

Continuous Monitor QA Plan
Section IV

Headquarters Responsibilities

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A RALEIGH HEADQUARTERS STAFF: DATA REPORTING, VALIDATION, AND QUALITY ASSURANCE

A.1 General Guidance

When the primary data logger has been shown to be obtaining acceptable data, the Headquarters telemetry computer using polling routines will automatically acquire the field data. The actions required by the field staff are to report reasons for missing data: identify invalid data; identify data to be changed by headquarters; validate the data; and document any unusual monitor performance. Also the field staff should back up the secondary (BUDL) data loggers on a diskette twice a month, during routine site visits. Refreshing the backup diskettes at every site visit is preferred. The regions do not send the backup diskettes to Raleigh Headquarters. The regions keep backup diskette data for 18 months minimally. All diskettes should have paper labels, which identify the site, the month of data recorded, and the actual date the backup was created (the date can be omitted when the same diskette is used for a later backup of the same month).

Data Management and Statistical Services Branch (DMSSB) staff may request certain segments of BUDL data be sent to Headquarters for PDL & BUDL comparison. Continuous analyzer data will be stored on the primary data logger and on the BUDL. The Regional Chemist is responsible for assuring that as much hourly data is reported as possible. When the primary data logger does not collect data or the data is invalid for a reason related to the primary data logger, the Regional Chemist should review the backup data logger data and any associated memo flags (i.e. open, chart stamp, and calibration memos) and the data from the BUDL minute data in hours using Electronic Data Acquisition System (E-DAS) software.

Chemists at headquarters review the daily polled data each workday. This reviewer provides feedback and makes inquiries to the appropriate regional operator when data questions arise. This polling usually occurs in the early hours of the morning and the printouts are available for review at the start of the workday.

A.1.1 Hourly data must be reported in Eastern Standard Time. (EST).
EST = Eastern Daylight Time-1hour.

A.1.2 Hourly data are reported at the start of the hour (1:00-1:59 is reported as 1:00).

A.1.3 The field operator must account for periods of missing or invalid data by identifying the reasons for missing or invalid data on an appropriate data form, generally the monthly data review form. Contact the Regional Chemist if this is not the case.

A.1.4 The Regional Chemist signs, dates and submits the monthly data review form to Headquarters. Contact the Regional Chemist if this is not the case.

A.1.5 When data polled from the primary data logger (PDL) is missing or invalid for some reason, such as the PDL failed to meet quality assurance limits, data are reported manually from the backup data logger (BUDL) by the operator using monthly data review reports or the revised AQ 42 form.

A.1.6 The regions should submit monthly data review forms to Headquarters within 10 days from the end of the collection month and must submit them within 15 workdays.

A.1.7 All data, including any supporting documentation, is retained following section A.15 guidelines. Exceptions to this are discussed elsewhere in the SOP (see section A.2.4, daily polled reports).

A.1.8 Completeness - Data are considered complete if 75% or more of the total possible number of observations are present. Continuous measurement criteria for completeness are shown below:

<u>Time Interval</u>	<u>Continuous Minimum Number of Observations</u>
<i>Hour Average</i>	<i>45 minute averages</i>
<i>3-hour Average</i>	<i>3 consecutive hourly observations</i>
<i>8-hour Running Block Average</i>	<i>6 hourly observations of block average</i>
<i>24-hour Average</i>	<i>18 hourly observations</i>
<i>Monthly Average</i>	<i>21- 24 daily averages</i>
<i>Quarterly Average</i>	<i>3 consecutive monthly averages</i>
<i>Yearly Average</i>	<i>9 month average with at least 2 monthly averages per quarter for monitors that run 12 months</i>
<i>Seasonal Average</i>	<i>for monitors that operate less than 12 months, at least 2/3 of the data for each quarter operated during the monitoring season should be available</i>
<i>3 Year Average</i>	<i>90% of the hourly data (ozone only)</i>

A.1.9 Representativeness - Data collected must be representative of the conditions existing at the time of the sample collection. The notes of unusual conditions made by the operator should be considered in validating questionable data. The integrity of the sample delivery system is extremely important in determining the representativeness of the data.

A.1.10 Flagged Data Review

Flags (symbols) are assigned to data to indicate their validity. If no flag follows a value, the datum is assumed accurate and valid. These data are used in calculating all appropriate statistics. Flags that do not invalidate data are as follows:

<u>Flag</u>	<u>Meaning</u>
<	Less than 75% data
H,h	"High-high" or "high" alarm
L,l	"Low-low" or "low" alarm
R	"Rate-of-change" alarm

Flags used to indicate invalid data are as follows:

<u>Flag</u>	<u>Meaning</u>	<u>Priority</u>
P	"Power Failure"	Highest
D	"Disabled"	
B	"Bad status input"	
C	"Calibration"	
T	"out of Control"	
U	"Analog Underrange"	Lowest

Data accumulated under the above conditions will be flagged and considered invalid. If bad data from "D", "B" and "C" indications exceed the threshold level, the average data for that time interval will be so flagged and not used in calculating the next valid larger time interval. The reviewer needs to validate these hours by checking that the backup datalogger values are similar and thus the data appears valid. If one of these flags shows up and there are more than 45 valid minutes, invalidate only the minute data.

Data Flag Definitions

<	Less than 75% required for valid average, shows a power interruption of 15 minutes or more, does not meet requirement for valid average
H,h	high-high or high alarm limit exceeded, main flow and/or auxiliary flow outside limits, numerical value; if average is equal to or exceeds this value
L,l	low-low or low alarm limit exceeded, main flow and/or auxiliary flow outside limits, numerical value; if average is equal to or less than this value
R	rate of change limit exceeded, numerical value; if difference between the previous reading and the current reading is equal to or exceeds this value
P	power failure of > 15 minutes
D	channel disabled (marked offline), maintenance and repairs, includes filter change, precision checks, and audits
B	bad status detected, power to monitor is out for a short time, data logger is still working
C	maintenance and repairs, includes filter change, precision checks, and audits
T	out-of-control tolerance exceeded (calibration data), equipment malfunction

U analog under range, signal is reading below low signal input/output set range (4 – 20Ma), data not included in the averaging

A.2 Daily Continuous Data Polling Procedures for the Ambient Monitoring Network for Headquarters Staff.

1. The Data Management and Statistical Services Branch (DMSSB) staff is responsible for the polling and reporting of all air monitoring data. Any questions of data validity are checked by the Project and Procedures Branch (PPB) Supervisor. The DMSSB staff shall assure that all quality assurance data indicated by this plan, including all forms, are properly retained for future reference (see section A.15 for data retention schedule, items 17367, 34009 and 40547).
2. Daily E-DAS auto-polling of the ambient network starts a few minutes after 4:00 am and continues until it is completed. Paper output is available by 5:30 am or sooner. Electronic documents on the internal web page appear at 5:30 and are refreshed at 7:30 and 9:30 (this takes advantage of auto-polls that occur for other reasons, in case of polling failures during the 4:00 am session).
3. Assigned DMSSB staff will check this report to see that the correct numbers of sites have been polled. If any required sites are not present, the DMSSB staff person will re-poll the site and provide results to the review chemist as soon as possible. DMSSB staff provides the report to the review chemist on a daily workday basis each morning.
4. The PPB Supervisor is responsible for seeing to it that the Regional Chemists report the "Theoretical Value" parameters for the nightly Auto Spans to DMSSB each time a new theoretical value is determined or anytime the theoretical value changes for any monitoring variable.
5. PPB Chemists will initial and date the daily polling hardcopy report received from DMSSB after review and note any comments about items which need to be attended to (e.g., "high temps- region called on this date"). These hardcopy reports will be stored for at least 2 months.
6. The PPB Chemist will review missing or incomplete data using NC QAPP/SOP: "*Section III: Regional Office Responsibilities: E-DAS set-up; Retrieval, Review, Correction and Storage of Data; Report Submission*".

A.3 Automatically Reported Data

A.3.1 On the first work day of each month after updating the E-DAS, the DMSSB staff will create the monthly data review report for each pollutant and site for the previous month. The DMSSB staff will mail the reports to the appropriate field offices for review and update the tracking file to indicate the data has been sent to the reviewer.

A.3.2 The DMSSB staff, upon receiving the monthly data review reports back from the regional offices, will check each form for completeness, correctness, unusual data (such as lower or higher data than typically occurring for that time of day), flagged data, and data that are greater than full scale range of the analyzer or less than 0 ppb. Mark all forms with questionable data with question mark (?) in the upper right hand corner.

A.3.3 DMSSB staff will ensure that reasons for all missing data have been recorded on the monthly data review reports. When reasons are missing, DMSSB staff will contact the field operators to obtain reasons for the missing data.

A.3.4 Forward any unresolvable data questions to the PPB Supervisor for validation. The PPB Supervisor will be responsible for investigating and resolving the questionable data.

A.3.5 When DMSSB receives monthly data review reports showing data requiring editing, DMSSB staff will forward these reports to the PPB Supervisor for agreement. See section A.4 (manually corrected data).

A.3.6 If the data does not require PPB review, DMSSB staff will edit the data file as indicated, by the regions to account for missing data, etc.

A.3.7 DMSSB staff will file all monthly data review reports, Monthly File Reports, and AQ-124 forms by site number in the data management monthly files (see section A.15 for data retention schedule).

A.3.8 DMSSB staff will create EPA submittal files when the monthly data have been entered and edited as described above.

A.3.9 DMSSB staff will submit the EPA submittal files to Air Quality System (AQS), and then LOAD, EDIT, REVIEW / CORRECT and POST the file(s) in AQS according to procedures. All quarterly data must be submitted to EPA within 90 days after the end of that quarter.

A.4 Manually Corrected Data

A.4.1 After receiving a response on questionable data from the PPB Supervisor, the DMSSB staff will key enter the data into the data acquisition system.

A.4.2 The DMSSB staff will verify all manually corrected data are entered completely and correctly in the system by comparing data on printouts to raw data.

A.4.3 The DMSSB staff will file all monthly data review reports and copies of the Monthly File Listings by site number. Follow A.3.2 to complete the data submittal process.

A.4.4 Special evaluations of questionable data may be conducted. These may include, but not be limited to, the following:

- (1) Statistical evaluation to determine if the questionable value is statistically an outlier, (See Appendix of EPA-600/9-76-005)
- (2) A full investigation as to possible causes at the site, including how well the standard operating procedures were followed by those collecting the data,
- (3) Rejection of the value if it is not found to be satisfactory and "identification of the unusual acceptable values",
- (4) Evaluation of unnecessary delay in processing ambient samples, and/or
- (5) Review of primary data system and BUDL data comparisons.

A.5 Site Startup and Shutdown

After initial and final calibrations performed on seasonal or rotational monitors, regions will submit site startup and shutdown forms to headquarters. The forms will be archived with the data and retained for the lifetime of the data (see section A.15 for schedules of data retention).

A.6 Accuracy Audits and Reporting

Accuracy audits for continuous gaseous monitors are performed and reported to Headquarters' by ECB staff using an AQ 121 form. 40 CFR 58 Appendix A requires at least one quarter of the monitors running in a network to be audited each quarter and every monitor to be audited at least once each year.

A.6.1 For the continuous monitors CO and NO_y, the ECB must not perform checks or audits between 6:00 AM and 9:00AM "Local Standard Time". This is an important data collection period. For ozone monitors, the ECB must not perform checks or audits after 11:00 AM "Local Standard Time". The calibrators used for auditing are different than the calibrator used for calibration and spanning. The audit calibrator must be calibrated quarterly (not to exceed 92 days between consecutive calibrations). The auditor must not be the same operator who conducts the routine monitoring, calibrations, and analysis. The audit is conducted before making any monitor or data logger adjustments. The monitor must operate in its normal sampling mode, and the audit gas must pass through the existing particulate filter.

A.6.2 ECB completes the audit, completes the report form, reviews the report and forwards the information to the Section Chief of Ambient Monitoring *within 15 workdays* of conducting the audit.

A.6.3 Within 10 workdays, the Section Chief of Ambient monitoring will review audit report and forward the AQ-121 audit forms to the PPB Supervisor.

A.6.4 The PPB Supervisor will update the tracking report to indicate the AQ 121 has been received from ECB and indicate if the audit is acceptable or if preventive actions need to be taken by the regional office. Under extreme cases, data may need to be further questioned and invalidated if the site operational checks by the operator are found to be unacceptable. For this analysis in general the results are marked as follows:

Accuracy %

Difference	Result	Operator & PPB Supervisor Actions
<15% at all points	Good	No further action needed
>15% Diff < 25% at any points	Fair	Review operation, conduct further checks
>25% at any point	Poor	Conduct further checks to correct problems and determine if the previous data is valid

A.6.5 Once the audit is accepted, the PPB Supervisor will forward the report to the DMSSB Supervisor who will ensure the appropriate site identifiers and audit information is entered into the EPA AQS database.

A.6.6 The DMSSB Supervisor forwards to Ambient Monitoring Section (AMS) Office Administrator who copies and distributes the form to the Regional and Headquarters Chemists within 5 workdays.

A.6.7 The Office Administrator returns forms to DMSSB for filing in AMS central files (see section A.15 for schedules of data retention).

A.6.8 DMSSB staff will also review the completeness and accuracy data collected by the regional staff, Headquarters' staff, and ECB staff. For any incomplete or inaccurate information, DMSSB staff will contact the initiator of the information and request immediate completion or correction.

A.7 Precision Checks and Reporting

Precision checks (audits) are performed and reported to Headquarters' (AQ 98 forms) by the regional staff. 40 CFR 58 Appendix A requires at least one check every two weeks (14 days).

A.7.1 For the continuous monitors CO and NO_y, the operators must not perform manual checks or calibrations between 6:00 AM and 9:00AM "Local Standard Time". This is an important data collection period. For ozone monitors, the operator must not perform manual checks or calibrations after 11:00 AM "Local Standard Time".

A.7.2 The calibrator used for checks is usually the calibrator used for calibration and spanning. The precision checks may be conducted manually or for some parameters automatically. The precision check is conducted before making any monitor or data logger adjustments. The monitor must operate in its normal sampling mode, and the calibration gas must pass through the existing particulate filter.

A.7.3 At the end of the quarter, the operator will complete a precision report form (AQ 98) and forward the form to the regional chemist for further review and submittal to Headquarters. The operator must review the precision findings and take appropriate actions based on the Operator's section for the continuous pollutant. The Regional Chemist must submit the precision forms to central office 10-15 working days after the end of the quarter.

A.7.4 The PPB Supervisor reviews the forms and submits them to DMSSB. The PPB Supervisor follows up with the regions to ensure that the regions submit the precision data. The PPB Supervisor will update the tracking report to indicate the precision data has been received from the regions.

A.7.5 The data technician will enter the appropriate site identifiers and audit information into the EPA AQS database.

A.8 Determination of the Agency Pooled Precision and Accuracy

After monitoring data are sent to AQS, AQS will calculate the agency pooled precision and accuracy. These reports will be generated annually by DMSSB for the Section Chief to complete the Annual Data Certification.

A.9 Interagency Testing

The State of North Carolina will participate in the EPA interagency continuous monitor studies when possible as required by 40 CFR 58.A.2.4. Since EPA conducts the interlaboratory studies, and since instructions (which may vary from test to test) are provided by EPA, no specific procedures will be included in this part. In addition to reporting the results to EPA, an interagency evaluation will be made of the results and corrective actions will be taken when necessary.

A.9.1 The Section Chief or PPB Supervisor will coordinate EPA audits. An evaluation will be made of the results and corrective action taken as necessary. The PPB Supervisor shall initiate any corrective actions and will send results to the regional offices.

A.10 Systems Auditing

A systems audit (qualitative appraisal of the total measurement system) should be conducted at the start-up of a new monitoring system and once per year thereafter.

The State Agency headquarters will evaluate the monitoring activities of each local agency and the state's operations using current state developed forms. Procedures will be checked for methods and equipment; installation of equipment; calibration; zero/span checks; operational checks, frequency of checks; control limits for zero, span, and other checks; maintenance, quality control for episodes; data validation and recording including verification of the data submitted to AQS; and quality control documentation. For the annual audit, EPA will then review the findings of the State Agency. The state will participate in all EPA conducted audits.

A.11 Data Certification

Two levels of reporting are necessary:

- 1) Report certifying the quality of the data to EPA,
- 2) Reports to the Ambient Monitoring Section Chief defining the status and results of the QA Program: for ozone, carbon monoxide, sulfur dioxide and oxides of nitrogen.

A.11.1 The quality assurance reports AMP350 (raw data), AMP246 (precision), AMP247 (accuracy), and the Oracle AS Discovery query completeness report shall be submitted by DMSSB Supervisor to the Section Chief, once all quarterly data and QA records have been entered into AQS for ozone, sulfur dioxide, carbon monoxide and oxides of nitrogen.

A.11.2 The Section Chief reviews these reports to ensure the precision, accuracy and completeness requirements of all the raw data requirements have been met for the quarter.

A.11.3 When the data are complete and correct, DMSSB staff will assist the Section Chief in preparing the quarterly data letter for submittal to EPA.

A.11.4 The Chief will submit to EPA the letter certifying the air quality data for that reporting quarter and indicate the date of the last accomplished AQS update.

A.11.5 The Chief must submit the quarterly data and data assessments within 90 days from the end of the quarter.

A.11.6 Other reports such as results of systems audits, identification of any problems or problem areas, corrective action plans, discussions of internal or interagency quality assurance tests, or the suitability of data for an intended purpose are submitted to the Section Chief as requested.

A.11.7 DMSSB duties include reporting ozone levels to: *AirNow* hourly, Air Quality Index several times a day, MARAMA (Mid-Atlantic Regional Air Management Association) weekly, EPA (Environmental Protection Agency) monthly and DAQ (Division of Air Quality) website at varying intervals.

A.11.8 Annual data certification by Section Chief is due to EPA as required by the 105 Grant.

A.12 Ozone Exceedance Evaluation Report (AQ-124)

The Ambient Monitoring Section reviews the hourly data from each ozone site daily. The maximum 8-hr average ozone concentration is determined for each site. **If the maximum 8-hour average ozone concentration at a site is ≥ 0.085 ppm**, the Regional Chemist will be notified that a potential exceedance has occurred at a site.

The field staff is required to collect, verify, and provide the monitoring data and supportive instrument performance checks for the date or dates that the potential exceedance(s) occurred.

The Regional Staff is required to provide data from the PDL, BUDL, and copies of logbook pages attached to an AQ-124 Exceedance Report. The required information includes:

1. Copy of the immediate previous Calibration (Logbook).
2. Copy of the immediate previous Calibration Check (Logbook).
3. Copy of the immediately previous and following daily auto calibration.
4. 1-Hour average data printout for the entire 24-hour day of the potential exceedance.
5. Complete the AQ-124, keep a copy of the report, and **send the original to DAQ Ambient Monitoring within 3 weeks** of receipt of a request for the Exceedance Report.

These exceedance reports with accompanying data are part of the permanent records maintained by the DAQ for each monitoring site (see section A.15 for schedules of data retention).

Note: Ozone exceedances in NC are generally episodic (2-3 consecutive exceedance days). In many cases, the same Calibration and Calibration Checks will encompass multiple exceedances.

Note: DAQ Ambient Monitoring may request additional checks to help validate any 8-hour average that is ≥ 0.085 ppm. The Regional Staff are required to respond to these requests as soon as possible. Requests may include site visits, on-site calibration checks, or other instrument checks for the reporting site.

A.13 Data Logger Comparison

DMSSB duties include comparison of the primary data downloaded to the DAQ computer and backup data submitted from the regions. Primary data and backup data that are more than ± 0.005 PPM different will be investigated.

-1- Each month a comprehensive subset of continuous monitors is to be selected. One or more monitor days of comparison between the 1-hour primary averages and the computed 1-hour backup datalogger averages (which are acquired as one-minute averages) will be reported and stored in files in the folder:

P:\ambient\pub\RegOffices.nc\ContinuousPrecs\.

-2- It is recommended that monitor-days used for comparison be selected randomly, but subject to the following restrictions.

¶ During ozone season:

- » select at least one ozone monitor-day from every regional office
- » select at least one monitor-day of NO_y, NO, COA, and SO₂ from each region that has one or more sites with this suite of monitors
- » select at least one monitor-day of SO₂ from among the sites that are not UAM sites
- » select at least one monitor-day of NH₃ data from among the available sites

¶ During criteria-CO season:

- » select at least one monitor-day from every criteria CO monitor
- » select at least one monitor-day from every SO₂ monitor
- » select at least one monitor-day from every NH₃ monitor
- » select at least one monitor-day from every NO_y, NO monitor
- » select at least one monitor-day from every O₃ monitor
- » select at least one monitor-day from every COA monitor

¶ Nonrandom selections:

- » Occasionally it is necessary to use the datalogger comparison procedure to *impute* a few 1-hour averages that were not available from the primary datalogger. Cases in which this is done can be substituted for the equivalent random selection if there are at least 12 nonmissing comparison hours included in the analysis.

A.14 Annual Network Review

Each year headquarters will conduct a network review of each of the monitor sites in the network. When the network review forms are received in the headquarters office, they will be reviewed for completeness and accuracy. Then they will be filed in the site documentation records (see section A.15 for schedules of data retention).

A.15 Program Records Retention and Disposition Schedule

The following table describes the retention and disposition of records. Each item number in the table identifies a category of Ambient Monitoring public records defined as an 'item' in the Records Retention and Disposition Schedule on file at the Records Services Branch in the Dept. of Cultural Resources, Division of Archives and History, Archives and Records Section, which administers North Carolina state rules concerning preservation of public information.

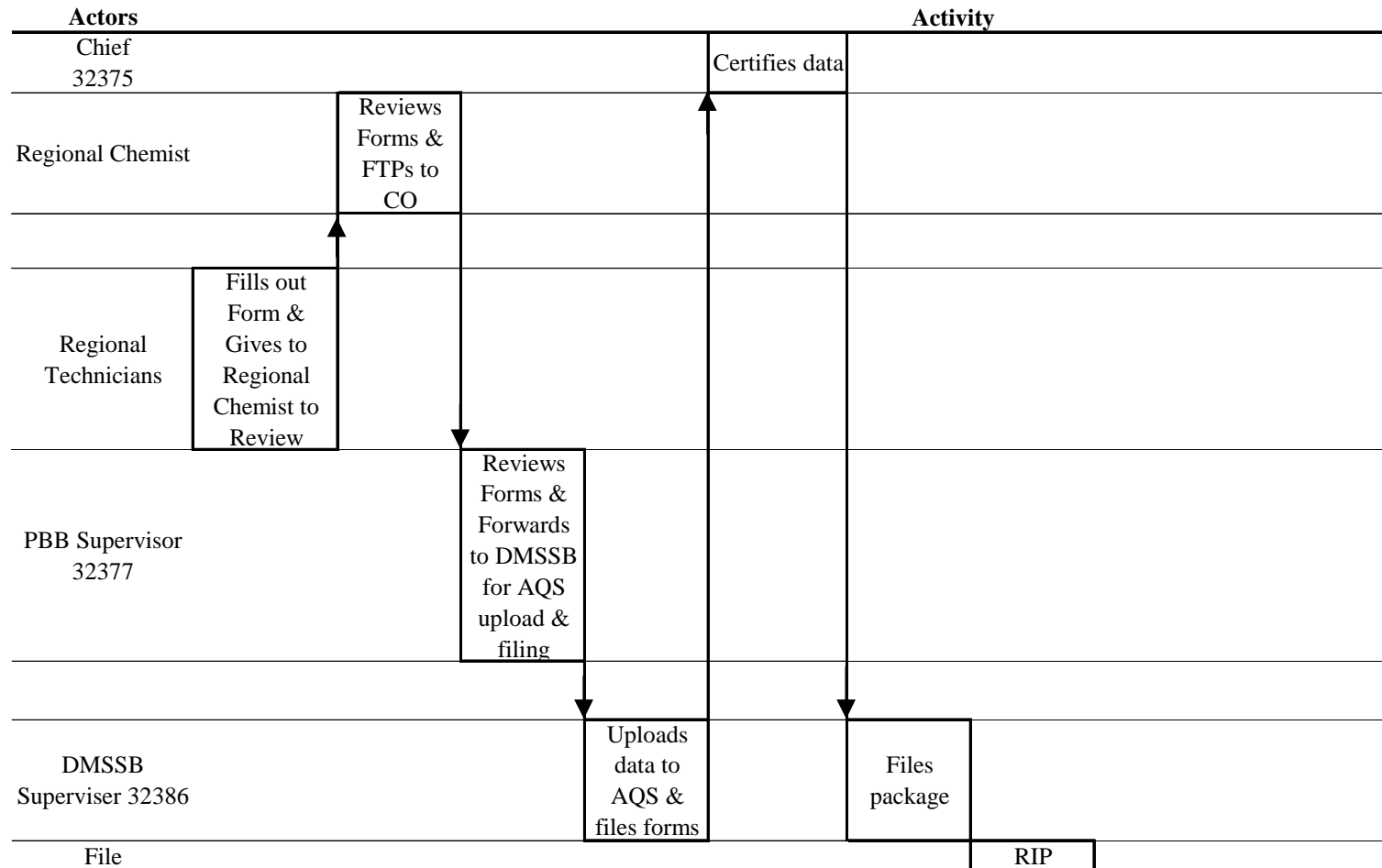
DMSSB items:	Description and Disposal Policy
17361	Ambient Air Network File: destroy in office after 5 years, destroy records currently being held for agency in the State Records Center 5 years from date of record
17367	Monitor files (paper forms): destroy in office after 5 years
34009	Air Quality Particulate and Gaseous Monitoring (printouts) File: destroy in office when administrative value ends
40542	Acid Deposition Database (electronic) File: destroy in office when administrative value ends
40547	Ozone Precursor Hydrocarbon Database (electronic) File: destroy in office after 12 years
PPB items:	
17360	Prevention of Significant Deterioration (PSD) and Self-Monitoring Ambient Monitoring File: transfer to State Records Center after 5 years. After 5 additional years, State Records Center to transfer into custody of state Archives
17365	System Audits File: transfer to State Records Center after 5 years. After 5 additional years, State Records Center to transfer into custody of state Archives
40554	Correspondence (Administrative) File: destroy in office after 3 years

PPB items:	Description and Disposal Policy
40555	Ozone Precursor Hydrocarbon Data File: print electronic records and interfile with related paper files. Destroy in office electronic versions when administrative value ends. Transfer paper records to State Records Center after 5 years. After 5 additional years, State Records Center to transfer into custody of state Archives
40559	Quality Assurance File: destroy in office after 5 years if no litigation, claim, audit or other official action involving the records has been initiated. Otherwise, destroy in office after completion of action and resolution of issues involved
ECB items:	
34010	Certifications File: transfer to State Records Center after 5 years. After 5 additional years, State Records Center to transfer into custody of state Archives
34011	EPA and State Performance Audits File: transfer to State Records Center after 5 years. After 5 additional years, State Records Center into transfer to custody of state Archives
Administration items:	
17366	EPA and State Performance Audits File: transfer to State Records Center after 5 years. After 5 additional years, State Records Center to transfer into custody of state Archives
40540	Section Chief's Reference File: destroy in office after 3 years

A.16 Appendix

This section reserved for further updates as needed.

Precision Continuous Forms (2004)



Time Line	Biweekly throughout quarter	1 week after end of quarter	2 weeks after end of quarter	3 weeks after end of quarter	4 weeks after end of quarter	5 weeks after end of quarter	6 weeks after end of quarter
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