

## 5.0 Documentation and Records

Organizations that perform Environmental Data Operations (EDO) and management activities must establish and maintain procedures for the timely preparation, review, approval, issuance, use, control, revision and maintenance of documents and records. Each organization should have a documented records management policy with the following elements addressed:

1. A list of files considered the official records and their media type i.e., paper, electronic
2. Schedule for retention and disposition of records
3. Storage and retrieval system of records
4. Person(s) responsible at each level of storage and retrieval for records
5. Assignment of appropriate levels of security

This information should be included in a monitoring organization’s Quality Assurance Project Plan. In ambient air monitoring, the majority of the records are data and related information. However, these steps could be used for other records management practices in a monitoring organization. Please refer to Section 14 for further information and the EPA records website<sup>1</sup>

**Table 5-1 Types of Information that Should be Retained Through Document Control.**

Categories	Record/Document Types
Management and Organization	State Implementation Plan Reporting agency information Organizational structure of monitoring program Personnel qualifications and training Quality management plan Document control plan Support contracts
Site Information	Network description Site characterization file Site maps/pictures
Environmental Data Operations	QA Project Plans (QAPPs) Standard operating procedures (SOPs) Field and laboratory notebooks Sample handling/custody records Inspection/maintenance records
Raw Data	Any original data (routine and QC)
Data Reporting	Air quality index report Annual SLAMS air quality information Data/summary reports Journal articles/papers/presentations
Data Management	Data algorithms Data management plans/flowcharts
Quality Assurance	Control charts and strip charts Data quality assessments QA reports System audits Network reviews

A document, from a records management perspective, is a volume that contains information that describes, defines, specifies, reports, certifies, or provides data or results pertaining to environmental programs. As defined in the Federal Records Act of 1950 and the Paperwork Reduction Act of 1995 (now 44 U.S.C. 3101-3107), records are: “...books, papers, maps, photographs, machine readable materials, or other documentary materials, regardless of physical form or characteristics, made or received by an agency of the United States Government under Federal Law or in connection with the transaction of public business and preserved or appropriate for preservation by that agency or its legitimate successor as evidence of the organization, functions, policies, decisions,

<sup>1</sup> <http://www.epa.gov/records/>

procedures, operations, or other activities of the Government or because of the informational value of data in them...". This section will provide guidance of documentation and records for the Ambient Air Quality Monitoring Program.

Table 5-1 represents the categories and types of records and documents that are applicable for document control. Information on key documents in each category follows. It should be noted that the list contains documents that may not be applicable to particular organizations and, therefore, is not meant to be a list of required documentation. This list should also not be construed as the definitive list of record and document types.

### **Electronic Records**

Today, more data are generated and retained electronically in the ambient air monitoring community. The majority of the documentation referred to in this section can be an electronic record. Retention of electronic records<sup>2</sup> is included in the above definition. It is recommended that electronic as well as paper records be stored in a logical order for ease of access should it be necessary. This is discussed more in-depth in Section 14.

### **Statute of Limitations**

As stated in 40 CFR Part 31.42, in general, all information considered as documentation and records should be retained for 3 years from the date the grantee submits its final expenditure report unless otherwise noted in the funding agreement. However, if any litigation, claim, negotiation, audit or other action involving the records has been started before the expiration of the 3-year period, the records must be retained until completion of the action and resolution of all issues that arise from it, or until the end of the regular 3-year period, whichever is later. For clarification purposes, the retention of samples produced as a result of required monitoring may differ depending on the program and/or purpose collected. For example, CFR requires that PM<sub>2.5</sub> filter samples be archived for a minimum of one year. For retention of samples for a specific program please refer to the appropriate reference in CFR for the individual program.

## **5.1 Management and Organization**

How the monitoring organization handles the document types listed in Table 5-1 for this category can be found in a single document, a quality management plan, which is a blueprint for how an organization's quality management objectives will be attained. The Quality Management Plan documents management practices, including QA and QC activities, used to ensure that the results of technical work are of the type and quality needed for their intended use. The EPA Quality Staff provide requirements for quality management plans<sup>3</sup> that monitoring organizations may find helpful.

## **5.2 Site Information**

Site information provides vital data about each monitoring site. Historical site information can help determine and evaluate changes in measurement values at the site. This information should be kept to characterize the site through time. The Air Quality System (AQS) Site File is one record used to capture and retain site information. Another source where site information is provided is the quality assurance

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<sup>2</sup> <http://www.epa.gov/records/tools/erks.htm>

<sup>3</sup> EPA Requirements for Quality Management Plans (QA/R-2) [http://www.epa.gov/quality1/qa\\_docs.html](http://www.epa.gov/quality1/qa_docs.html)

project plan. This should include specific documentation of site characteristics for each monitoring station. This information will assist in providing objective inputs into the evaluation of data gathered at that site.

Most ambient air agencies retain these records in paper and/or electronic file format. Included in a site information file are maps and pictures of an individual site. Because monitoring organizations are required to file an annual network plan and perform network assessments at a minimum of every five years, (40 CFR Part 58.10), this information should be retained and updated periodically by both the agency responsible for the site and/or the office responsible for reviewing the site information as needed for the network assessment process. Typically, the kinds of information found in a site identification record should include:

1. Purpose of measurements (e.g., monitoring to determine compliance with air quality standards).
2. Station type.
3. Instrumentation and methods (manufacturer's model number, pollutant measurement technique, etc.).
4. Sampling system.
5. Spatial scale of the station (site category--i.e., urban/industrial, suburban/commercial, etc.; physical location--i.e., address, AQCR, UTM coordinates, etc.).
6. Influential pollutant sources (point and area sources, proximity, pollutant density, etc.).
7. Topography (hills, valleys, bodies of water, trees; type and size, proximity, orientation, etc., picture of a 360 degree view from the probe of the monitoring site).
8. Atmospheric exposure (unrestricted, interferences, etc.).
9. Site diagram (measurement flowsheet, service lines, equipment configuration, etc.).
10. Site audits.

### **5.3 Environmental Data Operations**

A quality assurance program associated with the collection of ambient air monitoring data must include an effective procedure for preserving the integrity of the data. Ambient air monitoring results and in certain types of measurements, the sample itself, may be essential elements in proving the validity of the data or the decisions made using the data. Data can not be admitted as evidence unless it can be shown that they are representative of the conditions that existed at the time that the data (or sample) was collected. Therefore, each step in the sampling and analysis procedure must be carefully monitored and documented. There are basically four elements in the evidentiary phase of an overall quality assurance program:

1. Data collection - includes measurement preparation and identification of the sample, location, time, and conditions during the measurements in the form of data sheets, logbooks, strip charts, and raw data.
2. Sample and/or measurement result handling - includes evidence that the sample and data were protected from contamination and tampering during transfer between people and from the sampling site to the evidence locker (i.e., chain of custody) and during analysis, transmittal, and storage.
3. Analysis - includes evidence that samples and data were properly stored prior to and after analysis interpretation, and reporting.
4. Preparation and filing of measurement report - includes evidentiary requirements and retention of records.

Failure to include any one of these elements in the collection and analysis of ambient air monitoring data may render the results of the program inadmissible as evidence, or may seriously undermine the credibility of any report based on these data.

Environmental data operations include all the operations required to successfully measure and report a value within the data quality objectives. Documentation for environmental data operations would include:

- **QA Project Plans** - Documents how environmental data operations are planned, implemented, and assessed during the life cycle of a program, project, or task (see below).
- **Standard operating procedures (SOPs)**- Written documents that give detailed instruction on how a monitoring organization will perform daily tasks: field, laboratory and administrative. SOPs are a required element of a QAPP and therefore any EDO must include these (see below).
- **Field and laboratory notebooks**- Any documentation that may provide additional information about the environmental data operation (e.g., calibration notebooks, strip charts, temperature records, site notes, maintenance records etc.) (see below).
- **Sample handling and/or custody records**- Records tracing sample and data handling from the site through analysis, including transportation to facilities, sample storage, and handling between individuals within facilities. (Section 12 provides more information on this activity.)

### **Quality Assurance Project Plan**

As mentioned in the assistance agreement sections of 40 CFR Parts 30.54 (Non-State and Local Gov.) and 31.45 (State and Local Gov.) quality assurance programs must be established. In addition to the grant requirements, 40 CFR Part 58, Appendix A<sup>4</sup> states that each quality assurance program must be described in detail in accordance with the *EPA Requirements for Quality Assurance Project Plans*<sup>5</sup>.

### **Standard Operating Procedures**

In order to perform sampling and analysis operations consistently, standard operating procedures (SOPs) must be written as part of the QAPP. SOPs are written documents that detail the method for an operation, analysis, or action with thoroughly prescribed techniques and steps, and are officially approved as the method for performing certain routine or repetitive tasks. Although not every activity in the field/laboratory needs to be documented, the activities that could potentially cause measurement uncertainties, or significant variance or bias, should be described in an SOP. In general, approval of SOPs occurs during the approval of the QAPP. Individuals with appropriate training and experience with the particular SOPs in the QAPP need to review the SOPs.

SOPs should ensure consistent conformance with organizational practices, serve as training aids, provide ready reference and documentation of proper procedures, reduce work effort, reduce error occurrences in data, and improve data comparability, credibility, and defensibility. They should be sufficiently clear and written in a step-by-step format to be readily understood by a person knowledgeable in the general concept of the procedure.

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<sup>4</sup> <http://www.gpoaccess.gov/cfr/index.html>

<sup>5</sup> [http://www.epa.gov/quality1/qa\\_docs.html](http://www.epa.gov/quality1/qa_docs.html)

Elements that may be included in SOPs which are explained in the guidance document *Guidance for the Preparation of Standard Operating Procedures EPA QA/G-6*<sup>6</sup> are:

1. Scope and Applicability
2. Summary of Method
3. Definitions
4. Health and Safety Warnings
5. Cautions
6. Interferences
7. Personnel Qualifications
8. Equipment and Supplies
9. Procedure (section may include all or part of these sections):
  - a. Instrument or Method Calibration
  - b. Sample Collection
  - c. Sample Handling and Preservation
  - d. Sample Preparation and Analysis
  - e. Troubleshooting
  - f. Data Acquisition, Calculations & Data Reduction
  - g. Computer Hardware & Software (used to manipulate analytical results and report data)
10. Data Management and Records Management Parameters
11. Quality Control/Quality Assurance

Elements that are not needed may be excluded or listed as “NA” (not applicable).

Personnel implementing SOPs may not be involved in the “larger picture” which includes the use of the data and whether or not DQOs are being achieved. Therefore, it’s very important that the SOP covers the objectives of the monitoring program and the importance of following each step in an SOP in order to achieve quality results.

**NOTE:** There may be some incentive to rely on vendor developed methods manuals or to reference analytical methods on internet sites (e.g., TO-15 for NATTS VOCs) as a monitoring organization’s SOP without revision. Although the majority of information in these documents may be appropriate, many times the methods provide more than one option for method implementation and is not specific to the organization implementing the method. Therefore, organizations are encouraged to utilize these methods but edit them to make them specific to the organization.

Many of these operational procedures listed above are included in the EPA reference and equivalent methods, and EPA guidance documents. However, it is the organization’s responsibility to develop its own unique written operational procedures applicable to air quality measurements made by the organization.

SOPs should be written by individuals performing the procedures that are being standardized. SOPs for the Ambient Air Quality Monitoring Program environmental data operations must be included in QAPPs, either by reference or by inclusion of the actual method. If a method is referenced, it should be stated that the method is followed exactly or an addendum that explains changes to the method should be included in the QAPP (see NOTE above). If a modified method will be used for an extended period of time, the

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<sup>6</sup> <http://www.epa.gov/earth1r6/6pd/qa/qadevtools/mod4references/secondaryguidance/g6-final.pdf>

method should be revised to include the changes to appropriate sections. In general, approval of SOPs occurs during the approval of the QAPP. Individuals with appropriate training and experience with the particular SOPs in the QAPP need to review the SOPs.

SOPs should have some level of documented approval by the monitoring organization and be reviewed/approved at some frequency. There should be some level of document control on SOPs so that personnel can quickly determine whether or not they are using the most current method. The document control information on the pages of this Handbook provide a good example. It is suggested that the monitoring organization create a “master” list of the current SOPs it uses and include some document control information to allow users to identify the appropriate SOPs.

#### Field and Laboratory Notebooks--

Recording of some field and laboratory data is necessary for ambient air monitoring. Section 11 provides some details of activities that can be recorded in these notebooks. A standardized format should be utilized to ensure that all necessary information is obtained. The format should be designed to clearly identify the parameters during the measurements, the date and time, location of the measurement station, and operating personnel. This information may determine the credibility of the data and should not be erased or altered. Recording of the data should be legible. If a manual record is kept, any error should be crossed out with a single line, and the correct value recorded above the crossed-out entry.

Electronic recording and storage of data is widely used. Electronic recording of the data allows for flagging and retention of additional information that is pertinent to day to day operations that could otherwise be lost with conventional systems. The same information as listed in the above paragraph should be recorded during routine quality checks. Some monitoring organizations like to electronically produce strip charts of data and/or supporting information. This data can be used to enhance and support the validity of the data.

It is recommended a log book be kept for each instrument in a monitoring organization’s network. The information contained in this log should consist of the above information as well as any calibration, audit, and maintenance work performed on the instrument. This log should follow the instrument from site to site as the instrument may be moved. The date of any movement of the instrument should also be recorded in the log. This log can either be an electronic record or a hardbound book.

Additionally, a site log can be kept documenting maintenance of a specific monitoring site and the auxiliary monitoring equipment located there. Information that could be recorded includes maintenance to station HVAC system, air conditioner cleaning, maintenance to external sample intake pumps, permeation tube changes, sample line replacement or cleaning, and replacement of any equipment associated with the shelter or monitoring system. This log can also be either electronic or a hard bound book. Keeping this log can alert a field technician to upcoming maintenance as well as serve as a tool in determining data quality as necessary.

Do not discard original field records; copies of them are not normally admissible as evidence. For neatness, the field data may be transcribed or copied for incorporation in a final report, but the originals should be kept on file. Since these records may be subpoenaed, it is important that all field notes be legible.

## 5.4 Raw Data

Raw data includes any original factual information from a measurement activity or study recorded in laboratory work sheets, records, memoranda, notes, computer (electronic) files or exact copies thereof and that are necessary for the reconstruction and evaluation of the report of the activity or study. Raw data may include photographs, microfilm or microfiche copies, computer printouts, magnetic media, including dictated observations, and recorded data from automated instruments. For automated information systems, raw data is considered the original observations recorded by the information system that are needed to verify, calculate, or derive data that are or may be reported. Organizations should critically review the Ambient Air Quality Monitoring Program and create a list of what the organization considers raw data and provide a means to store this information in a manner that is readily accessible.

## 5.5 Data Reporting

In addition to samples and field records, the report of the analysis itself may serve as material evidence. Just as the procedures and data leading up to the final report are subject to the rules of evidence, so is the report. Written documents are generally considered as hearsay and are not admissible as evidence without a proper foundation. A proper foundation consists of introducing testimony from all persons having anything to do with the major portions of the measurement and analysis. Thus, the field operator, all persons having custody of the samples and data, and the analyst would be required to lay the foundation for the introduction of the measurement as evidence. This evidence can and should be recorded in the form of initials and notes written in indelible ink at the time of data collection on paper that is kept on file. The proper foundation is laid and available in case the data are questioned. Examples of this include strip charts dated and initialed by operator when visiting the site for routine quality checks and initials on routine paperwork and in logbooks when events are recorded. Electronic records should also allow for a recording of initials or be traceable to the operator performing the work.

To ensure compliance with legal rules, all measurement reports should be filed in a safe place by a custodian having this responsibility. Although the field notes and calculations are not generally included in the summary report, these materials may be required at a future date to bolster the acceptability and credibility of the report as evidence in an enforcement proceeding. Therefore, the full report including all original notes and calculation sheets should be kept in the file. Signed receipts for all samples, strip charts, or other data, should also be filed.

The original of a document is the best evidence; a copy is not normally admissible as evidence. Microfilm, snap-out carbon copies, and similar contemporary business methods of producing copies are acceptable in many jurisdictions if the unavailability of the original is adequately explained and if the copy was made in the ordinary course of business.

In summary, although all original calculations and measurement data need not be included in the final report, they should be kept in the agency's files. It is a good rule to file all reports together in a secure place. Keeping these documents under lock and key will ensure that the author can testify at future court hearings that the report has not been altered.

## 5.6 Data Management

Much of the data collected for the Ambient Air Quality Monitoring Program will be collected through the use of automated systems. These systems must be effectively managed and documented by using a set of guidelines and principles by which adherence will ensure data integrity. Discussions of data management activities and the requirements for documentation can be found in Section 14.

## 5.7 Quality Assurance

Quality assurance information is necessary to document the quality of data. A monitoring organization's plan for all quality assurance activities must be documented in its QAPP. This information should be retained in a manner that it can be associated with the routine data that it represents. QA information includes:

- **Control charts** - Use of control charts is explained in Section 12.
- **Data quality assessments (DQAs)** - These assessments are a statistical and scientific evaluation of the data set to determine the validity and performance of the data collection design and to determine the adequacy of the data set for its intended use. More discussion on DQAs can be found in Section 18.
- **QA Reports** - Reports pertaining to the quality of data are discussed in Sections 3 and 16.
- **Evaluation/Audits** - Assessments of various phases of the environmental data operation are discussed in Section 15.