

Standard Operating Procedure (SOP)
For
Quarterly Completeness Data Review
For The
North Carolina Division of Air Quality (NCDAQ)
Section 4



Approval Sign-Off Sheet

I certify that I have read and approve of the contents of this revision of the "SOP for Quarterly Data Review" with an effective date of 06/12/2020.

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Disclaimer:

This SOP is intended for use by NCDQA personnel as an aide and guidance in conducting the processes and procedures described within the document. It is not, and is not intended to be, a substitute for the education, training, experience and commitment required to perform these functions.



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2.39 Standard Operating Procedure for Quarterly Data Review for the North Carolina Division of Air Quality, or DAQ

2.39.1 Introduction

The quarterly data review is an in-house audit to ensure that the ambient monitoring data generated by the Division of Air Quality, or DAQ, meets or exceeds the requirements set forth in 40 CFR Part 58. The review will include all information submitted to the Air Quality System, or AQS, for the quarter, and serves two main purposes: 1.) the review determines whether all required information has been successfully uploaded to the AQS system. 2.) the review documents whether the data meets all required measures for quality, precision and bias. The review will utilize standard AQS reporting formats, along with raw and edited data stored in the EnviDas and Envista data acquisition and storage systems, log books, spreadsheets, maintenance logs and Electronic and Calibration Branch, or ECB, reports generated within DAQ. The review will provide Raleigh Central Office chemists with documentation that will assist in locating and correcting inconsistencies, quality control issues and other problems that may impact the completeness, precision and bias of the data.

2.39.2 The AQS Network/ AQS Data Reports

AQS is a nationwide data base operated by the United States Environmental Protection Agency, or EPA. AQS stores ambient data from monitoring networks in all 50 states. The quarterly data review will access only that data generated by DAQ. For purposes of this standard operating procedure, or SOP, AQS access and familiarity with the report retrieval process is assumed.

The quarterly review will utilize, at a minimum, the reports listed below to extract data from AQS for review:

- AMP350 Raw Data Report
- AMP251 QA Raw Assessment Report
- AMP256 QA Data Quality Indicator Report
- AMP430 Data Completeness Report
- AMP600 Certification Evaluation and Concurrence Report
- AMP501 Extract Raw Data Report
- AMP503 Extract Blank Data Report



In addition, the following documents from DAQ regional offices will be accessed:
eLogs, spreadsheets and work books, ECB 109 Forms, ECB audit and maintenance reports.

2.39.3 Pollutants/ Parameters

The quarterly review will consist of an assessment for each of the pollutants or pollutant families listed below. For each pollutant, where applicable, the criteria code is listed, along with the AMP report codes which will be reviewed for that pollutant. For example, to complete a review of ozone data for one quarter, information from five AQS reports will be accessed.

Pollutant	Criteria Code	No. of Reports	AMP Report Codes	
1. Ozone	44201	5	350, 251, 430, 256, 600	
2. CO	42101	5	350, 251, 430, 256, 600	
3. SO ₂	42401	6	350, 251, 430, 256, 600, 501	
	42406	1	501	
4. Nitrogen Compounds		5	350, 251, 430, 256, 600	
	NO _y	42600		
	NO	42601		
	NO ₂	42602		
	NO _x	42603		
5. PM _{2.5}	88101	6	350, 251, 430, 256, 600, 503	
	88502	3	350, 251, 430	
6. PM ₁₀	81102	5	350, 251, 430, 256, 600	
7. Miscellaneous Compounds		3	350, 251, 430	
	PM Coarse	86101		
	PM Local	85101		
	Total Nitrate 2.5 LC	88306		
	Black Carbon	88313		
	UV Carbon	88314		
	Indoor Temp	62107	2	350, 430
	8. Air Toxic Compounds		3	350, 251, 430
UATMP Carbonyl				
UATMP VOC				
9. Met Data		2	350, 430	
10. Sulfates	88403(method 875)	3	350, 251, 430	



2.39.4 Critical Criteria

Prior to commencing the review of the quarterly data, reviewers should familiarize themselves with the critical criteria for the specific pollutant to be reviewed, including national ambient air quality standard, or NAAQS, limits. In addition, the reviewer should have a basic understanding of the SOPs for the pollutant, and a list of monitoring stations currently analyzing that pollutant.

2.39.5 AQS Reports

2.39.5.1 AMP350 Raw Data Report

The AMP350 report presents, in a tabular format, all data generated by a given monitor for the period under review. The report is most usually broken down by month, with the data broken down by day and by hour. The AMP350 report tells the “story” of that monitor for the period under review. Average pollutant concentrations are shown for each hour or day of operation. Equipment faults and down times, QC checks, audits and maintenance are explained through void codes. Deviations from SOPs are indicated by flags. In reviewing the data, the reviewer should follow the guidelines listed below:

1. Check to see that, for the given pollutant, data from each separate monitor is present for the entire reporting period. (Ensure that all data uploaded correctly into AQS)
2. Determine if the data are complete. (The entire period is populated by recorded data or by appropriate null codes)
3. Determine if critical criteria were met (Monthly filter changes, monthly flow rate verifications, biweekly 1-point-QC checks, etc. occurred at required intervals)
4. Ensure that SOPs and QAPPs were followed. (That is, that the report shows that corrective actions were taken when required.)
5. Investigate any NAAQS exceedances or other data anomalies.

For some pollutants, such as Ozone, filter changes and other critical criteria may not appear on the report. Review of the log books and spreadsheets associated with the site will indicate if, and when those activities occurred.



2.39.5.2 AMP251 QA Raw Assessment Report

The AMP251 report presents the quality control data for each monitor for the period under review. These data are used to prove that a given monitor operated within its required specifications. The report lists each quality control check for a given monitor and its outcome. Missed or incomplete checks are indicated by place holders and appropriate codes. In reviewing the data, the reviewer should follow the guidelines listed below:

1. Check to see that, for each monitor listed in the AMP350 report, QC checks are reported in the AMP251 report.
2. Check to ensure that the number of checks listed corresponds to the requirements set forth in the appropriate QAPPs and SOPs.
3. Look at the results of the checks.
4. Ensure that only valid checks are reported.
5. Ensure that incomplete, missed or invalid checks are covered by placeholders and are appropriately coded.
6. Note any failed checks and determine if any subsequent action was required or taken. This should include specifically any data invalidation necessitated by the failed check.
7. Cross check against the AMP350 report to ensure that the coding of QC checks is consistent between the two reports.

2.39.5.3 AMP430 Data Completeness Report

The AMP430 report lists, for each monitor, by month, the percentage of time the monitor reported data during the period under review. For each pollutant strict guidelines exist defining the minimum amount of data that must be collected to be considered complete. The AMP430 report shows an agency's success in meeting that goal. In reviewing the data, a reviewer should follow the guidelines listed below:

1. Check to see that all monitors for the given pollutant are listed as reporting data.
2. Verify that each monitor reported data for the entire period under review.
3. Identify any monitors that fail to achieve the required completeness for the period and determine the cause of the incompleteness. The auditor should generate a report informing management of the failure and the steps taken to ensure the problem does not recur.
4. Cross reference the AMP350 and AMP430 reports to verify that all monitors are included, and that the completeness percentages reported correspond to the raw data listed.

2.39.5.4 AMP256 QA Data Quality Indicator Report

The AMP256 report lists and summarizes the quality assurance tests performed for each criteria pollutant monitor during the period under review. The report identifies the number and type of tests performed, the precision found, and the amount of bias present in the results. These tests are used to demonstrate that the



data produced by the monitors is an accurate and true representation of the actual conditions, is repeatable and free from bias. In reviewing the data, a reviewer should follow the guidelines listed below:

1. Check to ensure that all monitors are listed.
2. Verify that all required tests were performed at the required frequency.
3. Check the reported results to ensure the precision and bias measurements are within the specifications set forth in the relevant SOPs and QAPPs.

2.39.5.5 AMP600 Certification Evaluation and Concurrence Report

The AMP600 report lists the progress made toward meeting program completion requirements for the year. The report links all the previous reports by providing, for each active monitor, a useful overview of progress toward data, quality control and quality assurance completeness for the year. In reviewing the data, the reviewer should follow the guidelines listed below:

1. Ensure that all sites are listed.
2. Check whether sites are reporting minimum, maximum and mean values for the quarter.
3. Verify that one- point QC checks are recorded and that precision and bias are within tolerance.
4. Check whether NPAP and PE checks have been performed.

The AMP600 report assumes a higher level of importance as the year progresses, as it progressively measures progress toward concurrence.

2.39.5.6 AMP501 Extract Raw Data Report

The AMP501 report is a text file that lists ambient concentration data in a raw format. The report is used for reviewing SO₂ five- minute data and SO₂ 5-minute max data. In reviewing the data, the reviewer should follow the guidelines listed below:

1. Ensure all sites are listed.
2. Ensure that all data are present with no gaps or missing dates.

2.39.5.7 AMP503 Extract Sample Blank Data

The AMP503 report is a text file that contains the field and trip blank data for FRM PM_{2.5}. The report is used to confirm that the required number of field blanks were run, and that data are not biased through improper handling of the samples. The criteria for field blanks is set forth in 40 CFR 58.16. In reviewing this data, the reviewer should follow the guidelines listed below:

1. Ensure that all sites are listed
2. Verify that a minimum of 3 field blank samples (one per month) are recorded for each for the quarter.



3. Verify that no blank exceeds 15 micrograms.

2.39.6 ELog, Work Book, EnviDas/ Envista, Spreadsheet, and ECB Form Review

During the review process, the reviewer should periodically cross reference the reported AMP data with available elogs and spreadsheets. Where possible, the reviewer should verify that events recorded in the AMP data are adequately and accurately described in the operator logs for the sites. Explanations for flags and data void codes should be contained in the operator logs and Envista pages. There should be close agreement between the data reported in AQS and the validated spread sheets generated for the site. ECB forms should detail equipment replacement and maintenance, audits and standard certifications. In some cases, ozone for example, the AMP data may not reflect the site visits, maintenance and QC checks performed at the site. The reviewer should verify that the required work was completed and is documented in the operator logs. Operator logs can sometimes be used to help the reviewer understand data anomalies that appear in the raw data reports.

2.39.7 Pollutant Quarterly Audit Reports

For each pollutant or group of pollutants listed in section 2.39.3, the auditor should prepare a brief report summarizing his findings using the newly developed Data Audit Form. The data audit form will serve as a QA document and will track any subsequent corrections, edits or additions made to AQS and Envista data. The completed form should be forwarded to the appropriate RCO chemist to be used as a final check of that quarter's data. The form will list each site, describing any data gaps, missing QC and QA checks, critical criteria deviations and suspect data values. The RCO chemist will use the form to pinpoint any sites that may need additional attention, or whose data may need additional review. The RCO chemist will respond to any findings listed in the data audit form, briefly noting any corrections to the data that are required. The RCO chemist will forward the revised data audit form to the data base manager to allow correction of any AQS data necessary. The data base manager will make the necessary corrections in AQS, documenting the date of the changes on the form. The auditor will retrieve the revised form and verify the required changes have been made to the AQS data. To facilitate the smooth flow of information regarding the AQS data, the auditor should maintain a close working relationship with the RCO chemists.



2.39.8 Internet-Based Enterprise Application Management, or IBEAM, and Corrective Measures Tracking

Upon completion of the quarterly data review/ audit for each pollutant, the auditor should preserve the relevant AMP reports and all pollutant data audit forms, in the state's IBEAM system. The system stores the reports in an easily accessible location where data can be retrieved and reviewed by staff and the public. When the data review has discovered problems that require correction, the reviewer must verify that the changes have successfully been completed. This is accomplished by again accessing the AQS data base, and downloading the relevant files again to determine if the required corrections have been made. IBEAM allows multiple revisions of the data to be uploaded, to reflect the changes that occur as a result of the data review process.





SOP Quarterly Review 1_6-8-2020

Final Audit Report

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