_{3\text{MAX}}$ is still defined as "the

historical maximum annual average total output of 100% concentration nitric acid” (page 16). $\text{HNO}_{3\text{MAXScaled}}$ is equal to $\text{HNO}_{3\text{MAX}}$ scaled to the length of the campaign for which emission reductions are being calculated. The derivation and application of $\text{HNO}_{3\text{MAX}}$ and $\text{HNO}_{3\text{MAXScaled}}$ are explained and further clarified below in Clarification #3.

Corrections:

- The paragraph immediately below Equation 5.1 on page 16 is corrected as follows:

“The variable $\text{HNO}_{3\text{ER}}$ in Equation 5.1 is equal to either: (a) the historical maximum annual average total output of 100% concentration nitric acid scaled to the length of the campaign for which emission reductions are being calculated ($\text{HNO}_{3\text{MAXScaled}}$), or (b) $\text{HNO}_{3\text{n}}$ in Equation 5.5, whichever is lower.”
- The last two paragraphs of Section 5.1, immediately preceding Section 5.1.1 (at the bottom of page 16 and beginning of page 17), are deleted and replaced with the text in Clarification #3, below.
- In Equations 5.7 and Equation 5.9, the variable “ $\text{HNO}_{3\text{MAX}}$ ” is corrected to “ $\text{HNO}_{3\text{MAXScaled}}$ ”.
- The last two paragraphs of Section 5.2.1, immediately preceding Section 5.2.1.1 (at the bottom of page 23 and beginning of page 24), are deleted and replaced with the text in Clarification #3, below.

6. Equation 5.4 (Effective Date: June 2, 2010)

Section: 5.1.2.1 (Quantifying GHG Emission Reductions)

Context: Equation 5.4 (page 21) estimates campaign-specific project emissions for secondary projects. While the definition of each term appropriately refers to a specific “nth” project campaign, the terms themselves are missing references to “n”.

Corrections: The variables in Equation 5.4 are hereby corrected as follows:

- a. OH shall be OH_n
- b. V_{SG} shall be V_{SGn}
- c. NC_{SG} shall be NC_{SGn}

Section 6

7. Linearity Check/Cylinder Gas Audits Requirement (Effective Date: August 19, 2010)

Section: 6.2 and 6.2.1 (QA/QC Requirements, Frequency of Testing)

Context: Section 6.2 references both linearity checks and cylinder gas audits. Specifically, Section 6.2.1 requires that linearity checks and cylinder gas audits both be performed quarterly. We have determined that asking for both of these assessments is redundant and represents a difference in language/terms between 40 CFR Part 60 and 40 CFR Part 75.

Correction: Linearity checks are required to be performed in quarters for which there is no RATA test per Section 6.2.1; additional cylinder gas audits are not required under this protocol.

Section 8

8. Table 8.1 (Effective Date: November 18, 2010)

Section: 8.4 (Verifying Eligibility Criteria)

Context: Table 8.1 outlines the eligibility criteria for a nitric acid production project. It includes reference to an attestation form that shall be signed every verification “certifying that all nitric acid produced during the reporting period was in response to market demand”.

Correction: This eligibility criterion was erroneously left in the table from a previous draft of the protocol. There is no such attestation or a requirement in the protocol to sign such an attestation. Verifiers shall disregard this criterion when confirming the eligibility of a project.

Clarifications

Section 3

1. Attestations (Effective Date: November 18, 2010)

Section: 3.4.1 (The Legal Requirement Test); 3.4.3 (Regulatory Compliance)

Context: The protocol makes reference to the Regulatory Attestation form. As written, the Regulatory Attestation is used to meet both the Legal Requirement Test and the Regulatory Compliance requirement. However, the Reserve no longer uses the Regulatory Attestation form and instead has developed two separate forms – the Attestation of Voluntary Implementation and the Attestation of Regulatory Compliance – for this purpose. These forms are described in the Reserve Program Manual.

Clarification: The Legal Requirement Test and Regulatory Compliance requirement require execution of the Attestation of Voluntary Implementation and the Attestation of Regulatory Compliance, respectively.

Section 4

2. Table 4.2 (Effective Date: March 17, 2011)

Section: 4.2 (Tertiary Catalyst Projects, Table summarizing identified Sources, Sinks and Reservoirs)

Context: Table 4.2 provides greater detail on each SSR and justification for the inclusion or exclusion of all SSRs and gases from the GHG Assessment Boundary. In Table 4.2, SSR 3 – SCR De-NO_x Unit is excluded in both the Baseline and Project. The Justification/Explanation column of Table 4.2 does not adequately explain the rationale.

Clarification: The last column of Table 4.2 titled Justification/Explanation, in the row referring to SSR3, is clarified to read: “N₂O impact of existing SCR unit is small and a secondary effect. While not an included SSR, in practice the placement of emissions monitoring devices will determine whether N₂O emission effects from an SCR de-NO_x unit are actually measured. Such effects will be measured when the SCR de-NO_x unit is located in between the N₂O gas analyzers that measure baseline and project N₂O gas concentrations. However, even if there is an effect, it is likely to be small and considered negligible.”

Section 5

3. Calculation and Application of HNO_{3MAX} (Effective Date: June 2, 2010)

Section: 5 (Quantifying GHG Emission Reductions); Equations 5.1, 5.7, 5.9

Context: For both secondary and tertiary projects, calculation of emission reductions must take into account historic nitric acid (HNO₃) production levels. This requires deriving a “historical maximum annual average total output of 100% concentration nitric acid” (HNO_{3MAX}). HNO_{3MAX} must be scaled to the length of the campaign for which emission reductions are calculated. A new variable, HNO_{3MAXScaled}, is being introduced to denote this scaled value (see Erratum #5, above). HNO_{3MAXScaled} may be required in Equation 5.1 (for secondary projects) as a value for the term HNO_{3ER}, and is a required term in Equations 5.7 and 5.9 (for tertiary projects). Existing guidance in Version 1.0 of the Nitric Acid Production Project Protocol concerning how to calculate HNO_{3MAX} and scale this term appropriately is not sufficiently precise, leaving room for ambiguity. The following guidance should be substituted for the guidance on pages 16-17 and 23-24 indicating how to derived HNO_{3MAX} and scale this value to be used in Equations 5.1, 5.7, and 5.9.

Clarification:

Calculating HNO_{3MAXScaled} involves three steps:

1. Calculating average HNO₃ production levels for a historic period;
2. Choosing HNO_{3MAX} from the historic data; and
3. Calculating HNO_{3MAXScaled} by scaling HNO_{3MAX} to the appropriate timeframe.

Step 1:

Five consecutive years of historic data are used to calculate five values, each representing average HNO₃ production levels during a one year period at the process unit where the project is located. Average HNO₃ production can be calculated by:

- Averaging daily or hourly HNO₃ production data over a 12 month period, excluding days or hours when the nitric acid plant was not operating. This yields a per-day or per-hour value that is a representative average for that 12 month period.
- Averaging the amount of HNO₃ produced during each campaign over a one year period. For example, if there are three campaigns within a 12 month period, the average is equal to the sum of HNO₃ produced during all three campaigns divided by three. This yields a per-campaign value that is a representative average for that 12 month period.

If five years of historical data are not available to calculate five average HNO₃ production values, then five historical average HNO₃ production values may be calculated from five consecutive campaigns of HNO₃ production data, reported as an average hourly, daily, or

per-campaign value. If data from five consecutive campaigns are not available, then use the nameplate capacity of the NAP to determine $\text{HNO}_{3\text{MAX}}$, as indicated in Step 2.

Step 2:

$\text{HNO}_{3\text{MAX}}$ is either:

- The highest of the five average historic values calculated in Step 1; or
- If historic values cannot be calculated, the nameplate capacity of the NAP as specified in operating manuals and permits

Step 3:

$\text{HNO}_{3\text{MAXscaled}}$ is calculated by multiplying $\text{HNO}_{3\text{MAX}}$ by the number of operating days or hours, or the number of campaigns in the period for which emission reductions are being calculated.

4. Statistical Analysis of Historical Permitted Operating Conditions (Effective Date: August 19, 2010)

Section: 5.1.1.1 (Permitted Operating Conditions)

Context: In Section 5.1.1.1, the protocol requires that the permitted range for temperature and pressure be determined through a statistical analysis of historical data. It specifies that the permitted range is defined by eliminating all data that falls within the upper and lower 2.5% percentiles of the sample distribution. There has been some confusion over what specific data shall be included in the sample distribution, i.e. whether temperature and pressure data recorded before ammonia flows to the reactor should be included in the sample.

Clarification: Oxidation temperature and oxidation pressure data that are generated before ammonia begins flowing to the reactor shall be excluded prior to eliminating the upper and lower 2.5% of the observations.

5. Establishing Maximum Ammonia-to-Air Ratio as a Permitted Operating Conditions (Effective Date: November 18, 2010)

Section: 5.1.1.1 (Permitted Operating Conditions)

Context: Section 5.1.1.1 provides guidance on how to establish maximum ammonia-to-air ratio, one of the permitted operating conditions (POCs) that are established to ensure N_2O emissions during the baseline campaign are representative of typical historical N_2O emissions for the NAP. Per the guidance in the last paragraph of this section, the maximum must be within the specifications of the facility by comparison with operating manuals for the equipment and ammonia catalyst specifications. If the maximum is not within the specifications, then additional campaigns are to be undertaken to establish the POCs until the maximum can meet the criterion.

It has come to the Reserve's attention that there can occasionally be abnormal or erroneous ammonia-to-air ratio levels recorded that could cause the maximum ammonia-to-air ratio to fall outside of the specifications in the operating manuals, therefore triggering the need for additional campaigns to be completed in order to establish POCs.

Clarification: If the project developer feels there were abnormal ammonia-to-air ratio levels recorded during the historic campaigns used to establish the POCs for the project and has documentation or justification to support the recorded levels being erroneous, the verification body may use professional judgment to review the documentation and make a determination whether the abnormal ammonia-to-air ratio levels should be eliminated from the historical dataset.

6. Statistical Comparison of Permitted and Baseline Operating Conditions for Secondary Projects (Effective Date: August 19, 2010)

Section: 5.1.1.2 (Baseline Emission Factor)

Context: In Section 5.1.1.2, the protocol requires that a statistical test be performed to compare the average values of historical permitted operating conditions with the average values of operating conditions during the baseline sampling period to further ensure that operating conditions during the baseline sampling period are representative of normal operating conditions. The protocol does not specify what statistical test should be applied.

Clarification: To satisfy this requirement, the following statistical test shall be applied: the mean values for oxidation temperature, oxidation pressure and ammonia-to-air ratio obtained during the baseline campaign are compared to corresponding ranges for each parameter defined as the 95% confidence interval (1.96 times the standard deviation) of the specific permitted operating conditions (determined per Section 5.1.1.1). The baseline campaign is considered to be representative of normal operating conditions when all parameters fall within the corresponding range defined by the 95% confidence interval. Otherwise, the baseline sampling period shall be repeated.

7. Statistical Comparison of Permitted and Project Operating Conditions for Secondary Projects (Effective Date: November 18, 2010)

Section: 5.1.2.1 (Calculating Campaign-Specific Project Emissions)

Context: In Section 5.1.2.1, the protocol requires that a statistical test be performed to compare the average values of historical permitted operating conditions with the average values of operating conditions during each project campaign to further ensure that operating conditions during the project are representative of normal operating conditions. The protocol does not specify what statistical test should be applied.

Clarification: To satisfy this requirement, the following statistical test shall be applied: the mean values for oxidation temperature, oxidation pressure and ammonia-to-air ratio obtained during the project campaign are compared to corresponding ranges for each parameter defined as the 95% confidence interval (1.96 times the standard deviation) of the specific permitted operating conditions (determined per Section 5.1.1.1). The project campaign is considered to be representative of normal operating conditions when all parameters fall within the corresponding range defined by the 95% confidence interval. Otherwise, no emission reductions can be claimed by the project for that campaign.

8. Statistical Comparison of Permitted and Project Operating Conditions for Tertiary Projects (Effective Date: March 17, 2011)

Section: 5.2.1.1 (Calculating Campaign-Specific Project Emissions)

Context: In the last paragraph of Section 5.2.1.1, the protocol requires that a statistical test be performed to compare the average values of historical permitted operating conditions with the average values of operating conditions during each project campaign to further ensure that operating conditions during the project are representative of normal operating conditions. The protocol does not specify what statistical test should be applied.

Clarification: To satisfy this requirement, the following statistical test shall be applied: the mean values for oxidation temperature, oxidation pressure and ammonia-to-air ratio obtained during the project campaign are compared to corresponding ranges for each parameter defined as the 95% confidence interval (1.96 times the standard deviation) of the specific permitted operating conditions (determined per Section 5.2.1.1). The project campaign is considered to be representative of normal operating conditions when all parameters fall within the corresponding range defined by the 95% confidence interval. Otherwise, no emission reductions can be claimed by the project for that campaign.

Section 6

9. System Installation and Certification Requirements for Pre-Existing CEMS (Effective Date: August 19, 2010)

Section: 6.1.1 (System Installation and Certification)

Context: Section 6.1.1 summarizes the tests and requirements from 40 CFR Part 75 that must be met to ensure the proper initial installation and certification of the CEMS. The section does not explicitly address how plants with already existing CEMS that were installed for other purposes (and potentially prior to the protocol being available) shall meet these requirements.

Clarification: Projects utilizing a CEMS that was initially installed for a different purpose (e.g. to monitor NO_x abatement) must still meet all of the requirements per Section 6.1.1. If any of the required tests were not conducted or the requirements were not met at the time of initial installation and certification, the project developer must conduct the tests and ensure the requirements are met prior to beginning the baseline campaign.

10. Frequency of Testing for CEMS Installed Prior to Project Implementation (Effective Date: August 19, 2010)

Section: 6.2.1 (Frequency of Testing)

Context: Section 6.2.1 specifies the tests and testing schedule that must be met to ensure the QA/QC of the CEMS. It also specifies that these assessments must be performed and documented as of the date (or as of the calendar quarter following the date) that the CEMS was certified. It does not explicitly address frequency of testing for CEMS that were installed and certified for NO_x abatement prior to implementation of the N₂O project.

Clarification: For CEMS that were installed and certified for NO_x abatement prior to implementation of the N₂O project, the daily, quarterly, semi-annual, and annual assessments detailed in Section 6.2.1 only need to be performed, documented, and verified starting at the time of the baseline campaign, not as of the date when the CEMS originally completed certification testing for NO_x abatement. For CEMS that were installed specifically for N₂O project implementation, assessments must be performed and documented as of the date that the CEMS was certified.

11. Daily Calibration Error Test Requirement for CEMS Flow Meter (Effective Date: November 18, 2010)

Section: 6.2.1 (Frequency of Testing)

Context: Section 6.2.1 details the required tests to be conducted relevant to N₂O analysis using CEMS. A calibration error test of the flow meter is specified as a requirement under daily assessments. This test requirement (designed as a QA/QC procedure for power plants under 40 CFR Part 75) is not necessary for nitric acid plants on a daily basis, as the operating conditions at nitric acid plants are considerably more stable, and the flow meter equipment recommended to best serve nitric acid facilities by manufacturers would not necessarily have the capability to conduct daily assessments.

Clarification: The calibration error test for the CEMS flow meter shall be conducted quarterly, rather than daily. If the quarterly test reveals accuracy outside of a +/- 3% threshold, calibration by the manufacturer or a certified service provider is required for the flow meter.

For the interval between the last successful calibration error test and the calibration error test that revealed accuracy outside +/- 3% threshold, conservativeness will determine what flow meter data are used in emission reduction calculations. Depending on if the calibration error is detected in a baseline or project campaign, this may mean using the metered values without correction or adjusting the metered values based on the greatest calibration drift recorded at the time of calibration. The verification body shall confirm that any adjustments to the metered values result in the most conservative calculation of emission reductions. Any adjustments shall be made for the entire period from the last successful calibration error test until such time as the meter is properly calibrated and re-installed.

12. Daily Flow Interference Check Requirement (Effective Date: November 18, 2010)

Section: 6.2.1 (Frequency of Testing)

Context: Section 6.2.1 details the required tests to be conducted relevant to N₂O analysis using CEMS. A flow interference check of the flow meter is specified as a requirement under daily assessments. This requirement (designed as a QA/QC procedure for power plants under 40 CFR Part 75) is neither appropriate nor necessary for nitric acid plants. The tail gas coming out of the nitric acid plant stack is relatively dust/particle free and contains little moisture, greatly reducing the risk of velocity sensing interference. Furthermore, nitric acid plants generally have low flow variability. The semi-annual/annual RATA requirement will ensure the flow meter is properly calibrated.

Clarification: A daily flow interference check on the CEMS flow meter is not required under this protocol.

13. Quarterly Leak Check Requirement (Effective Date: August 19, 2010)

Section: 6.2.1 (Frequency of Testing)

Context: Section 6.2.1 details the required tests to be conducted relevant to N₂O analysis using CEMS. A leak check is specified as a requirement under quarterly assessments. Upon closer examination of Appendix B of 40 CFR Part 75 2.2.2, quarterly leak checks are required for differential pressure flow meters only.

Clarification: Quarterly leak checks are only required for CEMS utilizing differential pressure flow meters. Other types of flow meters are exempt from this requirement.

14. Quarterly Flow-to-Load Ratio/Gross Heat Rate Evaluation Test Requirement (Effective Date: August 19, 2010)

Section: 6.2.1 (Frequency of Testing)

Context: Section 6.2.1 details the required tests to be conducted relevant to N₂O analysis using CEMS. A flow-to-load ratio or gross heat rate evaluation is specified as a requirement under quarterly assessments. Upon closer examination of 40 CFR Part 75 (Appendix A, 7.8), it clarifies that units that do not produce electrical output (in megawatts) or thermal output (in klb of steam per hour) are exempted from the flow-to-load ratio test requirements of Section 2.2.5 of Appendix B.

Clarification: If the nitric acid plant where the project is located does not produce electrical or thermal output, then the project does not need to perform a quarterly flow-to-load ratio test.

15. Calculation of Ammonia-to-Air Ratio (AIFR) (Effective Date: June 2, 2010)

Section: 6.4 and 6.5, Tables 6.1 and 6.2, respectively (Project Monitoring)

Context: Tables 6.1 (page 36) and 6.2 (page 39) specify units for ammonia-to-air ratio as a percentage. However, the protocol is not specific about how to derive the percentage.

Clarification: Define the ammonia-to-air ratio as $\text{NH}_3/(\text{NH}_3 + \text{air})$. This can be calculated using mass (e.g. kg/hr) or volume (e.g. m³/hr) units, which will cancel out in the final percentage.