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Performance Tests Handbook

Maricopa County Air Quality Department
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INTRODUCTION

A performance test is a stack test, also referred to in the U.S. Environmental Protection Agency (EPA) regulations as a performance or source test, or relative accuracy test audit (RATA), that:

- Measures the amount of specific regulated pollutant, pollutants, or surrogates being emitted
- Demonstrates the capture efficiency of a capture system
- Determines the destruction or removal efficiency of a control device used to reduce emissions at permitted sources subject to the Clean Air Act

A performance test demonstrates that a control device or process equipment is properly installed and operated and is in compliance with the emission limits in permit conditions and applicable regulations. Performance tests are conducted in accordance with specific procedures in order to quantify emissions and provide an objective means for determining compliance with established emission limits.

Performance tests are required for a wide variety of industries and equipment. The most common equipment requiring testing includes scrubbers, catalytic or thermal oxidizers, turbines, baghouses, volatile organic compound (VOC) abatement systems, boilers, and flares. Performance test requirements are established in applicable regulations and permit conditions.

In addition to complying with applicable regulations and permit conditions, a performance test ensures that the equipment at a permitted source is functioning properly. Test results may challenge the manufacturer's guarantee providing the opportunity for adjustments that may improve the equipment's operation and efficiency. For combustion devices such as catalytic or thermal oxidizers, boilers and flares, testing ensures proper tuning of the device for efficient operation resulting in lower emissions and fuel usage.

From a technical and legal standpoint, a performance test is often the ultimate determination of compliance. While the test may be manpower and equipment intensive, the results are significant to both the regulatory agency and the permitted source. The results often determine the course of enforcement discussions between the agency and the permitted source. Considering the implication of the results, it is important that the test be performed in a valid representative manner. Additionally, due to the complex nature of the various test methods, regulatory agencies, facilities, performance test companies must ensure each test is an accurate representation of a permitted source's actual emissions.

A permitted source with a Non-Title V permit is generally required to test equipment at least once during the lifetime of a permit, which is typically five years. Testing must occur within 60 days of permit issuance or initial start-up of the equipment but may be extended up to 180 days with approval for good cause. The 180-day deadline applies to compliance demonstrations, which includes test report submittal. For these purposes, a day is a period of 24 consecutive hours beginning at midnight.

A permitted source with a Title V permit is generally required to conduct more frequent testing (e.g., annually). Performance test requirements are established in applicable regulations and within the Title

V permit conditions. However, Maricopa County Air Quality Department (MCAQD) may require additional testing when necessary.

A wide variety of pollutants may be tested during the performance tests (e.g., particulate matter (PM_{2.5} and PM₁₀), VOCs, oxides of nitrogen (NO_x), carbon monoxide (CO), and acids (hydrogen chloride (HCl) and hydrofluoric acid (HF)). The testing requirements vary depending on the process involved.

Any deviation to the sampling or analytical procedures must be described in the performance test protocol and receive MCAQD approval prior to testing. Where federal test methods are not available for the pollutants of concern or the nature of the test site makes their use impractical, other methods may be proposed. Justification which thoroughly explains the applicability of the proposed test for a particular site and pollutant must be provided for alternate test methods. MCAQD approval must be received prior to conducting any alternative test methods.

Adherence to the standardized procedures for sampling and analyses is essential. Unless a deviation to a test method is proposed and approved, MCAQD expects that testing will follow the reference method verbatim. EPA involvement may be required for some deviations.

About This Handbook

The purpose of the Performance Tests Handbook is to provide guidance to facilities and performance test companies in planning and preparing for performance tests, conducting the test, and preparing a complete and accurate test report.

Disclaimer

The contents of the Performance Tests Handbook are not intended to supersede any specific requirements of EPA's test methods. This handbook does not relieve a permitted source or the contracted performance test company from fulfilling their obligations as described by their permit and the applicable county, state, and federal rules and regulations. The Performance Tests Handbook should be utilized as a means to improve the process of planning, conducting, and reporting performance tests.

The user of this handbook should clearly understand that the discussion contained in this document is not binding. This handbook is not intended to serve as an alternative to a rule or regulation.

Updates

This handbook will be updated periodically. If you identify an area that requires clarification, please contact the MCAQD permitting division at AQPermits@maricopa.gov.

Acronyms

A.R.S.	Arizona Revised Statutes
BACT	Best available control technology
CAA	Clean Air Act
cfm	Cubic feet per minute
CFR	United States Code of Federal Regulations
CO	Carbon monoxide
CSV	Comma-separated values
dscf	Dry standard cubic feet
dy/wk	Day per week
ECS	Emission control system
EMC	EPA's Air Emission Measurement Center
EPA	U.S. Environmental Protection Agency
HCl	Hydrogen chloride
HF	Hydrofluoric acid
hr/dy	Hour per day
MDL	Minimum detection limit
NESHAP	National Emission Standards for Hazardous Air Pollutants
NIST	National Institute of Standards and Technology
NO _x	Nitrogen oxides
NSPS	New Source Performance Standards
PM _{2.5}	Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 microns (micrometers)
PM ₁₀	Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 microns (micrometers)
RATA	Relative accuracy test audit
SES	Source Evaluation Society
SIP	State implementation plan
VOC	Volatile organic compound
wk/yr	Week per year

SECTION 1: PERFORMANCE TEST PROCESS

The performance test process includes the following steps. Each of these steps is detailed in this handbook.

1. Identify the requirement(s) for a performance test
2. Define objectives based on permit conditions and applicable regulations
3. Select a performance test company
4. Submit to MCAQD at least 30 days prior to testing a separate performance test protocol for each piece of equipment to be tested, unless otherwise approved by the Control Officer
5. Respond to MCAQD's comments and/or clarifications regarding the performance test protocol
6. Notify MCAQD of the proposed performance test date at least two weeks prior to testing

7. Conduct the performance test
8. Submit a performance test report to MCAQD within 45 days following the completion of the performance test unless otherwise specified in permit conditions or regulations
9. Respond, if necessary, to MCAQD's compliance determination of the performance test report

SECTION 2: PERFORMANCE TEST PLANNING

Performance Test Requirements

Performance tests must be performed in strict accordance with procedures specified in the regulations listed below. In addition, some performance tests must be performed according to EPA's test methods. EPA's test methods are available on EPA's Air Emission Measurement (EMC) website at Epa.gov/emc.

Code of Federal Regulations (CFR), Title 40, Part 60 (Standards of Performance for New Stationary Sources, Appendix A)

If the permitted source is subject to 40 CFR 60, the permitted source must conduct a performance test according to the time frames below and must submit a written report of the results to MCAQD:

- Within 60 days after achieving the capability to operate at the maximum production rate at which the permitted source will be operated, or
- Not later than 180 days after initial start-up (with hyphen) of the permitted source, or
 - For the purposes of this handbook, "start-up" (with hyphen) means the moment a new piece of equipment has reached its capacity to operate at its maximum production rate or the moment an existing piece of equipment is placed back into operation after missing its last scheduled performance test and has reached its capacity to operate at its maximum production rate.
 - For the purposes of this handbook, "startup" (no hyphen) relates to normal operations of equipment.
- At such other times specified by 40 CFR 60, or
- At such other times as may be required by the EPA Administrator under the Clean Air Act, Section 114

CFR, Title 40, Part 61 (National Emission Standards for Hazardous Air Pollutants, Appendix B)

Unless the permitted source obtains a waiver for conducting a performance test under 40 CFR 61, the permitted source must conduct a performance test according to the following time frames:

- Within 90 days after the effective date, for an existing source, or
- Within 90 days after the effective date, for a new source, which has an initial start-up date before the effective date, or
- Within 90 days after initial start-up, for a new source, which has an initial start-up after the effective date

CFR, Title 40, Part 63 (National Emission Standards for Hazardous Air Pollutants for Source Categories, Appendix A)

If the permitted source is subject to 40 CFR 63, the permitted source must conduct a performance test within 180 days of the compliance date for such permitted source.

CFR, Title 40, Part 51 (Requirements for Preparation, Adoption, and Submittal of Implementation Plans), Appendix M (Recommended Test Methods for State Implementation Plans)

Test methods must be included in a state's SIP.

Maricopa County Air Pollution Control Regulations

A performance test is required by the Maricopa County Air Pollution Control Regulations, if the permitted source installs an emission control system (ECS) or installs a control device for particulate matter emissions. A performance test requirement is included in the following Maricopa County Air Pollution Control Regulations: Rules 311, 313, 316, 317, 319, 321, 322, 323, 324, 330, 331, 335, 336, 337, 338, 341, 342, 343, 345, 346, 347, 348, 349, 350, 351, and 358.

Audit Samples

EPA audit samples are required for certain EPA test methods to check the accuracy of the test company's sampling procedures and/or laboratory's analytical procedures.

Please refer to the [EPA's website](#) for details on EPA's Audit Program and the list of EPA test methods requiring an audit sample. If an EPA test method has an audit sample available, then an audit sample must be ordered to be analyzed with the test samples.

Best Available Control Technology (BACT)

If the permitted source has installed BACT to maintain emissions below the major source threshold, the permitted source must conduct a performance test to verify the permitted source's actual emissions and demonstrate compliance or non-compliance with the emission limits.

Control Devices

If the permitted source is using a control device in order to avoid an applicable requirement (e.g., the major source threshold), the permitted source must conduct a performance test.

Performance Test Companies

MCAQD does not have a certification or approval program for performance test companies nor can MCAQD make any recommendations for or against a performance test company. Any performance test company may conduct performance tests in Maricopa County.

However, MCAQD does recommend that performance test companies meet the competency requirements for Qualified Individuals (QIs) or Qualified Source Test Individuals (QSTIs).

The EPA has two programs, the Protocol Gas Verification Program (PGVP) and the Air Emission Testing Body (AETB), that will better ensure the accuracy of calibration gas measurements and the competency of emission stack testers.

Performance test companies that meet the competency requirements of these programs can obtain certifications, such as Qualified Source Test Individuals (QSTIs) or accredited Air Emission Testing Body (AETB) and will consequently have individuals on staff, who will be designated as “qualified individuals”.

Below are tips for selecting a performance test company. View the [Source Evaluation Society's \(SES\) website](#) where a list of performance test companies can be found.

Start the Process Early

Performance testing typically requires a two- to three-month lead-time from determining the requirement for a performance test to actually conducting the performance test. The process includes researching performance test companies, obtaining bids from performance test companies, selecting a performance test company, and allowing the selected performance test company to prepare and submit test protocol(s) at least 30 days prior to the desired test date.

Know What is Required from the Performance Test Company

Review your permit to understand the testing requirements. Determine if consulting work is needed in addition to performance testing. Determine if performance test company has “qualified individuals” on staff.

Verify that the Performance Test Company Can Meet the Time Frame Requirement

A performance test company's offering is inconsequential if the company is unable to meet your testing deadline. Scheduling flexibility is also key to ensure rescheduling does not result in missed test deadlines and violations.

Obtain at Least Two or Three Bids and Ensure Equivalent Bids are Compared

Ensure each bid includes the same components, such as:

- Testing for the same pollutants
- Test runs that are of the same duration
- Scaffolding or lift equipment, if necessary
- Generator services, if available power supply is limited (this is a common challenge)
- Pre-test, if desired
- Consulting services, if desired

Ask for References from Other Sources

Why did they choose one performance test company over another? Was the decision based solely on low bid, customer service, or past experience (good or bad)?

Performance Test Pre-Test Surveys

The permitted source must conduct an initial baseline study of the entire process to establish a baseline data/emission characterization and to ensure the system is properly balanced and is achieving maximum control efficiency.

MCAQD recommends that the permitted source perform an on-site pre-test survey with the performance test company to establish stack dimensions, sample port locations or installation requirements, scaffolding or lift equipment requirements, electrical power requirements, operating conditions, and safety requirements and procedures.

The permitted source should avoid non-scheduled maintenance or changes for two weeks prior to the performance test for system stabilization.

The permitted source should also confirm stack accessibility by removing caps from sample ports or installing the necessary sample ports and verify that all monitoring instrumentation is installed and working properly.

Performance Test Protocol

A performance test protocol is a site-specific test plan that includes information about the permitted source and process(es), a test program summary, the test schedule if available, data quality objectives, and both an internal and external quality assurance (QA) program.

A performance test protocol must be submitted to MCAQD to establish consistency and ensure that proper test methods and procedures are utilized. The performance test protocol must be submitted through the AQD Online Portal using the “Create a Performance Test Protocol” task.

Both the permitted source and the performance test company must identify a representative who will participate in coordinating the test. The permitted source representative must be able to identify all process and control equipment operating parameters needed to establish the system’s operating conditions during testing. Performance testing must not be conducted without an approved performance test protocol as required in the permitted source’s permit conditions. Failure to submit a performance test protocol for review and to receive approval from MCAQD for the protocol will result in the rejection of the test results.

A separate performance test protocol must be submitted for each piece of equipment tested, unless otherwise approved by the Control Officer. The test protocol(s) must be submitted at least 30 days prior to the scheduled performance test date unless otherwise specified in permit conditions or regulations. Any proposed deviations from the test methods must also be included for review and approval. Postponement of the performance test or rejection of the performance test protocol may occur if the permit requirements are not met or if the performance test protocol is incomplete. For compliance determinations, representative normal operating conditions may include a worst-case scenario that will allow the permitted source to demonstrate compliance at all times of operation.

The minimum requirements for a performance test protocol are listed below. This is a general list; the required information will vary depending on the permitted source and the pollutants of interest.

All pages of the performance test protocol must be numbered. The performance test protocol should follow this format, and data should be provided for each item to assure performance test protocol approval. A complete submittal will minimize the possibility of a performance test rejection as a result of improper sampling or data collection methods.

Performance Test Protocol – Minimum Requirements

Cover Information

- Facility ID, permitted source name, mailing address, and physical address of equipment (if different)
- Manufacturer, model number, and site unique identification of equipment tested
- Air quality permit number
- Performance test company name and address

Permitted Source Information

- Permitted source name, mailing address, and physical address of equipment (if different)
- Permitted source contact name, telephone number, email address, and fax number
- Air quality permit number and a copy of the applicable permit conditions

- General description of overall permitted source operations with normal and maximum operating schedules (hr/dy, dy/wk, wk/yr)
- Safety precautions and equipment required on site
- Permitted source access if other than by front lobby

Performance Test Company Information

- Test company name and address
- Test company contact name, telephone number, email address, and fax number
- Laboratory name, address, contact name, telephone number, email address, and fax number

Performance Test Information

- Purpose of performance test, including a list of all applicable regulations and regulatory requirements
- Test schedule, including the proposed date and estimated start time of test (if available)
- Identification of all pollutants to be measured including applicable emission limits and demonstration requirements
- A synopsis of the test methods and analytical procedures to be used, including methods to be performed concurrently
- Documentation and justification of all proposed deviations from the specified sampling procedures
- A description of the sampling equipment to be used including schematic diagrams, if appropriate
- The number and length of sampling runs which will constitute a complete test

Emission Point Information

- Drawing with actual dimensions indicating the exhaust gas flow direction from the process, through the control equipment, and to the emission point
- A dimensioned diagram of the inlet duct and/or stack showing the sampling locations with the distances downstream and upstream from flow disturbances per EPA Method 1
- Cross-sectional sketch of the inlet duct and/or stack at the sampling locations that include the sample port identifications (e.g., A and B), traverse point locations, and port lengths
- Estimated inlet duct and/or stack gas conditions at the sampling locations, such as temperature, moisture content, and volumetric flow rate. Specific test methods may require additional estimated parameters, such as estimated VOC concentration for EPA Method 25A calibration gas selections

Control Equipment Information

- Complete description of the emission control system, including the manufacturer, model number, serial number, rated capacity, rated efficiency, and unique unit identification that corresponds with designations in the AQD Online Portal database
- Control equipment data to be collected during the test to ensure representative operation, who will be responsible for recording the data (permitted source or performance test company), and the frequency of collection
- Acceptable limits of control equipment operating parameters
- Description of any gas conditioning prior to the control equipment
- Description of any adjustments to or maintenance procedures performed on the control equipment for the previous six months including any adjustments or maintenance expected prior to the scheduled performance test date
- Description of any equipment modifications, failures, or malfunctions occurring during the last five years
- Summary of all emissions-related engineering evaluations conducted on the system during the last five years

Process Information

- Complete description of the process operation, including a process flow sheet, if helpful
- Type and quantity of raw and finished materials used in the process
- Description of any cyclical or batch operations which would tend to produce variable emissions with time
- Maximum rated capacity of the process
- Actual maximum achieved capacity of the process
- Target process rate proposed for testing (the process or production rate of the process during testing must be the maximum allowable rate for which the permitted source will be permitted to operate)
- Actual capacity of the process during the previous six-month period
- Normal and maximum process operating schedule (hr/dy, dy/wk, wk/yr)
- Process data to be collected during the test to ensure representative operation, who will be responsible for recording the data (permitted source or performance test company), and the frequency of collection

Quality Control Information

- Copies of all field data sheets to be used during the test

- Chain of custody procedures (e.g., sample container numbering scheme and chain of custody records)
- Field quality assurance/quality control procedures (e.g., field blanks, sample storage and transport methods, and applicable sample holding times)
- Laboratory quality assurance/quality control procedures (e.g., manner and frequency of blanks, spikes, and standards)
- Statement that calibration sheets for the dry gas meter, pitot tube, nozzle, calibration gases, and any other test equipment will be made available prior to the start of testing

Performance Test Protocol Submittal Form

A completed Performance Test Protocol Submittal Form must be submitted to MCAQD along with the performance test protocol through the AQD Online Portal using the “Create a Performance Test Protocol” task.

The Performance Test Protocol Submittal Form is a checklist of the minimum information required in the performance test protocol. This document must contain citations for each section, page numbers in the performance test protocol where the information can be found, and signatures from representatives of both the permitted source and the test company.

Below is a link to the Performance Test Protocol Submittal Form: Maricopa.gov/2313

Confidentiality Claims

Any confidentiality claims must be accompanied by a notice of confidentiality pursuant to A.R.S. §49-487(C), which identifies the information that should be considered confidential and protected from disclosure to the public. The notice of confidentiality must contain sufficient supporting information to allow MCAQD to evaluate whether such information satisfies the requirements related to trade secrets or how the information could cause substantial harm to the permitted source’s competitive edge. MCAQD will not, however, consider any emissions data confidential.

When claiming confidentiality, two copies of the performance test protocol must be submitted; one complete copy that includes the confidential information and a second copy for public record with the confidential information redacted or removed. The confidential performance test protocol should be marked as such on the cover with the pages on which the confidential material can be found identified at the beginning of the protocol. Each page that contains confidential information should also be clearly marked.

When submitting a performance test protocol containing confidential information through the AQD Online Portal using the “Create a Performance Test Protocol” task, the “Trade Secret” attachment type must be used. Both the confidential and the public versions of the document need to be uploaded within the same “Trade Secret” attachment. Use of the “Trade Secret” attachment type will prevent

the confidential information from being added to the public records database. If you need assistance with submitting confidential information through the AQD Online Portal, please call 602-506-7833.

Performance Test Protocol Review

MCAQD will review the performance test protocol to ensure it satisfies the testing requirements in the permitted source's permit and in applicable regulations. The technical review will confirm the use of appropriate test methods, analytical procedures, and sampling strategies. After obtaining any additional information from the permitted source or the performance test company necessary to complete review of the performance test protocol, MCAQD will provide formal notice of approval or disapproval to the permitted source and performance test company.

Modifications or additions to the performance test protocol may be required to ensure that the test results meet the regulatory requirements. Any modifications or additions to the submitted protocol will be addressed in the comments section of MCAQD's performance test protocol review. Any issues or concerns regarding any modification or additions must be resolved prior to the test date.

Performance Test Date Notification

The permitted source must notify the MCAQD performance test supervisor at AQPermits@maricopa.gov of the scheduled performance test date and time at least two weeks prior to the test to allow MCAQD an opportunity to be present. Tests must be conducted during normal business hours, unless MCAQD approves other arrangements. Failure to provide adequate notification could lead to rejection of all test results.

SECTION 3: PERFORMANCE TESTING

Performance test results can have a significant impact on the continued operation of the process; therefore, it is important that the performance test be performed in a valid and representative manner.

Prior to performance testing, the permitted source and/or the performance test company is responsible for ensuring the following:

- Adequate sampling ports
- Safe sampling platforms
- Safe access to the sampling platforms
- Suitable power source for the sampling and testing equipment

Process and control device operating parameters recorded during testing are often compared to future operations at the permitted source. The specific operating parameters required will vary from one permitted source or process type to another. The permitted source is responsible for ensuring that any operating parameters requested by MCAQD are properly documented during the test.

Performance Test Tips

Below are tips for conducting a successful performance test:

Plan and Schedule Performance Tests Early

Scheduling early will allow the permitted source to make the necessary preparations to the production and work schedules to ensure a successful test and avoid unanticipated delays that may result in missed test deadlines and unnecessary violations. Planning early also allows time for the test company to review the permitted source's permit and prepare the test protocol so that it meets all regulatory requirements.

Conduct an On-Site Pre-Test Survey with the Performance Test Company to Determine Test Elements

The survey will identify items such as sample port locations (make sure caps are removable) or the need to install sample ports, scaffolding, lift equipment requirements for stack access, and electrical power requirements (common issue). This will eliminate surprises that may delay testing or lead to rescheduling of testing.

Submit a Separate Test Protocol and Test Report for Each Piece of Equipment to be Tested, Unless Otherwise Approved by the Control Officer

Combining more than one piece of equipment in one performance test protocol or performance test report may lead to confusion (e.g., different testing requirements or different situations at each piece of equipment). Each performance test report should be a separate document that can be used to determine the compliance status of a piece of equipment, unless otherwise approved by the Control Officer.

Refrain from Performing Non-Scheduled Maintenance or Making Changes to the System for at Least Two Weeks Prior to the Performance Test for System Stabilization

Last minute maintenance or changes to a system may cause operational problems that could interfere with testing. With some runtime on a system after maintenance, problems can be discovered and corrected prior to testing. Some examples of last-minute maintenance procedures that have resulted in failed tests include:

- Pressure spraying a scrubber and mist eliminator forcing water into the fan and pressure taps
- Replacing baghouse bags and one becoming unseated
- Improperly replacing a thermal oxidizer burner cone causing a hot spot in the unit
- Replacing catalytic oxidizer catalyst and not having it seated properly
- Not allowing sufficient curing time of refractory work to an incinerator causing the refractory to collapse during testing

Verify in Advance that All Monitoring Instrumentation is Installed and Working Properly

The day of the performance test is no time to find out that instrumentation is missing or inoperable. This will delay testing until the instrumentation is installed and operating properly. Improperly working instrumentation may result in a violation to permit requirements; therefore, instrumentation should be monitored and maintained continuously, not just prior to the performance test.

Confirm Duct and Stack Accessibility in Advance by Removing Caps from Existing Sample Ports

Port caps can become stuck or seized requiring additional time and equipment for removal or installation of new ports. For example, there was an instance where an incinerator stack was lined with refractory after installation of the ports; testing was delayed until the port extension could be cut off, and the refractory could be removed.

Review the Permitted Source's Safety Requirements and Procedures

Ensure everyone is aware of potential hazards associated with the permitted source or process, the appropriate safety precautions are followed, and that proper personal protection equipment is worn.

Conduct a Performance Test Pre-Test to Verify Acceptable Equipment Operation

Some permitted sources prefer to ensure proper tuning and/or operation of equipment prior to the performance test; however, this does increase the cost of the test program. All pre-tests should be conducted prior to the performance test to avoid costly delays or possible rescheduling. If a permitted source with a Title V permit fails a performance test pre-test, the permitted source must report the failure and submit the relevant performance test data to MCAQD pursuant to the reporting requirements of Title V.

Inform All Permitted Source Personnel of the Test Schedule

Informing all permitted source personnel of the performance test schedule will eliminate problems associated with maintenance and production schedules.

Coordinate Performance Testing with Production

Confirm the process will be operating at the proper level and with the proper material to satisfy testing requirements. Also, ensure the production schedule aligns with the performance test schedule. If production has any scheduled or unscheduled downtimes, such as employee breaks, shift changes, product changes, or malfunctions, the test company must be notified immediately.

Maintain Communication Between the Permitted Source and Performance Test Company Throughout Testing

The permitted source contact must be on site and available on test day(s) to verify production, authorize changes that could affect equipment operation or emissions, and answer questions. The performance test company must also be notified immediately of any process malfunctions. For batch operations, the permitted source and performance test company must coordinate start and stop times for each test run.

Determine Who Will Record All Necessary Process and/or Control Equipment Data

Recording all necessary process and/or control equipment data may be conducted by the permitted source, or the performance test company depending on accessibility and manpower and must be determined prior to the start of the test.

When conducting a performance test, attention must be given to collecting the data. The goal is to obtain complete and accurate information at representative operating conditions. It is essential to coordinate testing with production and to maintain communication between the permitted source and performance test company throughout the test.

In addition to the requirements provided in the individual test methods, the following items should be considered when collecting data. Details about each item are provided below.

- Performance test observations
- Traverse point locations
- Cyclonic flow checks
- Number of test runs
- Data documentation
- Timekeeping
- Units of measure
- Calibration gases
- Sample times and volumes
- Sample identification and handling
- Detection limits
- Leak checks
- Records retention

Performance Test Observations

MCAQD attempts to provide a regulatory observer for each performance test. In the event that MCAQD has approved performance testing without a regulatory observer present, any data sheets requested by MCAQD must be submitted to MCAQD within 24 hours of completing each test run.

In the event a change to the performance test procedures is necessary without a regulatory observer present, the test company must contact MCAQD for approval prior to proceeding with the

unapproved methodology. Unapproved modifications to the approved test methods may result in rejection of the test results.

If a regulatory observer from MCAQD is present, tests may only be stopped with MCAQD's approval.

If a regulatory observer from MCAQD is not present, tests may only be stopped for force majeure (i.e., an event that will be or has been caused by circumstances beyond the control of the permitted source, its contractors, or any entity controlled by the permitted source that prevents compliance with the regulatory requirements to conduct performance tests within the specified time frame despite the permitted source's best efforts to fulfill the obligation), which includes acts of nature, acts of war or terrorism, safety hazard beyond the control of the permitted source, forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances beyond the permitted source's control.

Termination of testing without force majeure after the first test run has commenced constitutes a failure of the test.

Traverse Point Locations

The traverse point locations must be determined using EPA Method 1 and must be clearly marked on the probe or pitot tube, which must include the port extension length, when applicable.

Cyclonic Flow Checks

Testing for the absence of cyclonic gas flow must be performed with the process operating in the same manner as it will be operating during the performance test. Such verification must be conducted prior to the performance test and the results must be presented in the performance test report.

Number of Test Runs

In accordance with 40 CFR 60.8 and Maricopa County Air Pollution Control Regulations Rule 270 (Performance Tests):

- Each performance test must consist of three separate test runs and the arithmetic mean of the results of the three runs apply
- In the event that a sample is accidentally lost, or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances beyond the permitted source's control, compliance may, upon MCAQD's approval, be determined using the arithmetic mean of the results of the two other test runs. MCAQD will not allow one test run to be excluded unless at least one of these conditions is met.

Data Documentation

Non-erasable ink must be used to record data. In the event of an error, the data-taker must cross through the erroneous value with a single line, record the correct value above it, and initial the change.

Strip charts and data-logger data must be clearly identified with the date, test start/stop times, parameters being recorded concurrently (with a clear and concise method of identifying each), span values, test run number, and the name of the individual tracking the data. MCAQD's observer may request that photocopies or electronic data be made available prior to leaving the permitted source at the conclusion of the performance test.

Handwritten field data sheets for all wet chemistry reference methods must be included with the performance test report.

Timekeeping

All field data sheets must include the exact start/stop times for each set of data collected.

Units of Measure

Units of measure must be consistent with the test method, with previous information supplied by the permitted source, and as presented in the performance test report.

Calibration Gases

All calibration gases must be prepared in accordance with EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards. If EPA Traceability Protocol gases cannot be obtained due to a lack of National Institute of Standards and Technology (NIST) standards, certified gas standards with an accuracy of ± 2 percent or better must be used.

Gases must be of the proper concentrations according to the test methods and pollutant concentrations being measured. Documentation from the gas supplier must be provided to verify that the certified concentration was valid at the time of testing. Tests conducted with any expired calibration gases must be voided. Alternatively, the expired gases may be re-analyzed and the recertification values must be used. Upon discovery, MCAQD must be notified in writing of any testing that has been performed with expired calibration gases.

Sample Times and Volumes

Unless otherwise specified in test methods, permit conditions, regulations or written approval, each test run must have a minimum sampling time of 60 minutes and a minimum sampling volume of 30 dry standard cubic feet (dscf). Longer sampling times or volumes may be necessary for variable processes where sampling during an entire batch cycle may be necessary or where low concentrations

are expected and a larger sample volume is required to obtain results above the minimum detection limit (MDL).

Sample Identification and Handling

All samples and filters must be labeled and uniquely numbered to ensure positive identification throughout the sampling and analytical procedures. Identification must be provided for each container with the number of the container recorded on the field forms, the chain of custody sheets, and on the analyses data forms.

Chain of custody sheets must be updated any time a sample is transferred from one entity to another; this includes samples taken to an in-house laboratory. Samples with limited hold times or requiring special handling, such as refrigeration, must have this information available on the chain of custody sheet.

Detection Limits

A reasonable attempt must be made to obtain results that are greater than the MDL. There are several ways to potentially increase the pollutant concentration above the- detection limit, including increasing the sample volume, concentrating the sample, and using high-sensitivity analytical techniques. If appropriate steps are not taken, the results that are below the detection limit could be considered unacceptable. If the results for a sample are less than the analytical detection limit, despite reasonable efforts to obtain detectable results, the detection limit must be utilized in the emissions calculations. For reagent blank values less than the analytical detection limit, a value of zero must be used.

Leak Checks

Immediately following every sampling run and prior to any change in sampling train components, a leak check of the entire sampling train must be conducted. Pretest leak checks are recommended but not mandatory.

For isokinetic sampling, the leakage rate at the highest vacuum during the run must not exceed the lesser of 0.02 cubic feet per minute (cfm) or four percent of the average sampling rate. For constant rate sampling, the leakage rate at the highest vacuum during the run must not exceed two percent of the sampling rate. All leak checks must be conducted as specified in the approved test method.

MCAQD may allow correction of the sample volume on a case-by-case basis using the following criteria:

- The reason for the excessive leakage, if known
- The measured leakage rate versus the allowable leakage rate
- The average vacuum during testing versus the average vacuum during the leakage rate determination

- The number of test runs in the series that have leakage rates in excess of the allowable leakage rate

Records Retention

Performance test companies should be aware that the records retention requirement for facilities is a minimum of five years. Consequently, any field notes, laboratory analyses sheets, and original data sheets must also be retained for a minimum of five years.

SECTION 4 – PERFORMANCE TEST REPORTING

Performance Test Reports

A copy of the performance test report(s) must be submitted to MCAQD through the AQD Online Portal, using the “Create a Compliance Report” task, within 45 days following the completion of the performance test unless otherwise specified in permit conditions or regulations. If circumstances prevent report submission within the required time frame, MCAQD approval must be requested as soon as possible and prior to due date. A description of the circumstances will be required for evaluation.

A separate performance test report must be submitted for each piece of equipment tested. In addition to reporting the results, the performance test report must include descriptions of the permitted source, the sampling and analytical methodology used, the process operating conditions, all raw field and lab data, and calculation methods.

Field and lab data must include copies of all original field data sheets (computer generated copies of the field data may be included but not substituted for original hand-written sheets), clearly labeled strip chart records (color copies may be required for clarity), laboratory analyses, calculations, and instrument calibrations.

Non-detect sample results must be reported at the detection limit and this value must be used in emissions calculations. In addition, all data logger data must be submitted as an electronic attachment to the test report in an Excel file. However, with the approval of MCAQD, other tabulated datasets such as comma-separated values (CSV) files may be submitted.

The performance test report is a separate document and may repeat information supplied in the permit application. However, the performance test report will serve as evidence to both MCAQD and the permitted source of a demonstration of the compliance status of the permitted source. Therefore, completeness is important with respect to content and quality. Presentation in an understandable and organized manner will lend credibility to the report.

The minimum requirements for a performance test report are listed below. This is a general list; the required information will vary depending on the permitted source and the pollutants of interest.

All pages of the performance test report must be numbered. The performance test report should follow this format and data should be provided for each item to assure performance test report approval. A complete submittal will minimize the possibility of a performance test rejection due to insufficient data. A permitted source's obligation has not been fulfilled until a complete performance test report has been received. However, a compliance determination will not be made until the performance test report has been thoroughly reviewed.

Performance Test Report – Minimum Requirements

Cover Information

- Facility ID, permitted source name, mailing address, and physical address of equipment (if different)
- Manufacturer, model number, and site unique identification of equipment tested
- Air quality permit number
- Test date
- Test company name and address

Test Information

- Purpose of test
- Type of process and control equipment
- Type of pollutants sampled
- List of all applicable regulations and regulatory requirements
- Test date(s)
- Name, title, phone number, and email address for each performance test participant (i.e., permitted source representative, test company members, consultants, and regulatory observers)
- Site/permit contact(s) (if different from performance test participants), title, phone number, and email address

Summary of Results

- Detailed tabulation of results, including process operating conditions and inlet duct and/or stack gas conditions
- Discussion of significance of results relative to applicable limits and demonstration requirements
- Discussion of all deviations from normal sampling procedures or operating conditions that occurred
- Documentation of all process or control equipment upset conditions that occurred during the testing
- Results of all audit sample analyses required, if applicable

- Description of all changes made in the process or control device since the last performance test, if applicable

Process and Control Equipment Information

- Complete description of the emission control system, including the manufacturer, model number, rated capacity, rated efficiency, and unit identification number
- Complete description of the process operation, including a process flow sheet, if helpful
- Actual process rate during the test
- Description of any adjustments to or maintenance procedures performed on the control equipment six months prior to testing

Sampling and Analytical Procedures

- Brief description of test methods utilized
- Brief description of analytical procedures
- Description of any procedures that deviated from the specified procedures

Appendices

- Complete test results with one complete set of sample calculations for each test method or pollutant using test data
- Electronic copy of all gas analyzers data logger data in one-minute averages (to include initial linearity check values, all recalibrations during test, and all invalid test runs through the final analyzer check)
- Copies of all handwritten field data sheets
- Copies of all laboratory data including quality assurance/quality control (e.g., blanks, spikes, and standards)
- Copies of all chain of custody forms verifying the integrity of the samples
- Copies of all test equipment calibration sheets for the dry gas meter, orifice meter, pitot tube, nozzle, and any other test equipment utilized
- Calibration gas certification sheets for each calibration gas used
- Process and control equipment data

Performance Test Report Submittal Form

A completed Performance Test Report Submittal Form must be submitted to MCAQD along with each performance test report through the AQD Online Portal using the “Create a Compliance Report” task.

The Performance Test Report Submittal Form is a checklist of the minimum information required in a performance test report. The document must contain citations for each section, page numbers in

the performance test report where the information can be found, and signatures from representatives of both the permitted source and the performance test company.

A complete and accurate checklist will help ensure submittal of a complete performance test report. Please note these are minimum requirements and there may be instances where additional information is required in the performance test report due to the nature of the test. The Performance Test Submittal Form can be found at Maricopa.gov/2313.

Confidentiality Claims

Pursuant to A.R.S. § 49-487(C), any confidentiality claims must be accompanied by a notice of confidentiality that precisely identifies the information that should be considered confidential and protected from disclosure to the public. The notice must contain sufficient supporting information to allow MCAQD to evaluate whether such information satisfies the requirements related to trade secrets or how the information could cause substantial harm to the permitted source's competitive edge. MCAQD will not, however, consider any emissions data confidential.

When claiming confidentiality, two copies of the performance test report must be submitted: one complete copy that includes the confidential information and a second copy for public record with the confidential information redacted or removed. The confidential performance test report should be marked as such on the cover with the pages on which the confidential material can be found identified at the beginning of the report. Each page that contains confidential information should also be clearly marked.

When submitting a performance test report containing confidential information through the AQD Online Portal using the "Create a Compliance Report" task, the "Trade Secret" attachment type must be used. Both the confidential and the public versions of the document need to be uploaded within the same "Trade Secret" attachment. Use of the "Trade Secret" attachment type will prevent the confidential information from being added to the public records database. If you need assistance with submitting confidential information through the AQD Online Portal, please call 602-506-7833.

Performance Test Report Review

Initially, MCAQD will perform a cursory review of the performance test report to determine if the report contains all the required components.

If the report is incomplete, MCAQD will notify the permitted source and performance test company of the deficiencies in the test report, the items needed to complete the performance test report review, and a due date for the requested items.

After MCAQD determines that the report contains all the required components, MCAQD will perform a detailed, technical review of the performance test report, including verification of all calculations. Once the review is complete, MCAQD will provide formal notice of approval or disapproval to the permitted source and performance test company and will address any non-compliant test results according to established procedures.

APPENDIX A: COMMONLY USED TERMS AND MEANINGS

Commonly Used Terms and Meanings: For the purposes of this handbook, the following definitions apply. If the document referenced for these definitions is revised, the most recently revised document for these definitions applies. Please see the [Acronyms](#) section of the handbook for the full name of abbreviated terms.

Term	Meaning
BACT	<p>An emission limitation, based on the maximum degree of reduction for each pollutant, subject to regulation under the Clean Air Act, which would be emitted from any proposed stationary source or modification, which MCAQD, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combination techniques for control of such pollutant.</p> <ol style="list-style-type: none"> 1. Under no circumstances shall BACT be determined to be less stringent than the emission control required by an applicable provision of the Maricopa County Air Pollution Control Regulations or of any State or Federal laws, which include the EPA-approved SIP. 2. If MCAQD determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice, or operation, and shall provide for compliance by means which achieve equivalent status. <p>[Maricopa County Air Pollution Control Regulations Rule 100-General Provisions and Definitions]</p>
CEMS	<p>The total equipment required to sample and analyze emissions or process parameters such as opacity, nitrogen oxide, and oxygen or carbon dioxide, and to provide a permanent data record.</p>