**Changes to Oxides of Nitrogen Analyzer Method Codes**

**December 22, 2014**

This memo presents the latest adaptation in the use of method codes to differentiate data from the myriad of oxides of nitrogen analyzers available to the ambient monitoring community and updates on newly available methods. The reason for this new approach in the method code assignment paradigm is due to occurances of different oxide of nitrogen analyzers using the same method code in AQS, causing some confusion on what type of analyzer is producing data. Background on this issue is provided in Appendix A. In an effort to clearly differentiate between the data being submitted by the many variants of oxides of nitrogen analyzers in operation, including Federal Reference Methods (FRMs), Federal Equivalent Methods (FEMS), and non-regulatory methods, the EPA is introducing a new paradigm of method code assignments in AQS. This new paradigm will build upon the previous approach, and now separates standard NOx FRMs, trace-level NOx FRMs, and NOy analyzers that stem from an original model that was given an FRM approval ID. In this new paradigm, standard NOx FRMs will continue to use the last three digits of the FRM approval ID. Trace level NOx analyzers will still use the three digit code plus "500" approach. And finally, NOy variants of any vendor's oxides of nitrogen analyzer lineage will now use the three digit code of the parent FRM from which the NOy analyzer was built, plus "600".

| Analyzer Type | Method Code Paradigm |
|---|---|
| Standard NOx FRM Analyzer | Last three digits of FRM Approval ID |
| Trace-level NOx FRM Analyzer | Last three digits of FRM Approval ID + 500 |
| NOy Analyzer (not an FRM or FEM) | Last three digits of parent FRM Approval ID + 600 |

Appendix B includes a table listing most of the vendor models in use nationally which lists the appropriate parameter code affiliations and method codes.

In addition to this new paradigm for chemiluminescence analyzer method codes, we are taking this opportunity to adjust the method code of the Teledyne API photolytic-chemiluminescent FEMs (models 200EUP and T200UP) to match the last three digits of their equivalency ID (EQNA-0512-200). For each of those models, the current method code of 600 shall be adjusted to 200.

Finally, we want to take this opportunity to point out two new direct $NO_2$ analyzers that have recently been approved as FEMs and list their method codes. The Environment S.A. AS32M and Teledyne API T500U Cavity Attenuated Phase Shift (CAPS) spectroscopy analyzers have been approved as FEMs for measuring $NO_2$. Their respective method codes are 210 and 212, and are reflected in the attached table. Note that these CAPS spectroscopy analyzers directly measure $NO_2$, and do not measure NO. As a result, the only appropriate parameter code affiliate is 42602 for these direct measurement analyzers.

**Who Needs to Take Action?**

This new approach will require operators of photolytic-chemiluminescent NOx FEM analyzers and NOy analyzers to change method codes. However, the EPA encourages each state, local, and tribal air agency to take this opportunity to ensure they are using the appropriate method code for all their oxides of nitrogen analyzer.

**Data Certification Impacts**

Conversion of all uses of AQS method code 600 for the Teledyne API photolytic-chemiluminescent NOx analyzers (models 200EUP and T200UP) to AQS method code 200 will be performed by the AQS Federal team on Saturday, January 17, 2015. The certification status of all data will be preserved.

For further information or questions, contact:

Robert Coats, US EPA – OAQPS – Outreach and Information Division – National Air Data Group, coats.robert@epa.gov

Nealson Watkins, US EPA – OAQPS – Air Quality Assessment Division – Ambient Monitoring Group, watkins.nealson@epa.gov

## APPENDIX A

### Background

Over the last few decades we have seen advancements in oxides of nitrogen measurement technology that have improved upon our traditional methods, modified existing methods for new applications, and more recently, brought on the advent of new, direct measurement methods. During this time, we have had to modify how collected data are organized and reported to aid in the differentiation of those data originating from a variety of analyzers. The primary tactic to differentiate data from the growing and changing analyzer population has been through the use of modified method codes.

To date, method codes for Federal Reference Method (FRM) and Federal Equivalent Method (FEM) pollutant analyzers have been assigned by using the last three digits of the approval ID assigned to the method when it was approved as an FRM or FEM by EPA's Office of Research and Development. For example, the standard Thermo model 42 NOx analyzer was approved as an automated reference method with an ID of RFNA-1289-074 in the Federal Register Vol. 54, page 50820, on December 11, 1989, and was assigned a method code of 074 for use in AQS. A list of approved methods is maintained at the following web address: http://www.epa.gov/ttn/amtic/criteria.html. For analyzers producing data bound for AQS which are not approved as FRM or FEMs, the method codes are assigned on an ad-hoc basis, with administrators simply using unused method code numbers.

In the 2000's when 'trace-level' or otherwise more sensitive versions of criteria gas analyzers for carbon monoxide, sulfur dioxide, and oxides of nitrogen were made available, the analyzers were not significantly modified from their parent FRM or FEM approved models. As a result, instrument manufacturers did not have to apply for reference or equivalency for these new, more sensitive versions of their original, standard models. This allowed the new trace-level analyzers to stay in the same reference approval lineage of the original standard analyzers.

In order to differentiate between data produced by standard analyzers and newer trace-level analyzers in AQS, it was suggested that the method code of the trace-level analyzers be modified. The paradigm that was established was to add "500" to the existing method code to differentiate trace-level FRM analyzers from their standard FRM counterparts. This approach had no potential side-effects for carbon monoxide and sulfur dioxide analyzers. However, in the case of oxides of nitrogen there was a complication because there were also analyzers for NOy using the same codes as trace level NOx analyzers. As a result, the plus 500 method code paradigm was applied to both trace level NOx analyzers and NOy analyzers, which kept those two analyzer types from being clearly differentiated in AQS. Critically, this also permitted non-FRM parameters to be reported to AQS under a method code associated with an FRM.

**APPENDIX B - OXIDES OF NITROGEN METHODS (AMBIENT) - JULY 2014**

| Vendor | Vendor Model | ANALYZER TYPE | ANALYTES | | | | | Application | Detection Method | Appropriate Parameter Code Affiliates | APPROPRIATE METHOD CODE(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | NO | NO2 | NOx | NOy-NO | NOy | | | | |
| Ecotech | EC 9841A | **NOx** | NO | NO2 | NOx | | | Std. NOx analyzer | Chemiluminescence | 42601 42602 42603 | 090 |
| Ecotech | EC 9841B | **NOx** | NO | NO2 | NOx | | | Std. NOx analyzer | Chemiluminescence | 42601 42602 42603 | 090 |
| Ecotech | EC 9841T | **NOx** | NO | NO2 | NOx | | | Trace level NOx | Chemiluminescence | 42601 42602 42603 | 590 |
| Ecotech | Serinus 40 | **NOx** | NO | NO2 | NOx | | | Std. NOx analyzer | Chemiluminescence | 42601 42602 42603 | 186 |
| Ecotech | EC 9841 T-NOy | **NOy** | NO | | | NOy-NO | NOy | NOy | Chemiluminescence | 42600 42601 42612 | 690 |
| Ecotech | EC 9843 | **NOy** | NO | | | NOy-NO | NOy | NOy | Chemiluminescence | 42600 42601 42612 | 691 |
| TAPI | 200A | **NOx** | NO | NO2 | NOx | | | Std. NOx analyzer | Chemiluminescence | 42601 42602 42603 | 099 |
| TAPI | 200AU | **NOx** | NO | NO2 | NOx | | | Trace level NOx | Chemiluminescence | 42601 42602 42603 | 599 |
| TAPI | 200E | **NOx** | NO | NO2 | NOx | | | Std. NOx analyzer | Chemiluminescence | 42601 42602 42603 | 099 |
| TAPI | 200EU | **NOx** | NO | NO2 | NOx | | | Trace level NOx | Chemiluminescence | 42601 42602 42603 | 599 |
| TAPI | T200 | **NOx** | NO | NO2 | NOx | | | Std. NOx analyzer | Chemiluminescence | 42601 42602 42603 | 099 |
| TAPI | T200U | **NOx** | NO | NO2 | NOx | | | Trace level NOx | Chemiluminescence | 42601 42602 42603 | 599 |
| TAPI | 200EUP (Photolytic) | **NOx** | NO | NO2 | NOx | | | Trace level Photolytic-Chemi. NOx | Photolytic Chemiluminescence | 42601 42602 42603 | 200 |
| TAPI | T200UP (Photolytic) | **NOx** | NO | NO2 | NOx | | | Trace level Photolytic-Chemi. NOx | Photolytic Chemiluminescence | 42601 42602 42603 | 200 |
| TAPI | 200EU/Noy (aka 200EU/501 NOy) | **NOy** | NO | | | NOy-NO | NOy | NOy | Chemiluminescence | 42600 42601 42612 | 699 |
| TAPI | T200U/NOy (aka T200U/501 NOy) | **NOy** | NO | | | NOy-NO | NOy | NOy | Chemiluminescence | 42600 42601 42612 | 699 |
| TAPI | T500U | **NO2** | | NO2 | | | | Direct NO2 | Cavity Attenuated Phase Shift Spectroscopy | 42602 | 212 |
| Thermo | 14 B/E | **NOx** | NO | NO2 | NOx | | | Std. NOx analyzer | Chemiluminescence | 42601 42602 42603 | 035 |
| Thermo | 14 D/E | **NOx** | NO | NO2 | NOx | | | Std. NOx analyzer | Chemiluminescence | 42601 42602 42603 | 037 |
| Thermo | 42 | **NOx** | NO | NO2 | NOx | | | Std. NOx analyzer | Chemiluminescence | 42601 42602 42603 | 074 |
| Thermo | 42c | **NOx** | NO | NO2 | NOx | | | Std. NOx analyzer | Chemiluminescence | 42601 42602 42603 | 074 |
| Thermo | 42c - TL | **NOx** | NO | NO2 | NOx | | | Trace level NOx | Chemiluminescence | 42601 42602 42603 | 574 |
| Thermo | 42c - Y | **NOy** | NO | | | NOy-NO | NOy | NOy | Chemiluminescence | 42600 42601 42612 | 674 |
| Thermo | 42i | **NOx** | NO | NO2 | NOx | | | Std. NOx analyzer | Chemiluminescence | 42601 42602 42603 | 074 |
| Thermo | 42i-TL | **NOx** | NO | NO2 | NOx | | | Trace level NOx | Chemiluminescence | 42601 42602 42603 | 574 |
| Thermo | 42i - Y | **NOy** | NO | | | NOy-NO | NOy | NOy | Chemiluminescence | 42600 42601 42612 | 674 |
| Thermo | 42S | **NOy** | NO | | | NOy-NO | NOy | NOy | Chemiluminescence | 42600 42601 42612 | 674 |
| Environ-ment SA | AS32M | **NO2** | | NO2 | | | | Direct NO2 | Cavity Attenuated Phase Shift Spectroscopy | 42602 | 210 |