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## *Quality Management Plan*

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## **1.0 Introduction**

### **1.1 Purpose of Document**

This Quality Management Plan (QMP) describes the quality management system utilized by the Knox County Department of Air Quality Management (KCDQAM). Quality assurance goals, policies, procedures, organizational responsibilities, evaluation and reporting requirements and other attributes of KCDAQM's quality management system are address within this QMP. This data is entered into the Environmental Protection Agency's Air Quality Sub-System (EPA AQS) database.

KCDAQM is responsible for implementing all aspects (quality assurance, data collection, and data processing) of Knox County's Ambient Air Monitoring Program; Stationary Source Permitting and Compliance Program; Open Burning Permitting and Compliance Program; and Asbestos Demolition/renovation Permitting and Compliance Program.

A glossary of technical terms and acronyms used in this document can be found in Appendix A.

### **1.2 Historical Background**

In early 1965, the subject of air pollution in Knox County had garnered sufficient interest that the Technical Society of Knoxville and the Knox Area Health Services Study requested that Knoxville City Government and Knox County Government direct the Metropolitan Planning Commission to file an application with the Division of Air Pollution Control of the U.S. Department of Health, Education and Welfare for a grant to study air pollution in Metropolitan Knoxville. The grant was authorized in June of 1966 and funds were granted to the Metropolitan Planning Commission with the city and county governments matching the grant. A survey of emissions began in July of 1967. Once completed, the survey indicated the need for a local air quality management program.

A federal grant authorized under the Department of Health, Education and Welfare led to the establishment of the Department of Air Pollution Control on June 4, 1968. The State of Tennessee Chapter 37, Private Acts established the department on March 20, 1969 and with the assistance of the Knox Clean Air League, founded in September 1968, the Knox County Air Pollution Control Regulations were adopted on September 22, 1969 and became effective on October 1, 1969. The Air Pollution Control Board (The Board) was also created in the Chapter 37 Private Acts of 1969. The Board is separate from the KCDAQM and acts as the legislative arm with the power to adopt rules and regulations implemented by the KCDAQM.

In October 1971, the State of Tennessee Air Pollution Control Board granted Knox County the first certificate of exemption to operate an air pollution program in Knox County. The Knox County program must be at least as stringent as the program operated by the State of Tennessee, which must in turn be as stringent as the federal program. The State reviews the local Knox County program every two years to determine if it meets all of the requirements to continue operating under the Certificate of Exemption. In 1999, the Department was renamed the Department of Air Quality Management.

The Ambient Air Quality Monitoring Program within the KCDAQM has maintained a QMP and associated standard operation procedures in accordance with 40 CFR Part 58. The KCDAQM QMP was a

supplemental document as the Tennessee Department of Environment & Conservation (TDEC) was the Primary Quality Assurance Organization (PQAO) for Knox County. The KCDAQM adopted the Quality Management Plan developed by TDEC's Division of Air Pollution Control. However, in 2014 the KCDAQM became the PQAO and has since been working to update and revise all the documentation needed for a quality environmental data program. This is the first revision of the QMP after the KCDAQM accepting the role of PQAO.

### **1.3 Quality Assurance Goal**

The foremost goal of the KCDAQM quality management system is to ensure that all environmental monitoring and emissions information generated shall produce data of known and acceptable quality and support, in a scientifically defensible manner, the informational needs and regulatory functions of the KCDAQM to support decisions in the best interest of the health of the people of Knox County.

## 2.0 Quality Assurance Policies

### 2.1 Basic Principles

Quality assurance is a system of management activities designed to ensure that the data produced will be of the type and quality needed and expected by the data user. Quality control defines the procedures implemented to assure that acceptable precision, bias, completeness, representativeness, and comparability are obtained and maintained in the generated data set. Quality control procedures, when properly executed, provide data that meet or exceed the minimally acceptable quality criteria established to assist management in making confident decisions. It is the policy of the KCDAQM to implement a QA program and QC procedures to assure that data of known and acceptable precision, bias, completeness, comparability, and representativeness are collected in all monitoring projects.

Precision, bias, completeness, comparability, and representativeness are the principle Data Quality Indicators (DQI) that provide qualitative and quantitative descriptions used in interpreting the degree of acceptability of data. "Establishing acceptance criteria for these DQIs sets quantitative goals for the quality of data generated in the analytical measurement process. Of the five principal DQIs, precision and bias are the quantitative measures, representativeness and comparability are qualitative, and completeness is a combination of both qualitative and quantitative measures." (US EPA QA/G-5, Appendix D).

Accuracy is a combined metric that represents the closeness of an individual measurement, or the average of a number of measurements, to the true value. Components of accuracy are random error, represented by the metric precision, and systematic error, represented by the metric bias. These error components result from sampling and analytical operations. The specific requirements of these five DQIs are established beforehand, on a project-by-project basis, so that the goals of each project are met. The goal is to locate and eliminate or minimize bias, so the data collected show the true conditions of the area being sampled. This includes consideration of citing criteria, spatial scales, monitoring objectives, climatic change, source configuration, and duration of study.

### 2.2 General KCDAQM Policies

The department relies on environmental monitoring and emissions inventory data to support a multitude of scientific, regulatory and administrative decisions on a local level, as well as provide the information for decisions at the state and federal level. Accordingly, efforts to ensure, document and improve the quality of the data is one of the most important functions of the staff.

The monitoring program is expected to comply with the following general policies:

- (1) The objectives of each air monitoring project shall be clearly delineated during the planning stages of the project. These objectives shall be consistent with the policies and priorities of the department.
- (2) Tolerable levels of data uncertainty shall be identified during the planning stages of each monitoring project.
- (3) Quality assurance and quality control measures shall be integrated into all monitoring projects in the most cost-effective manner possible without hindering the meeting of the QA objectives.

- (4) A quality assurance project plan (QAPP), describing how the activity will achieve the stated objectives and the required level of data reliability, shall be developed by the manager of the monitoring program. This document shall be reviewed and approved by the QA Officer, the Director, and by the region 4 EPA.
- (5) Sample collection, analysis and data management activities shall be subjected to periodic evaluation by supervisory personnel, internal auditors, and EPA technical systems auditors to identify and correct deficiencies and enhance the credibility of each monitoring project.

The permitting and compliance programs are expected to comply with the following general policies:

- (1) Regulatory changes at the state and federal level are incorporated into the KCDAQM regulations in a timely manner.
- (2) All sources that have a regulatory requirement for permitting shall be permitted in order to protect local air quality
- (3) Compliance evaluations and complaint investigations shall be conducted to ensure that sources are in compliance with all Knox County Air Quality Management Regulations (KCAQMR) as adopted by the Air Board.
- (4) Any source in noncompliance with KCAQMR shall be required to conduct corrective actions to return to compliance.

### 3.0 Management and Organization

The KCDAQM is a small local organization and does not have an independent Quality Assurance Department. Many staff perform multiple duties or back up duties within the department. The Ambient Air Monitoring Program generates the monitoring data and provides the quality assurance for the data. The Permitting and Compliance Program generates the emission inventory data, issues permits and conducts compliance evaluations. The KCDAQM has a contract PM2.5 laboratory, Intermountain Laboratories (IML) and a contract TSP/Pb laboratory, Eastern Research Group Laboratory (ERG). Each of the contract laboratories follows an internal QMP and QAPP for the project and provides an initial quality assurance of the data provided. The KCDAQM reviews all data provided by contract laboratories when received and provides a final quality assurance review.

#### 3.1 Organizational Structure

The KCDAQM is composed of a Director, 2 Program Managers, 2 Administrative Staff, 2 Environmental Specialist II, and 7 Environmental Specialist I. Each staff member is responsible for producing quality data. The structure is illustrated in figure 3.1 with the positions which have direct quality assurance responsibilities indicated in green.

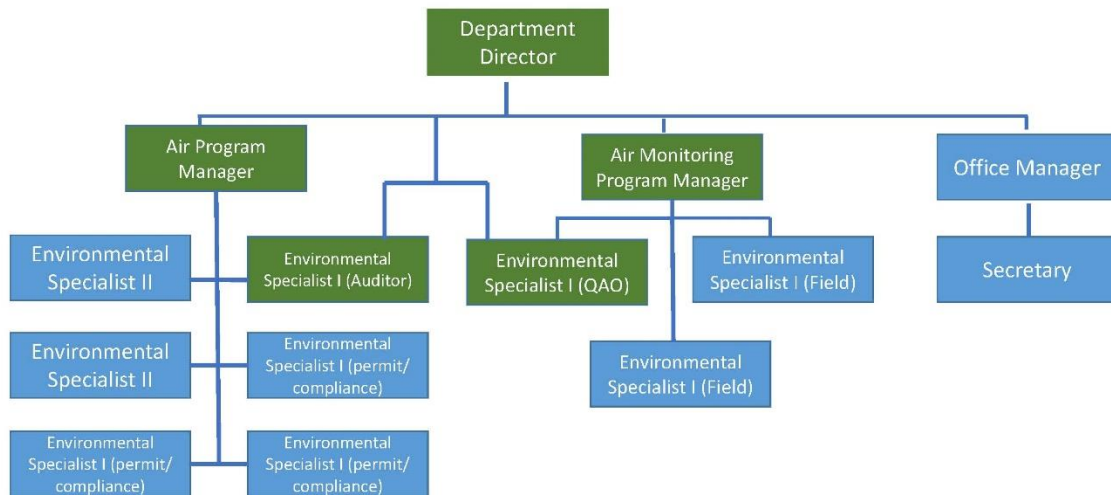


Figure 3.1 – Organizational Chart

#### 3.2 Quality Assurance Functions by position

##### 3.2.1 Agency Director:

- Senior administrative official accountable for quality of all operations performed by KCDAQM staff



- Delegates QA management to Program Managers
- Manages and reviews grants, budgets, proposals, and allocation of resources
- Authorizes purchasing of equipment and issuing contracts necessary for the implementation of programs
- Ensures adequate staffing of KCDAQM
- Working with Air Monitoring Program Manager to resolve issues such as obtaining land use for citing, obtaining building permits and taking action after significant data loss
- Provides final approval of QMP, QAPPs, and SOPs
- Certifies data on an annual basis in accordance with 40 CFR 58.15

#### **3.2.1.1 Office Manager and Secretarial Staff**

- Provides first line of communication between Department and the public
- Issues open burning permits
- Provides secretarial support to all staff
- Provides liaison for the department and other County agencies (Purchasing, Human Resources, etc.)

#### **3.2.2 Air Monitoring Program Manager(AMPM):**

- Ensures the ambient air monitoring network is operated in accordance with the Code of Federal Regulations, Part 40
- Ensures implementation of the Air Monitoring QA program including meeting data quality objectives (DQOs) and reviews, approves and distributes Quality Bulletins
- Reviews, approves and upon Director and EPA concurrence distributes QMP, QAPPs and SOPs
- Conducts final review of environmental and QA data prior to submittal to AQS to ensure the data is precise and accurate.
- Assesses software and hardware needs of monitoring program
- Ensures software and hardware comply with technical system requirements
- Facilitates the resolution to disputes arising from discrepancies in audit findings and QS/QA/QC issues
- Prepares reports for the department
- Supervises corrective actions
- Prepares the data certification for Director review

#### **3.2.2.1 Environmental Specialist I (Quality Assurance Officer)**

- Validates data by reviewing, log books, all QA and QC documentation, and external laboratory QC
- Prepares, reviews and revises quality documents for Air Monitoring Program including QMP, QAPPs, SOPs and Quality Bulletins
- Assesses QA/QC quality by tracking frequency, standard certifications, and adherence to SOPs
- Reviews audits, both internal and external, for standard certifications and data quality
- Discusses internal and external audit results with Air Monitoring Program Manager

- Notifies Air Monitoring Program Manager of QC problems and when large section of data will be invalidated
- Enters validated data and QA/ QC results into AQS

#### **3.2.2.2 Environmental Specialist I (Air Monitoring Field Staff)**

- Operates the monitoring network in accordance with the SOPs and QAPPs
- Maintains the equipment and inventories;
- Collecting, and calculating environmental data;
- Participates in training and certification activities;
- Performs all required QC activities to meet the measurement quality objectives prescribed in the QAPP;
- Documents deviations from established procedures and methods;
- Assesses initial data quality and notifying Quality Assurance Officer of suspect data
- Tests new software and hardware

The Air Monitoring Program Manager, Internal Auditor and the Quality Assurance Officer have direct access to the Agency Director on all matters relating to the quality of air monitoring operations. KCDAQM does not hire contractors or consultants to support the organization's ambient air data collection or operation of equipment.

#### **3.2.3 Air Program Manager:**

- Ensures implementation of the permitting and compliance QA programs including developing, revising and distributing Air Program SOPs and QAPP
- Develops/ revises regulations for Air Board approval
- Prepares and reviews calculation and permitting templates for conformity
- Reviews all compliance evaluation reports
- Reviews developed emission inventory data to verify accuracy for modelling
- Conducts final quality review of permits and emissions inventory data for submittal to EPA
- Conducts annual review of stationary source and compliance data entered into EPA's ICIS-Air database
- Prepares reports for the department

##### **3.2.3.1 Environmental Specialist II**

- Performs the duties of 3.2.3.2 Environmental Specialist I (Permitting/ Compliance Staff)
- Enters stationary source and compliance data into EPA's ICIS-Air Database, as required by EPA's information collection request (ICR) "Air Stationary Source Compliance and Enforcement Information Reporting"
- Prepares emissions inventory data for submittal to EPA, as required by Air Emissions Reporting Rule (AERR)
- Plans/ coordinates the quarterly meeting of the Air Board, prepares meeting minutes and submits regulatory changes to TDEC and EPA for

##### **3.2.3.2 Environmental Specialist I (Permitting/ Compliance Staff)**

- Prepares permits and conducts compliance evaluations of stationary sources
- Calculates emissions from stationary sources
- Reviews source generated data for accuracy and QC (e.g., stack testing reports, emission reports, compliance reports, etc.)
- Conducts complaint investigations (e.g., open burning, source specific, odor, etc.)
- Prepares compliance evaluation reports and submits them to the Air Program Manager
- Recommends corrective actions for noncompliance to Air Program Manager

#### **3.2.3.3 Environmental Specialist I (Internal Auditor)**

- Performs the duties of 3.2.3.2 Environmental Specialist I (Permitting/Compliance Staff)
- Performs the internal audits of the Air Monitoring Program
- Coordinates with the QAO for scheduling
- Reports results to the Director, Air Monitoring Program Manager, and the Quality Assurance Officer

### **3.3 Air Pollution Control Board**

By law, Board members represent one of each of the following:

- a doctor of medicine licensed to practice medicine in the state, nominated by the Knoxville Academy of Medicine;
- an engineer or technically trained person or scientist in an area related to air pollution, nominated by the Technical Society;
- a representative of the industrial interests of the county, nominated by the Chamber of Commerce;
- a member of the faculty or staff of the University of Tennessee who must be a resident of Knox County or the Knoxville Metropolitan area, nominated by the Chancellor of the University of Tennessee;
- a member of the faculty or staff of Pellissippi State Community College, nominated by the Chancellor of the Board of Regents;
- an official or employee of the City of Knoxville, nominated by the Mayor of the City of Knoxville;
- an official or employee of Knox County, nominated by the Mayor of Knox County;
- an official or staff of the Knoxville Area Transportation Planning Organization, nominated by the Chairperson of the Knoxville Area Transportation Planning Organization;
- and a private citizen from the public at large who is not a public official or an employee of the city or county, nominated by the Knox County Commission.

These nominations are then approved by the Knox County Commission. Members hold office for a four-year term or until their successors are appointed. Members are term limited to two four-year terms.

## 4.0 Quality System Description

The KCDAQM quality management system centers around quality documents, quality control procedures, quality assurance program audits, data quality assessments, and corrective actions.

### 4.1 Quality Documents

*Quality Management Plan (QMP)* documents the quality system of KCDAQM inclusive of both the monitoring and permitting staff. It describes the management structure, organization, objectives policies roles and responsibilities and quality management tools utilized to implement all the required components of the quality system. The QMP is prepared and reviewed by the QAO, the APM and the AMPM with final approval and distribution from the Director.

*Quality Assurance Project Plan (QAPP)* is developed to implement QA and QC policies and procedures. The Air Monitoring QAPP is the primary quality document for the Air Monitoring Program. It is reviewed and revised by the QAO and the AMPM. Upon approval of the document by the Director and EPA it is distributed by the AMPM. The Emission Inventory QAPP is the primary quality document for the development of emission inventory data for submittal to EPA. The Emissions Inventory QAPP is reviewed and revised by the APM. Upon approval of the document by the Director and EPA it is distributed by the APM. The QAPPs serve as a reference, set quality benchmarks to achieve, and incorporates standard procedures to be followed. The KCDAQM will adhere to the principles and procedures within the QAPPs. The QAPPs are reviewed and revised every 5 years or sooner if the project objectives change.

*Standard Operating Procedures (SOPs)* are developed and revised by the responsible program manager (or their designee) and reviewed by the Director. SOPs in the Air Monitoring Program are also reviewed by EPA Region 4 to ensure they meet the minimum federal regulation requirements for data acquisition. SOPs are reviewed at minimum every 5 years for revision but should be reviewed and revised whenever significant changes are implemented.

*Quality Bulletins* are developed by the QAO and reviewed by the Air Monitoring Program Manager. Quality Bulletins allow for immediate changes to be made to an SOP during the interim between revisions. Quality Bulletins include: a background discussion on what changes are needed and why, an implementation that describes the changes to be made, and a references section which list any affected documents as well and other references that illustrate the necessity for the change. Finally, the Quality Bulleting includes an instruction on usage section that directs if the document is supplementing an existing document and kept until revised, or a temporary notice with a specific timeframe. Upon approval by the AMPM they are disseminated to the affected staff. Quality Bulletins are a useful tool to ensure that the best practices can be implemented immediately and documents any changes to existing procedures to aid in the revision of SOPs.

*Annual Network Plan (ANP)* is prepared each year according to 40 CFR Part 58 Sub B 58.10(a)(1). The network plan evaluates the monitoring needs of the area, that appropriate siting criteria is met and that the network is adequate to assess the attainment of air quality standards. The ANP is submitted to the State of Tennessee, as part of the Tennessee Annual Network Plan. The Tennessee Division of Environment and Conservation will place the collective ANP on public notice for comments, then submit to EPA Region 4.

## **4.2 Quality Control Procedures**

Quality control checks enable the KCDAQM to review and access the precision and bias of the monitors within the network. The quality control checks are reviewed by the Quality Assurance Officer and entered into the Air Quality System (AQS) national database. QC parameters are established in the QAPP for the project.

## **4.3 Quality Assurance Program Audits**

### **4.3.1 Internal Audits**

Quarterly audits are performed on the air monitoring program by the internal auditor following the procedures in the Technical Systems Audit SOP. These audits include all of the monitors in the network, the filter preparation area, site inspection, logbooks, and review of data entry into AQS. These are submitted to the Director, Air Monitoring Program Manager, and Quality Assurance Officer.

### **4.3.2 External Audits**

The State of Tennessee performs periodic performance audits of the monitors in the network. These audits are provided to the Director and the Air Monitoring Program Manager for review and validation. All audits deemed valid will be entered into the AQS data base.

The USEPA performs a Technical Systems Audit at least every 3 years. These are a thorough review of field activities, data management, staff development, and conformity to QAPP among other things. These are not performance audits but rather documentation and procedural audits.

### **4.3.3 NPAP (National Performance Audit Program) and PEP (Performance Evaluation Program) Audits**

National performance audits are performed by EPA Region 4 for Ozone monitors. The monitors are compared to a mobile lab containing ozone generating equipment. The results are entered into AQS by EPA and a written report is provided to the Air Monitoring Program Manager.

The EPA personnel run a portable particulate monitor collocated to a PM<sub>2.5</sub> or lead monitor and compare the values of a full run day. The results are entered into AQS by EPA and provided to the Air Monitoring Program Manager.

## **4.4 Data Quality Assessments**

At least quarterly the Quality Assurance Officer performs review of the data quality by performing precision and bias calculations, reviewing outliers, generating reports through the AQS database and reviewing all data points for validity and flags. All validation decisions resulting in void data which are not clear are annotated in the void data log.

Annually the Air Monitoring Program Manager reviews all the quarterly data review packages produced by the Quality Assurance Officer, the void data log, and the data submitted to the AQS database for accuracy. Any discrepancies are investigated and annotated.

Emissions inventory data is updated by the Air Program Manager as stationary sources change production levels or emit pollutants not previously emitted. A thorough evaluation of the emissions inventory is conducted every three years before final revisions are approved and uploaded to the NEI.

#### **4.5 Corrective Actions**

In all systems errors can occur, the hallmark of a quality system is that errors are accounted for adequately and corrections are made to limit repeat occurrences. KCDAQM requires corrective actions in both Programs to minimize errors, noncompliance, and exceedances.

##### **4.5.1 Permitting and Compliance Programs**

- **Stationary Source:** Corrective actions are required when a stationary source is found to be in noncompliance with a permit condition or KCDAQMR requirement. These corrective actions may include additional compliance evaluations, additional reporting requirements, certification of compliance, and enforcement actions.
- **Open Burning:** When an open burning violation is found, the Environmental Specialist should attempt to get the fire extinguished by the violator. Dangerous or uncontrolled fires will result in immediate notification of the applicable Fire Department. Enforcement actions may be recommended to the Air Program Manager for noncompliance.
- **Asbestos Demolition/ Renovation:** Corrective actions are required when a violation of the Asbestos NESHAP is discovered. Corrective actions may include halting of the demolition or renovation project, requiring the submittal of a notification, requiring an asbestos survey be conducted by a qualified asbestos inspector, writing a permit, and requiring the removal of asbestos. Enforcement actions are taken when a notification was not submitted and a permit obtained.
- **Emissions Inventory:** If there appears to be incorrect data in the emission inventory, the source will be contacted and any incorrect emissions data corrected. Correct data in the emissions inventory is critical for air dispersion modeling and submittals to EPA.

##### **4.5.2 Air Monitoring Program**

The corrective action procedures for the air monitoring program are discussed in detail in section 11.2 of this document.

## **5.0 Personnel Qualifications and Training**

All KCDAQM employees involved in the collection, handling and analysis of environmental data must possess the minimum level of education, training and experience necessary to meet the demands of their position. These are reflected in the class specifications for the job position or the employee position description.

### **5.1 Personnel Qualifications**

Qualifications of KCDAQM personnel are assured through the requirements and operation of the Knox County Government hiring process. As an example, the environmental specialist position requires: Bachelor's degree in Environmental Science, Science, Engineering, or closely related field; supplemented by two (2) years previous experience and/or training involving environmental or public health compliance or a related area; or any equivalent combination of education, training, and experience which provides the requisite knowledge, skills, and abilities for this position. Must be proficient in Microsoft Office. Must possess and maintain a valid Tennessee Driver's License. If the applicant meets the minimum criteria for the position, their information (copy of application, resume) is forwarded to KCDAQM for review. Interviews will be set up with qualified candidates. During the interview process, the applicants are questioned not only about their technical expertise but also about their organizational, interpersonal & communication skills as well as work habits. References may be contacted for confirmation of work experience.

### **5.2 Training**

Training is assigned by the Director and Program Managers according to the job duties, responsibilities and experience. During the annual review period for staff any deficiencies found will prompt a review of the training effectiveness and need for additional training programs and updates.

#### **5.2.1 New employees training**

New employee training includes at minimum: reviewing of quality documents (SOP's, QAPP, Quality Bulletins, etc.), reviewing of applicable local and federal regulations, and on the job mentoring with experienced staff. Depending on the tasks they perform, they may be required to participate in a 40-hour HAZWOPER training and Visible Emissions Evaluation training. New employees are partnered with senior employees to provide technical training and so that new employees understand their job responsibilities; both the quantity and quality of work to be completed. Additionally, how-to videos for technical and QC/QC functions are available on the shared drive for the air monitoring staff. Program Managers are responsible for notifying new employees of all required training and document completion of training. New staff are evaluated at six and twelve months after initial hire by the appropriate program manager. A plan for achieving performance objectives are included in the employee development portion of the evaluation.

#### **5.2.2 Continuing education training**

Methods employed in the collection and analysis of environmental samples and environmental data are subject to continual review and improvement. Training needs are assessed on a

continual basis by program managers. Training is offered as needed or required to maintain and improve the skills and knowledge of staff. Training is tracked and documented in the annual review. Continuing educational courses offered by vendors, EPA, APTI and Metro 4 are available as funding allows.

Additionally, all employees are actively encouraged to pursue online training opportunities whenever possible. These courses and seminars may be provided as videotapes, closed circuit transmission, and/ or web based real-time interactive formats.

### **5.2.3 Quality Assurance Training**

The Quality Assurance Officer and Air Monitoring Program Manager are expected to complete the following or equivalent EPA training courses: Orientation to Quality Assurance, Data Quality Objectives, Quality Assurance Project Plans, and Data Review and Validation.

The monitoring field staff will follow the specific directions within the Operations Manual supplied by the monitor vendor when servicing or performing QC and/or remedial checks on the monitors. All staff has accessibility to SOPs, operation manuals and technical service contacts and will follow directions as specified in the KCDAQM's EPA approved Standard Operations Procedures. Technical and QA/QC how to videos are available on the shared drive for monitoring staff. These training videos are assigned by the AMPM for staff to view according to their job responsibilities. Additionally, employees are aware of the EPA website <http://www.epa.gov/ttn/amtic/> where QA/QC and technical guidance documents can be obtained. All air monitoring personnel have sufficient training to currently perform necessary functions at an acceptable level.

### **5.3 Annual Review**

All staff within the department are evaluated annually to ensure that they are performing their assigned duties and are working according to the guiding quality documents. Staff performance evaluations are written by the supervising manager and reviewed and approved by the Director. Managers are evaluated by the Director. Staff performance evaluations may include ride-along inspections in order to accurately review the quality of the work performed. Each employee evaluation is performed in accordance with documents and forms provided by Knox County Human Resources. The employee evaluation includes an assessment of job duties, completeness, thoroughness, and timeliness of duties performed. The evaluation process allows management to assess the staff's understanding of procedures and determine future training needs.

### **5.4 Safety and Additional Training**

KCDAQM staff have the potential to encounter hazardous situations. To minimize these risks the KCDAQM in accordance with the Knox County Safety Program utilizes a web-based training module. The county safety officer and the health department training coordinator assign modules to staff according to their Job Hazard and Risk Assessments. These trainings include but are not limited to Hearing Conservation, Hazard Communication and Fire Extinguishers. Additional training such as Slips and Falls, Severe Weather, and Laboratory Safety are assigned by the Director. These training modules are completed annually by staff, and post module testing ensures effectiveness of information dispersal.



The air program staff receive additional training through EPA-APTI, EPA-NETI, Metro 4 and workshops as needed.

## **6.0 Procurement Policy**

The procurement of equipment, supplies and services for environmental operations shall be planned and controlled to ensure that the quality of obtained goods is documented and meets the technical requirements for the project. Procurement of goods shall abide by the procedures described in Procurement Regulations provided by the Knox County Procurement Division.

### **6.1 Procurement of Equipment and Supplies**

When the KCDAQM purchases equipment, the Program Manager investigates the type of equipment needed, the detection limits of the equipment and the accuracy and precision of the equipment required to provide good data. Monitoring equipment must also be approved by the US EPA as an approved method for collection of a particular pollutant. The Program Manager submits a request to the Director based on the price of services. A quote is obtained for product(s)/service(s) if under \$10,000 annually. Three (3) quotes are obtained for product(s)/service(s) if between \$10,001 and \$24,999 annually. A request for bids must be placed if service(s)/product(s) will exceed \$25,000 annually. The Office Manager creates a requisition that must be approved by the Director and submitted to the Knox County Procurement for approval on all quotes. If bidding is required, a bid specification sheet is submitted to Knox County Procurement. The assigned finance department staff member will issue the appropriate paperwork for the equipment. Quality assurance and technical requirements should be clearly indicated in purchase orders or related procurement documents. Program Managers (or their designees) shall ensure that all technical specifications are met before goods are accepted. Any goods found unacceptable either by damage in shipping, or unable to meet the technical specifications of the bid are returned to the vendor. The Program Manager contacts the vendor directly to resolve disputes on unacceptable goods. If the vendor is unable to meet the bid specifications or provide acceptable goods, the Finance Department is notified by the Program Manager in order to remove the vendor from the approved vendor list.

The Director is responsible for submitting grant applications to the US EPA for funding to maintain the KCDAQM's programs. When funds are received, they are placed into KCDAQM'S budget under the supervision of the Knox County Department of Finance. All vendors whom wish to provide services or equipment to KCDAQM must first register as a vendor with the Knox County Department of Finance. When registering with Knox County Department of Finance, potential vendors will be given a set of rules and regulations to which they must adhere.

All gaseous criteria and particulate matter pollutant monitors used in the Air Quality Monitoring Network shall be certified to adhere to EPA equivalent or reference methods. Therefore, they are assumed to be of sufficient quality for data collection operations. However, they may follow an additional qualification process and any issues found will be discussed between the Air Monitoring Program Manager and the product vendor.

### **6.2 Contracted Services**

Contracted services are conducted in accordance with all applicable Federal, State and County laws and regulations at the time of the request. Three types of contracted services exist, national contracts, Knox County contracts and individually procured contracts. For Individually procured contracts, the Office Manager, with the Director's approval, submits a request to Knox County Procurement for the goods

and services required. The Knox County Procurement department advertises, secures and awards the bids for the services requested.

KCDAQM utilizes the services of several support laboratories for analysis of air monitoring data:

- The KCDAQM has a contract with Inter-Mountain Laboratories (IML) to perform analysis of PM<sub>2.5</sub> samples. IML utilizes 40 CFR part 50 and 58 for the preparation and analysis of PM 2.5 samples.
- Eastern Research Group, Inc (ERG) hold the US EPA national contract for the analysis of lead in ambient air. KCDAQM participates in this program. ERG using Inductively Coupled Plasma Mass-Spectroscopy (ICP-MS) as approved by 40 CFR 50 Appendix G manual equivalent method EQL-0512-202. ERG also provides KCDAQM with quality control data generated with every batch of filters analyzed; such as lab blank, lab control, pre-spike and duplicate results.

## 7.0 Computer Technology

### 7.1 Computer Hardware and Software

All purchases of computer hardware are approved by the Knox County Information Technology (IT) Department and abide by the purchasing requirements of the Knox County Procurement Division. IT installs and repairs computer hardware issues. Due to the specific nature of air monitoring software, the IT department may aid in the purchasing and problem support. However, the Program Managers typically act as a liaison with the software vendor and supports department staff with the repair of software issues.

It is the policy of the KCDAQM to provide a computerized data retrieval system with computer hardware available that meets technical requirements and has sufficient capabilities to ensure that data and information produced from or collected by the system, meet applicable EPA information requirements. All computers are password protected.

All data is automatically copied to a shared network drive on the KCDAQM's server. Access to the shared drive folders is controlled, and access levels can be established by the Program Managers. The shared drive is only accessible through password protected system computers. The data files are automatically backed up daily to a separate drive that is accessed through the server but located separately in case the server is damaged.

The following computer information and the use of each software program is documented in specific KCDAQM SOP's to be followed uniformly by the Air Monitoring Program staff in the data processing system.

#### ***Agilaire AirVision***

Ambient Air Monitoring Program central computer is currently operating AirVision software. A software support and upgrade agreement is renewed annually. The continuous ambient air monitoring data network is controlled by a central laboratory computer. This specialized software program was designed exclusively for processing ambient air quality data and to automate data processing events. This program allows the user to:

- (1.) configure the data retrieval process;
- (2.) discriminate data;
- (3.) formulate and construct formats for various air quality data reports; and
- (4.) submit to Air Quality Subsystems (AQS).

The Air Monitoring Program Manager is responsible for setting up the data retrieval tasks, monitoring sites and instrument information, and files for data archiving. Only trained or experienced users of the AirVision software should attempt the above configurations or any reconfiguration of the program. Otherwise, consulting an Agilaire service representative to obtain instructions is advised. The ESC instruction manual (for datalogger) is also recommended as a guide to perform tasks in addition to the ESC service information. Data logger set up and configuration follow the pollutant SOP and QAPP. The data logger has a multiple-level password-protected menu system that allows access based on the password configuration and allowable level of the user. All continuous monitoring air quality data is

stored in permanent files on the shared network drive and is backed up daily on a separate drive located outside of KCDAQM Air Monitoring Laboratory.

### ***Agilaire AV-Trend***

The Agilaire AV-Trend is a commercial computer program that will compile air quality data and the data in a graph-like format or as a continuum of data to simulate a recorder strip chart trace. A site computer is hooked up to the data logger and graphs the minute average data much like a strip chart recorder.

### ***Measurement Technology Laboratories (MTL)***

MTL software is used by KCDAQM to aid in the validation of filter based PM<sub>2.5</sub> data. Data is loaded and the software uses an Access database format to check the data with regulatory requirements. MTL also can create recognizable data files for the AQS database.

## **7.2 Data entry requirements**

Environmental data manually entered into a federal computer database by KCDAQM staff shall be examined and verified by at least one other staff member familiar with the database. All concentration data manually entered is fully reviewed for accuracy and completeness. QA/QC data manually entered in to the database is reviewed thru statistical reports, and random selected samples for accuracy. Any inaccuracies found in the manual entry of data shall result in a full review of all data entered for the time period under review. The percentage and method of review shall be specified in the approved QAPP. Staff transferring data electronically shall perform random spot checks of the transferred data and report any problems to the Program Manager for further investigation and resolution. This shall entail the selection of a representative, randomly selected sample of the data and the documentation and correction of any errors found. The percentage and method of review shall be specified in the approved QAPP.

## **7.3 Verification of Calculations**

Computer based mathematical and statistical programs involving environmental data shall be tested before application and periodically thereafter. Specific attention shall be given to excel and other department created calculation programs. Upon form creation, all calculations are checked and cells locked to prevent introduction of errors. Annually, randomly selected data shall be hand calculated and any discrepancies outside of minor rounding changes shall be noted. Additional details on the calculations, forms and verifications can be found in the pollutant SOP's as well as the QAPP.

## **8. Documents and Records**

KCDAQM shall comply with all applicable local, state and federal requirements for documents and records including the transmittal, distribution, public access, traceability, revision, retention, and preservation of KCDAQM's inter- and intra-agency documents and records. Documents include but are not limited to: QMP, QAPPs, SOPs, quality control forms, inspection forms, quality bulletins, audit reports, permits, notice of violations and calculations.

### **8.1 Responsibility for Documents and Records**

The responsibility for identifying, preparing and managing quality documents and records lies with the program managers. Quality documents are reviewed annually by the program managers to determine if the document still meets the scope and purpose of the objective. The program managers are also responsible for distributing active records to staff. Previous versions of documents are archived when no longer in use. Only designated personnel are granted permission to edit or modify documents. Permits, calculations, maintenance records, logbooks, and other documents are records produced by staff are filed and retained by staff according to the appropriate SOP. Each SOP details document control and process for which each staff member is responsible.

### **8.2 Document Retention Policy**

KCDAQM shall also comply with retention time when such requirements for documents generated under specific environmental programs are stipulated in KCDAQM or federal regulations. Records and documents created or received by KCDAQM are retained for a period of time as specified in the KCDAQM Records Retention Policy (Appendix B). The most stringent retention criteria are always applied. As a general rule, ambient air monitoring data shall be stored for a period of five years, unless any litigation, claim, negotiation, audit, or other action involving the records has been started before the expiration of the five-year period. If this happens, the records will be retained until completion of the action and resolution of all issues that arise from it, or until the end of the regular five-year period, whichever is later.

The program responsible for the document shall maintain in it a digital and/or hardcopy format. If the records or data was originally captured in digital format, it should be archived in digital format, unless a hardcopy of the original record or data is also required by the program QAPP. Program Managers have the responsibility to maintain updated documents and to archive those that are no longer in use. In order to properly manage current and archived documents, two document repositories shall be used on the respective program's shared drive; current documents and archived documents. Additionally, Managers maintain a record providing a timeline indicating when a specific version of a document was in effect. Archived documents shall remain available to staff until scheduled for destruction according to the records retention policy.

KCDAQM does not utilize offsite long-term archiving. All documents retained are held at the office for the program which created or received the document. The air monitoring program staff file all monitoring data, documents, and data support records in a central location within the Air Monitoring Lab. These files are sorted by year and parameter. All electronic records are copied on a shared network drive that is backed up to a drive located outside of the Air Monitoring Lab. The air program staff file all permitting and compliance records in file cabinets located in the KCDAQM main office located in the Knox

County Health Department. These files are sorted by source and file type. All electronic records are copied on a shared network drive that is backed up to a drive located outside of the KCDAQM main office.

Once a year documents outside their retention time are gathered and transferred to the Knox County Records Department for destruction.

### **8.3 Document Tracking**

The document format utilized by KCDAQM for tracking and controlling quality management documents is described below. Each document shall be formatted to include a 3-line index in the header of each page that includes the following information:

- Line 1-: Title of the Document
- Line2: Document Revision Number and Revision Date
- Line 3: Page X of Y

Quality Bulletins are utilized to make minor updates quality documents between official revisions, in order to be timelier implemented. Within the quality bulletin the document to be amended will be clearly notated. Quality Bulletins are indexed as follows:

- Line 1: Number (this is the year of the bulleting, followed by the number of bulletins in that year, for example 2018-05 for the 5<sup>th</sup> quality bulleting issued in 2018)
- Line 2: Issue Date
- Line 3: Page X of Y

## 9. Planning

Unless some form of planning is conducted prior to investing the necessary time and resources to collect data, the data may not meet the specific project needs. All KCDAQM operations involving the generation and analysis of environmental monitoring data shall be systematically planned and documented according to this QMP and the appropriate quality management documents. Reports and assessments are evaluated on an ongoing basis by program managers to help address training needs, corrective actions, and other quality assurance activities. The QAPP shall be reviewed annually for program, procedural and requirement changes. If changes are found the QAPP shall be revised. A formal review of the QAPPs and resubmittal shall occur at least every 5 years even if no changes have occurred. The primary planning documents utilized include the annual budget, the grant agreements with EPA, KCDAQM policies and QAPPs.

### 9.1 Planning Requirements

The planning process for development of QAPPs, special projects, and work force implementation is based upon input from data users, field and laboratory staff, management and other stake holders. The QAPPs constitute formal planning tools for internal and external environmental monitoring programs and projects. QAPP development is based upon established Data Quality Objectives (DQOs). Project managers apply the following regulations and guidelines when developing a project: 40 CFR Part 35 *Quality Assurance for Assistance Agreements*, 2 CFR Part 1500 *Uniform administrative requirements, cost principles and audit requirements for federal awards*, 48 CFR Part 46 *Quality Assurance*, ANSI/ISO Q9001 *American National Standard Quality Management System Requirements*, and EPA QA/G-4 *Guidance on Systematic Planning Using the Data Quality Objectives Process*. This is in addition to the project specific CFR requirements used in establishing the DQOs. For example, the Ambient Air Monitoring Program QAPP also complies with 40 CFR parts 50, 53 and 58. Prior to implementation, each QAPP must be reviewed and approved by the Director and submitted to the EPA. KCDAQM operates under the guidance of the State of Tennessee and the EPA. Any new air monitoring projects, or additions to already existing projects are requested in writing by either of the above-mentioned organizations. KCDAQM's management and field scientists will work under the instruction of the USEPA and/or TDEC to plan and execute any future additional air monitoring projects or expansions.

### 9.2 Data Quality Objectives (DQOs)

The process of establishing DQOs is outlined in EPA's Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II (Jan 2017). The DQO process facilitates the development of clear statements of program objective and constraints that will optimize data collection plans. DQOs define specific parameters, including the type of data to be collected, and the allowable population and measurement uncertainty for a given objective. EPA has established formal DQOs for many of the monitoring programs which are implemented in QAPP development. EPA and KCDAQM established DQOS shall be included in the appropriate quality management documents.

As a local air monitoring program, the KCDAQM is designed to collect data to meet four basic objectives:

1. Provide air data to the general public in a timely manner.
2. Determine compliance with federal and local standards
3. Support emission strategy development
4. Support air pollution research.



These objectives could require different DQOS than that which the EPA established formal DQOs based on program specific quality requirements. As a local air monitoring organization KCDAQM shall develop additional quality objectives for any special purpose monitoring projects or other project that does not have established DOS, or for which no regulatory criteria apply.

## **10. Implementation of Work Processes**

The QAPPs and KCDAQM policies provide staff members with information and directions about completing a project or task but does not provide specific directions for completing each work assignment that is a part of the overall project/task. Consistency in completion of work assignments is important in meeting quality objectives. Defining uniform and standard work processes help achieve data quality goals. The Air Program (permitting and compliance) along with the administrative personnel have written SOPs for each area of work process. A SOP is required for all the monitoring networks at KCDAQM. Networks include: the PM 2.5 FRM network, the Ozone network, the PM 2.5 continuous network, the PM 10 network and the TSP Lead network. Any deviation from the approved procedures shall be communicated to the appropriate program manager. In the Air Monitoring Program significant deviations as established by the AMPM shall be documented on a corrective action report. This occurs even if no additional action must be taken but forms a record of the deviation for quality assurance review.

### **10.1 Standard Operating Procedures Approval and Maintenance Process**

From a fundamental prospective, SOPs provide staff members with step-by-step directions for completing each work activity within a QAPP or a project plan. SOPs limit the variability between individuals and available resources (e.g., equipment, time, etc.). The Program Manager is responsible for ensuring the development of SOPs and directs the staff to produce, verify and test the SOPs. The draft SOP is reviewed and approved by the Program Manger and the Director. Air Monitoring SOPs are then sent, in electronic format, to the Region 4 EPA SESD Management for their review and final approval. When final approval has been met, the approved SOP and all the associated documentation (written correspondence, letters of approval, etc.) become a part of the KCDAQM's library and disbursed to staff by the respective program manager.

Work activities are subject to change with purchase of updated equipment, regulatory changes, analytical methodology changes, new information, etc. The Program Managers are responsible for periodic updates of SOPs within their purview. Immediate changes can be made using Quality Bulletins to alert all staff of necessary change. The formal changes are incorporated through the regular review process.

On a rotating schedule SOPs are reviewed for applicability and accuracy. If no change is necessary the Program Manager will notate the review was completed. When an air monitoring SOP revision is made, the revision must be first approved by the Director and then submitted to the Region 4 EPA SESD for review and final approval.

### **10.2 Distribution and Storage**

Finalized QMP, QAPPS, and SOPS utilized by KCDAQM are available on the shared drive for the covered program. They are distributed to all staff whose work duties are covered by the document and also filed in the KCDAQM on site library either at the main office or air lab. These documents are available in both paper and electronic formats. Previous versions are maintained until at least 5 years after their revision and destroyed according to the records retention policy described in Section 8.0. This is to maintain a document trail for the data produced under those procedures.

KCDAQM does not provide online access to all quality documents to the public. However, they are provided upon request.

## 11. Assessments and Response Actions

Assessments are intended to provide an objective basis for improving the quality of the system. Performing timely and appropriate corrective action in response to an assessment will maintain the integrity of the quality system. Each assessment, regardless of performing agency, produces a report which is presented to the AMPM.

### 11.1 Assessments

The environmental monitoring operations covered by this QMP are subject to internal and external assessments including, but not necessarily limited to:

- Network Reviews
- Technical Systems Audits
- Internal Technical Audits
- Data Quality Assessments
- Data Quality Audits

#### 11.1.1 Annual Network Plan (ANP) and 5-year Assessment

Conformance with network requirements of the Ambient Air Quality Monitoring Network as set forth in 40 CFR Part 58, Appendices D and E are determined through annual network reviews of the ambient air quality monitoring system, as required by 40 CFR Section 58.20(d). This review will be done by the Air Monitoring Program Manager or Quality Assurance Officer and checked by the Air Monitoring Program Manager. The network review is used to determine if a particular air monitoring network is collecting adequate, representative, and useful data in pursuit of its air monitoring objectives. Additionally, the network review may identify possible network modifications to enhance the system or correct deficiencies in attaining network objectives.

Additionally, every 5 years included in the Annual Network Plan, a 5-year assessment is made on the network's representativeness and ability to meet monitoring objectives. This 5-year assessment not only looks at the monitoring network, but also the changes in demographics of the community served, the financial aspects of maintaining stations, and historical significance of data sets. The 5-year assessment is not only an important assessment but also a useful planning tool for evaluating and prioritizing the networks and the objectives.

Upon completion the documents are reviewed internally by the Air Monitoring Program Manager and Director. They are then sent to the State of Tennessee and put on public notice. This usually occurs at the end of April each year. If comments are received they are documented and addressed. After comments are addressed, or if no comments the document is sent to the EPA for review and approval.

#### 11.1.2 Technical Systems Audits

A Technical Systems Audit (TSA) is a thorough and systematic on-site qualitative audit conducted by US EPA Region 4 staff that have been trained to EPA standards and have no vested interest in

Knox County Government. Facilities, equipment, personnel, training procedures, protocols, and record keeping are examined for conformance with the QAPP. A TSA will be performed during the early stage of the project to assist in identifying deficiencies and providing timely corrective actions.

The audit team will prepare a written summary of findings and present those to the Director. TSAs are performed at least every 3 years or as scheduled by the USEPA staff. The AMPM drafts a response to the findings, which includes any needed corrective action, and then shares findings and corrective action plan with appropriate staff.

#### **11.1.3 Internal Technical Audits**

Internal technical audits shall be performed at least twice a year but should be performed quarterly. Performed according to the Audit SOP, the Auditor (see Section 3.2.3.2 for position requirement), who takes no part in generating the day to day data for the Air Monitoring Program, shall with the environmental specialists audit each piece of equipment against a certified transfer standard. See Section 4.3.1 Internal Audits for additional items included in the audit.

The Auditor prepares a report and presents it to the Air Monitoring Program Manager and the Director for review and corrective action. The AMPM discusses any questionable results with the environmental specialist field staff to direct corrective action.

#### **11.1.4 Performance Evaluations**

National performance evaluations are a type of audit in which the quantitative data generated in a measurement system is obtained and implemented at the federal level. Only qualified and authorized personnel, who have no vested interest in KCDAQM execute performance audits. KCDAQM uses EPA contractors through the PEP and NPAP programs. The results are reported directly to AQS.

#### **11.1.5 Data Quality Assessments**

A data quality assessment (DQA) is the statistical analysis of environmental data to determine whether the data meets the DQOs and data collection design; and whether the total error in the data is tolerable. This will be completed by the Quality Assurance Officer and reviewed by the Air Monitoring Program Manager. Calculations for DQA activities shall follow the requirements and equations identified in 40 CFR Part 58, Appendix A, Section 5, and reiterated in Section 14 of the Air Monitoring QAPP. The DQA process is described in detail in the Guidance for the Data Quality Assessment Process, EPA QA/G-9.

### **11.2 Corrective Actions**

Each type of assessment from section 11.1 may result in failures or discrepancies which require corrective action. Additionally, the regular collection, analysis, quality control checks and report generating may also find problems requiring corrective action. In each scenario it is the Air Monitoring Program Manager's responsibility to assess the need for corrective action.

For internal assessments, once deemed necessary, the Air Monitoring Program Manager shall delegate the completion of the corrective action to the appropriate ambient air staff member. The ambient air staff member shall thoroughly document in the logbooks all action taken and complete a corrective action report to be given to the Quality Assurance Officer for inclusion in the quality assurance data review file.

For external assessments, all of the procedures for internal assessments shall be followed, as well as the Air Monitoring Program Manager preparing a written response to the external assessor including corrective actions taken, planned, and timeline for completion. It is the AMPM's responsibility to ensure all corrective actions have been implemented.

The Corrective Action Report is prepared after completion of all corrective action delegated by the AMPM for a particular event. This report is reviewed by the AMPM to ensure corrective action was completed appropriately and reviewed by the QAO to review the quality of data before and after the corrective action was performed.

### **11.3 Dispute Resolution**

In the event that a quality assurance related dispute arises, the Director will review and discuss the identified issue with appropriate staff and management. The Director will recommend corrective action or request clarification from the external auditing agency after a collaborative discussion with management. If the KCDAQM is not able to resolve the issue, the Director and associated personnel will work collaboratively with EPA to address the issue. The goal is to ensure that data generated is legally and scientifically defensible.

## 12.0 Quality Improvements

Previous sections of this document have discussed specific mechanisms for bring about the continual improvement of the quality management system. These mechanisms include, but are not limited to, QA planning, Quality Assessments, employee training, document integrity and corrective action procedures. This section addresses 3 additional mechanisms for ensuring continual improvements in the quality management system: Continuous Quality Improvement Model, review and revision of the QMP itself, and communication of QA concerns and recommendations among staff.

### 12.1 Continuous Quality Improvement (CQI) Model

It is the practice of Program Managers to consistently review the quality assurance practices and assess the validity of those practices. The KCDAQM uses the Continuous Quality Improvement (CQI) model to evaluate and adjust work practices. CQI is the systematic process of identifying, describing and analyzing strengths and problems and then testing, implementing, learning from and revising solutions. CQI process is an ongoing cycle of collecting data and using it to make decisions to gradually improve program processes.

The KCDAQM follows the CQI framework of Plan, Do, Study, Act. This is a cyclical process for developing and implementing change. “Plan” means to collect and analyze data and develop possible solutions. “Do” is to implement one of the proposed solutions. “Study” measures any changes as the result of the proposed solution and “Act” means to adopt the solution as a standard practice or start over.

All KCDAQM staff have received training in the CQI structure, and use this guideline. All CQI projects may not be formally documented at each stage, but each quality improvement implemented is evaluated thru the CQI framework. Formal documentation should be produced and presented to the Director when significant process changes.

The Program Managers “plan” by identifying needs and opportunities for improvement, then “do” by assigning staff to develop procedures, “study” the use of assessments and evaluate if corrective action is needed and finally “act” by either implementing changes, or planning for additional changes.

### 12.2 Quality Management Plan Review

To ensure that the quality management system continues to meet the highest scientific and organization standards and remains consistent with the primary goal established in section 1.3 of this document, the QMP shall be reviewed and updated on a regular basis. The Quality Assurance Officer shall review the QMP annually and formulate any needed revisions. The Quality Assurance Officer will then review applicable QAPPs and SOPs which could be affected and discuss findings with the Program Managers to obtain approval. Minor changes shall be made using a Quality Bulletin to note the approved language and proposed changes. Once the Quality Bulletin is signed by the affected Program Manager and Director, it shall amend the QMP and be attached to the document in the KCDAQM library.

At approximately every 5 years, a thorough review of the QMP will occur by the Quality Assurance Officer and Program Managers. All minor changes made with Quality Bulletins will be formally added to the revision, major changes will be evaluated and approved or denied and the document will be resubmitted to EPA for review and approval. The basis for this requirement, and points to consider

when submitting the 5-year revision are presented in the document EPA Requirements for Quality Management Plans (EPA QA/R-2)

### **12.3 Communication**

The Director, Program Managers, Quality Assurance Officer and Auditor shall meet on an as needed basis to review and discuss quality assurance initiatives, training needs, assessments, corrective actions and other relevant issues to the quality management system. Program Managers shall meet regularly with staff to obtain feedback on QA and QC issues. Often the Director attends these meetings, but if not in attendance any critical information exchanged shall be communicated in writing to the Director by the Program Managers.

In addition to the scheduled meetings considered above, all KCDAQM staff are encouraged to communicate on QA and QC issues and to express any concerns or recommendations to their Program Managers. These recommendations shall be incorporated into the CQI process discussed in 13.1 above. An ongoing exchange of ideas encourages the timely recognition of areas of improvement and is the final piece of a healthy quality management system.

## Appendix A Glossary of Terms

**accuracy** – the extent to which a measured value actually represents the condition being measured. Accuracy is influenced by the degree of random error and systematic error inherent in the measurement operation.

**activity** - an all inclusive term describing a specific set of operations or related tasks to be performed, that in total result in a product or service.

**air pollution** – the presence in the outdoor atmosphere of one or more air contaminants in sufficient quantities and of such characteristics and duration as to be injurious, or tend to be injurious to human health and welfare, plant or animal life, or to property or which unreasonably interferes with the enjoyment of life and property or conduct of business

**APTI** – air pollution training institute

**assessment** – the evaluation process used to measure the performance or effectiveness of a system and its elements.

**audit** – a systematic and independent examination of quality activities and related results are implemented effectively and are suitable to achieve objectives.

**bias** – the systematic or persistent distortion of a measurement process which causes errors in one direction

**Board (or APC Board)** – the Air Pollution Control Board of Knox County

**comparability** – a measure of the confidence with which one item can be compared to another

**completeness** – a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions.

**compliance evaluation** – an evaluation to assess compliance of a source with permit conditions and KCAQMR

**contractor** – any organization or individual hired to perform work or furnish services.

**corrective action** – a measure taken to rectify a condition adverse to quality and if possible, preclude its recurrence

**data quality assessment** – a statistical evaluation of a set of environmental data to determine the adequacy of the data for its intended use.

**deficiency** – an unauthorized deviation from acceptable procedures or practices

**Director** – Director of the Department of Air Quality Management of Knox County.



**document** – any written, pictorial, or electronic that provides information or evidence (noun) , to record something in written photographic or other form (verb)

**emissions** – the release of air contaminants into the outdoor atmosphere.

**environmental data** – the description of a physical medium expressed in terms of some measurable physical or chemical set of characteristics.

**inspection** – examination or measurement of an activity to verify conformance with specific requirements.

**internal assessment** – any quality assessment of the work performed by an individual or group conducted by those overseeing and/or performing the work.

**METRO 4** - a Regional organization representing the 17 local air programs in Region 4

**method** – a body of procedures for performing an activity in a systematic and repeatable manner.

**NETI** – National Enforcement Training Institute

**open burning** – the unconfined burning of combustible material where no equipment has been provided or used for the control of air for combustion.

**organization** – a company, corporation, firm or institution, or part thereof, public or private, that has its own functions and administration.

**peer review** – a critical review of a finding or documented conducted by qualified individuals other than those who produced the finding of document but having equivalent technical expertise.

**performance evaluation** – a type of audit in which the quantitative data generated is obtained independently and compared with routinely obtained data to evaluate the proficiency of a technician, monitor or laboratory.

**precision** – the level of agreement among individual measurements of the same type conducted under identical or similar conditions.

**quality** – the standard of something as measured against other things of a similar kind or the degree of excellence.

**quality assurance (QA)** – an integrated system of management activities involving planning, implementation, assessment, reporting and quality improvement to ensure that a process, item, or service is of the type and quality needed.

**quality assurance project plan (QAPP)** – a formal document that describes in detail the necessary QA, QC and technical activities that must be implemented to ensure that the results of the project satisfy the stated criteria.

**quality control (QC)** – the overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements of the user.

**quality management plan (QMP)** - a formal document that describes a quality management system in terms of the organizational structure, functional responsibilities, and planning, implementation and assessment of work.

**record** - a document or portion thereof furnishing evidence of the quality of an item or activity, verified and authenticated as technically complete and correct. Records may include reports, photographs, drawings, and data stored on electronic, magnetic, optical or other recording media.

**reference method** – a method of monitoring, sampling and analyzing for air contaminants in accordance with title 40 Part 53 of the Code of Federal Regulations.

**representativeness** – a measure of the degree to which data accurately and precisely represent a selected characteristic of a monitored system.

**standard operating procedure (SOP)** – a written, formally approved document that comprehensively and sequentially describes the methods in a routine operation analysis or action

**validation** – the establishment of a conclusion based on detailed evidence or by demonstration. this term is often used in conjunction with data review and represents a final determination on individual data points.

**verification** – the establishment of a conclusion based on detailed evidence or by demonstration. This term is often used in conjunction with comparisons of parameters.

### Acronyms and Abbreviations

**AMPM** – Air Monitoring Program Manager

**ANP** – Annual Network Plan

**APM** – Air Program Manager

**AQS** – Air Quality System database

**CFR** – Code of Federal Regulations

**CQI** – Continuous Quality Improvement

**DQA** – Data Quality Assessment

**DQI** – Data Quality Indicator

**DQO** – Data Quality Objective

**EPA**- United States Environmental Protection Agency

**ERG** – Eastern Research Group Laboratories, Inc

**ES1** – Environmental Specialist 1

**HR** – Human Resources Department

**IML** – Intermountain Laboratories, Inc

**IT** – Information Technology Department

**KCAQMR** – Knox County Air Quality Management Regulations

**KCDAQM** – Knox County Department of Air Quality Management

**NEI** – National Emissions Inventory database

**PCP** – Permitting and Compliance Program

**PQAO** – Primary Quality Assurance Organization

**QA** – Quality Assurance

**QAO** – Quality Assurance Officer

**QAPP** – Quality Assurance Project Plan

**QC** – Quality Control

**QMP** – Quality Management Plan

**SOP** – Standard Operating Procedures

**TDEC** – Tennessee Department of Environment & Conservation

**TSA** – Technical Systems Audit

**Appendix B**  
**Records Retention Policy**

**Knox County Department of Air Quality Management  
Records Retention Policy**

**KCDAQM Records Schedule 101**

**Title:** Permit Records

**Status:** Final

**Description:**

Records pertaining to the permitting of a stationary source of air pollution. These records include permits, permit applications, correspondence, reports and other related documents. These records include information created by the Department, the owners or operators of air contaminant sources, federal agencies, state agencies, local governments and the public.

**Retention Instructions:**

**Item a:** New Source Review (NSR) permit application and associated documents establishing a minor source baseline date

- **Permanent**

**Item b:** All other permit records

- **Disposable**
- Close when source is no longer in operation.
- Destroy 10 years after file closure.

**Guidance:**

**Media neutral** – This schedule allows the disposition of the record copy in any media (media neutral). If the record is created in electronic format or digitized (e.g., imaged) and maintained electronically, the electronic records must be retrievable and usable for as long as required by the applicable retention schedule.

**Sensitive information** – When records are due for destruction according to the retention instructions, records containing sensitive information (e.g., confidential business information) must be shredded or otherwise definitively destroyed to protect confidentiality.

**Multiple record schedules** – In situations where records are covered by more than one record schedule, retain the record for the longest retention period.

**Knox County Department of Air Quality Management Review:** 3/3/2017

**Knox County Law Department Review:** 3/22/2017

**TDEC Division of Air Pollution Control Review:** 3/22/2017

**Public Records Commission Approval:** 10/12/2017

**Knox County Department of Air Quality Management  
Records Retention Policy**

**KCDAQM Records Schedule 201**

**Title:** Compliance Monitoring Activity Records

**Status:** Final

**Description:**

Records pertaining to compliance monitoring activities. These records include correspondence, reports and other related documents. These records include information created by the Department, the owners or operators of air contaminant sources, federal agencies, state agencies, local governments and the public.

**Retention Instructions:**

**Item a:** All compliance monitoring activity records

- **Disposable**
- Close when activity is complete.
- Destroy 10 years after file closure.

**Guidance:**

Media neutral – This schedule allows the disposition of the record copy in any media (media neutral). If the record is created in electronic format or digitized (e.g., imaged) and maintained electronically, the electronic records must be retrievable and usable for as long as required by the applicable retention schedule.

Sensitive information – When records are due for destruction according to the retention instructions, records containing sensitive information (e.g., confidential business information) must be shredded or otherwise definitively destroyed to protect confidentiality.

Multiple record schedules – In situations where records are covered by more than one record schedule, retain the record for the longest retention period.

**Knox County Department of Air Quality Management Review:** 3/3/2017

**Knox County Law Department Review:** 3/22/2017

**TDEC Division of Air Pollution Control Review:** 3/22/2017

**Public Records Commission Approval:** 10/12/2017

**Knox County Department of Air Quality Management  
Records Retention Policy**

**KCDAQM Records Schedule 301**

**Title:** Enforcement Records

**Status:** Final

**Description:**

Records pertaining to the enforcement of Knox County Air Quality Management Regulations. These records include compliance monitoring activities records documenting a violation, notice of violations, correspondence, meeting documents, administrative orders, penalty documentation and other related documents. These records include information created by the Department, the owners or operators of air contaminant sources, federal agencies, state agencies, local governments and the public.

**Retention Instructions:**

**Item a:** All enforcement records

- **Disposable**
- Close when case is complete.
- Destroy 10 years after file closure.

**Guidance:**

**Media neutral** – This schedule allows the disposition of the record copy in any media (media neutral). If the record is created in electronic format or digitized (e.g., imaged) and maintained electronically, the electronic records must be retrievable and usable for as long as required by the applicable retention schedule.

**Sensitive information** – When records are due for destruction according to the retention instructions, records containing sensitive information (e.g., confidential business information) must be shredded or otherwise definitively destroyed to protect confidentiality.

**Multiple record schedules** – In situations where records are covered by more than one record schedule, retain the record for the longest retention period.

**Knox County Department of Air Quality Management Review:** 3/3/2017

**Knox County Law Department Review:** 3/22/2017

**TDEC Division of Air Pollution Control Review:** 3/22/2017

**Public Records Commission Approval:** 10/12/2017

**Knox County Department of Air Quality Management  
 Records Retention Policy**

**KCDAQM Records Schedule 401**

**Status:** Approved

**Title:** Monitoring Records

**Description:**

This schedule covers records of activities related to management of the air monitoring program. These records include but are not limited to site information, QA Project Plans, Standard Operating Procedures, logbooks, exposed filters, quality assurance documents, audits, correspondence and data. These records include information created by the Department, the owners or operators of air contaminant sources, federal agencies, state agencies, local governments and the public.

**Retention Instructions:**

Chart 1 provides the category of record, record type and retention time. The intent of this schedule is to ensure that for all quality assured data collected all associated documents used in the collection and validation of that data are kept as long as the data is kept.

Category	Record Type	Retention time
Operational	Quality Management Plan	Until approved revision + 5 years
	Quality Assurance Project Plans	Until approved revision + 5 years
	Standard Operating Procedures	Until approved revision + 5 years
	Logbooks	5 years
	Chain of Custody	5 years
	TSP & PM10 Exposed Filters	5 years
	PM2.5 exposed filters	5 years, 1 <sup>st</sup> year cold storage
Site Information	Network Plan	Until approved revision + 5 years
	Site Maps, pictures, characterizations	Until revised + 5 years
Data Management	Raw Data	5 years
	Quality Assured Data	5 years
	AQI Reports	5 years
	Summary reports, presentations	3 years
Quality Assurance	Control and strip charts	5 years
	QA reports, Data Quality Assessments	5 years
	System Audits, Internal Audits	5 years
	Reference Standard Certifications	5 years after last valid certification
	Network reviews	Until approved revision + 5 years

Chart 1

**Guidance:**

**Statute of Limitations** – This policy sets asides a minimum of 5 years for all documents. 40 CFR Part 31.42 requires 3 years from the date the grantee submits its final expenditure report. However, if any litigation, claim, negotiation, audit or other action involving the records has been started before the expiration of the 5 year period, the records must be retained until completion of the action and resolution of the issues or until the end of the regular 5 year period whichever is later.

**Media neutral** – This schedule allows the disposition of the record copy in any media (media neutral). If the record is created in electronic format or digitized (e.g., imaged) and maintained electronically, the electronic records must be retrievable and usable for the time period specified in Chart 1.



**Knox County Department of Air Quality Management  
Records Retention Policy**

Sensitive information – When records are due for destruction according to the retention instructions, records containing sensitive information (e.g., confidential business information) must be shredded or otherwise definitively destroyed to protect confidentiality.

Multiple record schedules – In situations where records are covered by more than one record schedule, retain the record for the longest retention period.

**References:**

40 CFR 58.16

40 CFR 31.42

EPA Quality Assurance Handbook for Air Pollution Measurement Systems Vol. 2, Jan 2017

EPA Quality Assurance Guidance Document 2.12 Jan 2016

**Review:**

**Knox County Department of Air Quality Management Review: 8/8/2017**

**Knox County Public Records Board: Approved 10/12/2017**

**Knox County Department of Air Quality Management  
Records Retention Policy**

**Appendix A: Record Type Guidance**

**Knox County Department of Air Quality Management  
Records Retention Policy**

**Permit Records**

The following records are considered permit records:

- Permit application forms
- MACT, GACT, and NSPS plans including initial notifications; notification of compliance; operation and maintenance plans; and startup, shutdown, and malfunction plans
- Correspondence regarding the permitting of a source including additional information requests; permit application completeness determinations; agreement letters; submitted requested additional information; and exempt source determinations
- Conference minutes regarding the permitting of a source
- Potential to emit calculations
- Department NNSR/PSD determinations (netting analysis, BACT, LAER, etc.)
- Statement of Basis
- Records documenting public notice
- Performance test reports (including notification, observations, and correspondences)
- Construction permits
- Operating permits

**Compliance Monitoring Activity Records**

The following records are considered compliance monitoring activity records:

- Inspection reports
- Partial and full compliance evaluation reports
- Complaint investigation reports
- Correspondence regarding the compliance monitoring of a source including consumption requests; record/information requests; and submitted requested records/information
- Conference minutes regarding the compliance monitoring of a source
- Actual emission calculations
- Reports/notification required by an operating permit including NO<sub>x</sub>/VOC emission statements; emission reports; annual compliance certifications; annual/semi-annual compliance reports; annual/semi-annual monitoring reports; notifications of storage tank inspections; and notifications of malfunction excess emission

**Enforcement Records**

The following records are considered enforcement records:

- Documents indicating a violation occurred
- Issued Notice of Violations (NOVs)
- Issued Administrative Order and Assessment of Civil Penalty
- Issued Administrative Order and Consent Agreement
- Signed Consent Agreements
- Correspondences regarding an enforcement action including additional information submitted; conference requests; referrals to Knox County Law Director, Knox County District Attorney and/or EPA; Administrative Order appeals; and Air Pollution Control Board final order or determination
- Documents addressing a requirement of an issued Administrative Order
- Conference minutes regarding an enforcement action
- AO appeal hearing minutes