

Stack Sampling

Introduction to Stack Sampling	2
Test Methods	2
When Stack Testing is Required	3
Stack Tests Conducted by the Owner/Operator	3
General Policy	4
Test Plan Reviews	4
AQD Procedures for Test Plan Review	5
Test Plan Submittal	5
Emission Test Reporting	6
AQD Procedures for Test Report Review	8
Stack Tests Conducted by the Air Quality Division	8
General Policy	9
References	9
Appendix A. USEPA Test Methods from 40 CFR Part 51	10
Appendix B. USEPA Test Methods from 40 CFR Part 60	11
Appendix C. USEPA Test Methods from 40 CFR Part 61	14
Appendix D. USEPA Test Methods from 40 CFR Part 63	15

Stack Sampling

Introduction to Stack Sampling

From a technical and legal standpoint, the emission test is often the ultimate determination of compliance. While the test may be manpower and equipment intensive, the results of a test are of great significance to both the regulatory agency and the source. The results often determine the course of enforcement discussions between the agency and the source. Considering the significance attached to the results, it is important that the test be performed in a valid representative manner. The complex nature of the various sampling methods place great responsibility on agency, facility, and testing personnel to ensure each test is an accurate representation of a source's actual emissions.

Stack testing, intermittent testing and sampling, and performance testing are all terms for the same requirement. They refer to tests which provide a means to determine the concentration of emissions. Where modeling estimates the ground level concentration some distance from the point of release, stack testing is a direct measurement of pollutant concentration at the point of release. Performance tests are conducted according to established procedures in order to quantify the source emissions and provide an objective means for determining compliance with established emission limits. These measurements are compared to the emission limits specified in the Permit to Install to verify compliance.

The rules and procedures regarding intermittent testing and sampling are found in Part 10 of the *Michigan Air Pollution Control Rules*. Performance test criteria are specified, and attention to detail and strict adherence to the guidelines is required. Due to the precision and accuracy required for acceptable test results, it is recommended that the tests be performed by experienced professionals.

A permit can specify that emission tests be performed at specified time intervals with specific reporting requirements to verify compliance. This is frequently requested when the proposed emissions concentrations are close to the regulatory limits, or the Michigan Department of Environmental Quality's (MDEQ's) Air Quality Division (AQD) permit reviewer is skeptical that control methods will meet performance predictions. When a source requests the use of an innovative control device or process, permit approval is often contingent upon stack testing to verify success in controlling emissions below regulatory limits. Stack test results can also determine the course of enforcement action and pursuit of compliance programs.

Test Methods

Regardless of who performs the stack test or why, guidelines have been established for methods used for emission testing. Testing should be performed in strict accordance with procedures specified in the *Code of Federal Regulations*, Title 40, Part 60 (Standards of Performance for New Stationary Sources, Appendix A as amended), Part 61 (National Emission Standards for Hazardous Air Pollutants, Appendix B), Part 63 (National Emission Standards for Hazardous Air Pollutants for Source Categories, Appendix A), and Part 51 (Requirements for Preparation, Adoption, and Submittal of Implementation Plans, Appendix M); and in the *Michigan Air Pollution Control Rules, Part 10, Intermittent Testing and Sampling*. Any variation in the sampling or analytical procedures must be described in the pre-test information and receive approval from the AQD prior to testing. Where state or

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. The proposal for alternate test methods must be fully explained. Justification must be provided which demonstrates the applicability of the proposed test for a particular site and pollutant. Lists of the federal test methods are found in Appendices A, B, C, and D.

The two most common MDEQ Part 10 test methods for stack performance testing are methods 5B, in-stack filtration method, and 5C, out-stack filtration method. These methods are usually suitable for determination of particulate emissions from stationary sources identified in the *Michigan Air Pollution Control Rules*, Part 3, Table 31 of R 336.1331. These sources include fuel burning equipment, incinerators, ferrous cupola foundry operations, chemical and mineral kilns, asphalt paving plants, cement manufacture, iron ore pelletizing, fertilizer plants, and exhaust systems serving material handling equipment not otherwise listed. Figure 31 and Table 32 in Part 3 show supplemental data for allowable emissions. Either method is applicable when specifically provided for in the Michigan Rules and orders, Permits to Install, or Renewable Operating Permits.

Michigan methods 5B and 5C withdraw particulate matter isokinetically from the source and collect it on solid filtering media. Isokinetic testing is a technique in which a representative sample from the stack is obtained by removing a sample at the same rate as the stack gas. After the sampling event is completed, the particulate mass collected on the filter is determined by weight, or gravimetrically. The primary distinction between the two methods is based on the temperature of the stack gas. Stack gas parameters are very important in the selection of the appropriate test method. The principle of out-stack testing (5C) is that the particulate matter is withdrawn isokinetically from the source and collected on solid filtering media maintained at a temperature in the range of $120 \pm 14^{\circ}\text{C}$ ($248 \pm 25^{\circ}\text{F}$). A reference point of 248°F has been established based on the chemical and physical characteristics of particulate matter. The rule of thumb for selecting the appropriate method is that when the stack temperature is below 248°F , then method 5B, or in-stack testing, can be used. If the stack temperature is above the reference point or high stack moisture exists, then the out-stack method, 5C, is used.

NOTE: MDEQ Method 5C is equivalent to the USEPA Method 5 (40 CFR 60) and Method 5B is equivalent to the USEPA Method 17 (40 CFR 60.)

When Stack Testing is Required

The AQD can request stack testing to be performed at any source of an air contaminant, either at the source's expense, or at the state's expense.

Stack Tests Conducted by the Owner/Operator (Rule 1001)

Circumstances in which the owner/operator would be required to conduct performance testing at his/her expense include:

1. Prior to issuance of a Renewable Operating Permit (ROP).
2. Violation of Rule 301 and the potential emissions exceed 100 tons per year (tpy).

3. When the source has not submitted an acceptable performance test to demonstrate compliance with conditions specific in the Permit to Install and the MDEQ, AQD rules.
4. When the source is located in a nonattainment area and more than 12 months have expired since the last performance test.
5. When the source has potential emissions in excess of 100 tpy, located in an attainment area, and more than 36 months have expired since the last performance test.
6. When a compliance program has been completed.

This testing must be performed within 60 days after receiving the written request from the MDEQ. The owner/operator must notify the MDEQ in writing at least seven (7) days before the scheduled test dates. Compliance staff may witness the testing, so it is advisable to provide a longer lead-time, if possible.

General Policy

Stack test results can have a significant impact on the continued operation of a process, therefore it is important that the test be performed in a valid and representative manner. The quality and applicability of the test can be assured by taking a few preliminary steps. Prior to any test, a review of the test plans by AQD personnel is highly recommended. To assure quality control of tests used by the AQD for compliance determinations and permit approval, it is the policy of the AQD to perform a technical review and approve test plans and test reports as resources allow. Thirty days prior to a test, a copy of the test plan should be sent to the appropriate district office and to the Technical Programs Unit (TPU) in Lansing. This procedure applies to any performance test submitted as a requirement of a permit, order, or rule; or tests submitted for purposes of demonstrating emission control capability pursuant to obtaining a permit.

The AQD staff will evaluate the sampling, analytical, and source operating protocols proposed in the test plan. By conducting a technical review of actual test methods and analytical protocol as applied in the field and lab, adjustments to the plan may be recommended to ensure the validity of the results for regulatory purposes. Failure to submit a test plan for review could result in the rejection of test results. Therefore, expending the time and resources up-front for the plan can save unnecessary expenses later in repeating tests.

Test Plan Reviews

A test plan is more than just specifying a test procedure. A complete test plan must include such items as sampling and analytical methodology, quality assurance procedures for sampling and analysis, source operating parameters, source parameters to be recorded, when the test will take place, and who will be present. Appendix A in Part 10 contains methods which have specific requirements which must also be included.

All test plans, regardless of pollutant or source type, will be reviewed by field staff for those items which affect source operation. All test plans should be submitted to the TPU for technical review and approval of test methods and analytical protocol.

AQD Procedures for Test Plan Review

After a copy of the test plan is received, the TPU does the following:

- a. Reviews the plan for appropriate test method, analytical protocol, and sampling duration.
- b. Confers with district staff as to the acceptability of the source operating parameters.
- c. Confers with the company or their testing consultant to obtain any additional information and resolve necessary modifications to the test plan.
- d. Reviews the requirements in the air pollution control permit as well as other applicable regulations.
- e. Unless otherwise specified by the district staff, the TPU then provides formal notice of approval or disapproval to the facility or source, with a copy to the district staff and test consultant. In rare cases, approval may be given verbally in some situations and later confirmed in writing.

District staff reviews the source operating parameters identified in the plan to verify that the proposed operation meets the requirements of Rule 1003 and any other applicable requirements.

Test Plan Submittal

A test plan is required by the MDEQ, AQD to establish consistency and ensure that proper test methods and procedures are employed. The information specified below must be submitted to the TPU and copied to the district office at least 30 days prior to the scheduled test date. After review of the information, a pre-test conference may be scheduled to discuss and finalize the plan. This may be requested by either the AQD or the company. A complete submittal will minimize the possibility of a test rejection as a result of improper sampling or data collection methods.

The following checklist was prepared by the AQD. It is a list of items to be included for a complete test plan. (Note: This is a general list; some items may not apply for a specific test.)

1. Identification and a brief description of the source to be tested. The description should include:
 - a. Names, addresses and telephone numbers of the contacts for information regarding the source and the test plan.
 - b. Type of industrial process or combustion facility.
 - c. Type and quantity of raw and finished materials used in the process.
 - d. Description of any cyclical or batch operations which would tend to produce variable emissions with time.
 - e. Basic operating parameters used to regulate the process.
 - f. Rated capacity of the process.

2. A brief description of any air pollution control equipment associated with the process, including:
 - a. Type of control device
 - b. Operating parameters
 - c. Rated capacity and efficiency
3. Applicable permit/license number or designation for the process to be tested.
4. Identification of all pollutants to be measured.
5. A description of the sampling train(s) to be used, including schematic diagrams, if appropriate.
6. Detailed sampling and analysis procedures. Reference standard methods, if applicable. Justify any proposed modifications.
7. The number and length of sampling runs which will constitute a complete test.
8. A dimensioned sketch showing all sampling ports in relation to breeching and to upstream and downstream disturbances or obstructions of gas flow.
9. Estimated flue gas conditions such as temperature, moisture, and velocity.
10. Projected process operating conditions during which the tests will be run (e.g., production rate).
11. A description of any process or control equipment data to be collected during the test period.
12. A description of any monitoring data to be collected during the test period and subsequently reported (e.g., stationary continuous emission monitor data).
13. Chain of custody procedures.
14. Field quality assurance/quality control procedures (e.g., field blanks, sample storage and transport methods).
15. Laboratory quality assurance/quality control procedures (e.g., manner and frequency of blanks, spikes, and standards).
16. Names and titles of personnel performing the tests.

Emission Test Reporting

Two copies of performance tests results shall be submitted to the AQD within 60 days following the last test date. One copy sent to the AQD district office and one sent to the AQD, TPU. The emission test report should contain all pertinent data concerning the test program. In addition to reporting the results, the report should include descriptions of the source, the sampling and analytical methodology used, the process operating conditions, and all raw field and lab data and calculations methods. The emission test report is a stand-alone document, and may repeat information supplied in the permit application. However, the emission test report will serve as evidence to both the agency and the source as a demonstration of the compliance status of the facility. Therefore, completeness is important with respect to content and quality. Presentation in an understandable and organized manner will lend credibility to the report.

The exact format of the report and the required information will vary depending on the source and the pollutants of interest. The following is an outline designed by the AQD staff as a format for a complete test report:

1. Introduction

- a. Identification, location and dates of tests.
- b. Purpose of testing.
- c. Brief description of source.
- d. Names, addresses, and telephone numbers of the contacts for information regarding the test and the test report.
- e. Names and affiliation of all personnel who were present during the testing.

2. Summary of results

- a. Operating data (e.g., production rate, fuel type or composition).
- b. Applicable permit/license number or designation for the source.
- c. Results expressed in units consistent with the emission limitation applicable to the source.
- d. Comparison with emission regulations.

3. Source description

- a. Description of process, including operation of emission control equipment.
- b. Process flow sheet or diagram (if applicable).
- c. Type and quantity of raw and finished materials processed during the tests.
- d. Maximum and normal rated capacity of the process.
- e. Description of process instrumentation monitored during the test.

4. Sampling and analytical procedures

- a. Description of sampling train(s) and field procedures.
- b. Description of recovery and analytical procedures.
- c. Dimensioned sketch showing all sampling ports in relation to breaching and to upstream and downstream disturbances or obstructions of gas flow.
- d. Sketch of cross-sectional view of stack indicating traverse point locations and exact stack dimensions.

5. Test results and discussion

- a. Detailed tabulation of results including process operating conditions and flue gas conditions.
- b. Discussion of significance of results relative to operating parameters and emission regulations.
- c. Discussion of any variations from normal sampling procedures or operating conditions which could have affected the results.
- d. Documentation of any process or control equipment upset condition which occurred during the testing.

- e. Description of any major maintenance performed on the air pollution control device(s) during the 3-month period prior to testing.
- f. In the event of a retest, a description of any changes made to the process or control device since the last test.
- g. Results of any quality assurance audit sample analyses required by the reference method.
- h. Calibration sheets for the dry gas meter, orifice meter, pitot tube, and any other equipment or analytical procedures, which require calibration.
- i. Sample calculations of all formulas used to calculate the results.
- j. Copies of all field data sheets.
- k. Copies of all laboratory data, including quality assurance/quality control (e.g., blanks, spikes, and standards).

AQD Procedures for Test Report Review

District staff review stack test reports upon receipt and follow up according to established procedures with any non-compliance test results. Recorded source operating parameters identified in the report are reviewed to verify that they meet the requirements of Rule 1003 and any other applicable requirements. Most test reports are sent to the TPU for a preliminary, cursory review. Once the TPU receives the report, the information is entered into the TPU tracking log. TPU and district staff will work together in determining if a full technical review is necessary.

Reports that routinely receive a full technical review are tests involving; seldom used methods, uncommon pollutants, new/uncommon source type, trial burns, a response to an urgent matter (i.e., enforcement case, concerns brought forth by the public), district or the TPU staff questions the data, or if the testing firm has had quality control problems. Reports that involve initial performance tests, NSPS, NESHAP, major sources, or waste incinerators often receive a full technical review as resources allow. While it depends on the situation, an example of a test which may not receive a full review could include tests that are conducted annually, involve a single or non-toxic pollutant, and if the cursory review does not indicate sampling problems.

Once it is determined that a full technical review is needed, the TPU staff will confirm that the report contains all of the required components, which is detailed in the AQD guidance document, *Format for Submittal of Source Emission Test Plans and Reports*, revised in November 2003.

If the report is incomplete, the TPU will notify the company and/or testing consultant of the deficiencies in the test report, the items needed to complete the test review, and a due date for requested items. A copy of this letter is sent to the district staff and others as appropriate (e.g., permit engineers, enforcement specialist, USEPA, etc.)

Stack Tests Conducted by the Air Quality Division

The AQD, under the authority of Rule 1002, can conduct performance tests at a source. The tests are conducted at the state's expense; however, this is not typically done. The source has some obligations regardless of who performs the test.

General Policy

Rule 1003 requires that all performance tests be conducted while the source of an air contaminant is operating at maximum routine operating conditions, or under such other conditions, within the capacity of the equipment, as may be requested by the AQD. Other conditions may include source operating periods of startup, shutdown, or such other operations excluding malfunction, specific to certain sources. In other words, the sampling event must be representative of the actual performance operation expected for the source.

Rule 1003 also specifies some sampling requirements. Three separate source samples shall be obtained within a 36 hour period (all at similar production levels). For purposes of determining compliance with an applicable emission limit, rule or permit condition, the arithmetic mean of the results of the three samples shall apply. MDEQ, AQD authorization is necessary to waive or modify these requirements.

During the source test, district staff often records the source operating parameters so that the stack test results may be compared to future operations of the source. However, it is the responsibility of the source to record any production or process parameters as requested by the AQD. Specific parameters to be baselined vary from one source type to another. Compliance district staff may also conduct USEPA method 9 visible emission observations of the plume during the test as further baselining of the source operation.

The facility is responsible for performing the pretest preparation listed in the procedures below. The facility has the primary responsibility of assuring that the source is ready for the source test when the source sampling crew arrives at the site.

Prior to testing, the source shall provide and bear the expense of preparation of performance test facilities as specified by the AQD to include:

1. Sampling ports adequate for the reference test methods applicable to the source
2. Safe sampling platforms as required
3. Safe access to the sampling platform
4. Suitable power source within 50 feet of the approved sampling location

References

Michigan Department of Environmental Quality, *Administrative Rules for Air Pollution Control, Part 1 - General Provisions.*

Michigan Department of Environmental Quality, *Administrative Rules for Air Pollution Control, Part 3 - Emission limitations and prohibitions--Particulate matter.*

Michigan Department of Environmental Quality, *Administrative Rules for Air Pollution Control, Part 10 - Intermittent Testing and Sampling.*

40 CFR 60, Subpart A – General Provisions, 1999

United States Environmental Protection Agency, *Plant Inspection Workshop - Techniques for Evaluating Performance of Air Pollution Control Equipment: Observing Compliance Tests*, February 1981.

Appendix A.

USEPA Test Methods from 40 CFR Part 51

Appendix M-Test Methods

Method 201	Determination of PM ₁₀ emissions (constant sampling rate procedure)
Method 201a	Determination of PM ₁₀ emissions (exhaust gas recirculation procedure)
Method 202	Determination of condensable particulate emissions from stationary sources
Method 204	Criteria for and verification of a permanent or temporary total enclosure
Method 204a	Volatile organic compounds content in liquid input steams
Method 204b	Volatile organic compounds emissions in captured streams
Method 204c	Volatile organic compounds emissions in uncaptured streams (dilution technique)
Method 204d	Volatile organic compounds emissions in uncaptured streams from temporary total enclosures
Method 204e	Volatile organic compounds emissions in uncaptured streams from building enclosures
Method 204f	Volatile organic compounds content in liquid input streams (distillation approach)
Method 205	Verification of gas dilution systems for field instrument calibrations

Appendix B.

USEPA Test Methods from 40 CFR Part 60

Appendix A - Test Methods

Method 1	Sample and velocity traverses for stationary sources
Method 1a	Sample and velocity traverses for stationary sources with small stacks or ducts
Method 2	Determination of stack gas velocity and volumetric flow rate (type s pitot tube)
Method 2a	Direct measurement of gas volume through pipes and small ducts
Method 2b	Determination of exhaust gas volume flow rate from gasoline vapor incinerators
Method 2c	Determination of stack gas velocity and volumetric flow rate in small stacks or ducts (standard pitot tube)
Method 2d	Measurement of gas volumetric flow rates in small pipes and ducts
Method 2e	Determination of landfill gas production flow rate
Method 2f	Determination of flow rate using 3-D pitot tubes
Method 2g	Determination of flow rate using S-type and 3-D pitots to be rotated to measure different angles of flow
Method 2h	Procedure for determining the wall effects on flow
Method 3	Gas analysis for the determination of dry molecular weight
Method 3a	Determination of oxygen and carbon dioxide concentrations in emissions from stationary sources (instrumental analyzer procedure)
Method 3b	Gas analysis for the determination of emission rate correction factor or excess air
Method 3c	Determination of carbon dioxide, methane, nitrogen and oxygen from stationary sources
Method 4	Determination of moisture content in stack gases
Method 5	Determination of particulate emissions from stationary sources
Method 5a	Determination of particulate emissions from the asphalt processing and asphalt roofing industry
Method 5b	Determination of nonsulfuric acid particulate matter from stationary sources
Method 5c	[reserved]
Method 5d	Determination of particulate matter emissions from positive pressure fabric filters
Method 5e	Determination of particulate emissions from the wool fiberglass insulation manufacturing industry
Method 5f	Determination of nonsulfate particulate matter from stationary sources
Method 5g	Determination of particulate emissions from wood heaters from a dilution tunnel sampling location
Method 5h	Determination of particulate emissions from wood heaters from a stack location
Method 5i	Determination of low level particulate matter

Appendix B. (continued)

Method 6	Determination of sulfur dioxide emissions from stationary sources
Method 6a	Determination of sulfur dioxide, moisture, and carbon dioxide emissions from fossil fuel combustion sources
Method 6b	Determination of sulfur dioxide and carbon dioxide daily average emissions from fossil fuel combustion sources
Method 6c	Determination of sulfur dioxide emissions from stationary sources (instrumental analyzer procedure)
Method 7	Determination of nitrogen oxide emissions from stationary sources
Method 7a	Determination of nitrogen oxide emissions from stationary sources-ion chromatographic method
Method 7b	Determination of nitrogen oxide emissions from stationary sources (ultraviolet spectrophotometry)
Method 7c	Determination of nitrogen oxide emissions from stationary sources-alkaline-permanganate/colorimetric method
Method 7d	Determination of nitrogen oxide emissions from stationary sources-alkaline-permanganate/ion chromatographic method
Method 7e	Determination of nitrogen oxides emissions from stationary sources (instrumental analyzer procedure)
Method 8	Determination of sulfuric acid mist and sulfur dioxide emissions from stationary sources
Method 9	Visual determination of the opacity of emissions from stationary sources
Alternate Method 1	Determination of the opacity of emissions from stationary sources remotely by lidar
Method 10	Determination of carbon monoxide emissions from stationary sources
Method 10a	Determination of carbon monoxide emissions in certifying continuous emission monitoring systems at petroleum refineries
Method 10b	Determination of carbon monoxide emissions from stationary sources
Method 11	Determination of hydrogen sulfide content of fuel gas streams in petroleum refineries
Method 12	Determination of inorganic lead emissions from stationary sources
Method 13a	Determination of total fluoride emissions from stationary sources; spadns zirconium lake method
Method 13b	Determination of total fluoride emissions from stationary sources-specific ion electrode method
Method 14	Determination of fluoride emissions from potroom roof monitors for primary aluminum plants
Method 14a	Determination of total fluoride emissions from selected sources at primary aluminum production facilities
Method 15	Determination of hydrogen sulfide, carbonyl sulfide, and carbon disulfide emissions from stationary sources

Appendix B. (continued)

Method 15a	Determination of total reduced sulfur emissions from sulfur recovery plants in petroleum refineries
Method 16	Semicontinuous determination of sulfur emissions from stationary sources
Method 16a	Determination of total reduced sulfur emissions from stationary sources (impinger technique)
Method 16b	Determination of total reduced sulfur emissions from stationary sources
Method 17	Determination of particulate emissions from stationary sources (in-stack filtration method)
Method 18	Measurement of gaseous organic compound emissions by gas chromatography
Method 19	Determination of sulfur dioxide removal efficiency and particulate matter, sulfur dioxide, and nitrogen oxides emission rates
Method 20	Determination of nitrogen oxides, sulfur dioxide, and diluent emissions from stationary gas turbines
Method 21	Determination of volatile organic compounds leaks
Method 22	Visual determination of fugitive emissions from material sources and smoke emissions from flares
Method 23	Determination of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans from stationary sources
Method 24	Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings
Method 24a	Determination of volatile matter content and density of printing inks and related coatings
Method 25	Determination of total gaseous nonmethane organic emissions as carbon
Method 25a	Determination of total gaseous organic concentration using a flame ionization analyzer
Method 25b	Determination of total gaseous organic concentration using a nondispersive infrared analyzer
Method 25c	Determination of nonmethane organic compounds (NMOC) in landfill gases
Method 25d	Determination of the volatile organic concentration of waste samples
Method 25e	Determination of vapor phase organic concentration in waste samples
Method 26	Determination of hydrogen chloride emissions from stationary sources
Method 26a	Determination of hydrogen halide and halogen emissions from stationary sources-isokinetic method
Method 27	Determination of vapor tightness of gasoline delivery tank using pressure-vacuum test
Method 28	Certification and auditing of wood heaters
Method 28a	Measurement of air to fuel ratio and minimum achievable burn rates for wood-fired appliances
Method 29	Determination of metals emissions from stationary sources

Appendix C.

USEPA Test Methods from 40 CFR Part 61

Appendix B-Test Methods

Method 101	Determination of particulate and gaseous mercury emissions from chlor-alkali plants-air streams
Method 101A	Determination of particulate and gaseous mercury emissions from sewage sludge incinerators
Method 102	Determination of particulate and gaseous mercury emissions from chlor-alkali plants-hydrogen streams
Method 103	Beryllium screening method
Method 104	Determination of beryllium emissions from stationary sources
Method 105	Determination of mercury in wastewater treatment plant sewage sludges
Method 106	Determination of vinyl chloride from stationary sources
Method 107	Determination of vinyl chloride content of inprocess wastewater samples, and vinyl chloride content of polyvinyl chloride resin, slurry, wet cake, and latex samples
Method 107A	Determination of vinyl chloride content of solvents, resin-solvent solution, polyvinyl chloride resin, resin slurry, wet resin, and latex samples
Method 108	Determination of particulate and gaseous arsenic emissions
Method 108A	Determination of arsenic content in ore samples from nonferrous smelters
Method 108B	Determination of arsenic content in ore samples from nonferrous smelters
Method 108C	Determination of arsenic content in ore samples from nonferrous smelters
Method 111	Determination of Polonium-210 emissions from stationary sources
Method 114	Test methods for measuring radionuclide emissions from stationary sources
Method 115	Monitoring for Radon-222 emissions

Appendix D.
USEPA Test Methods from 40 CFR Part 63

Appendix A-Test Methods

Method 301	Field validation of pollutant measurement methods from various waste media
Method 303	Determination of visible emissions from by-product coke oven batteries
Method 303a	Determination of visible emissions from nonrecovery coke oven batteries
Method 304a	Determination of biodegradation rates of organic compounds (vent option)
Method 304b	Determination of biodegradation rates of organic compounds (scrubber option)
Method 305	Measurement of emission potential of individual volatile organic compounds in waste
Method 306	Determination of chromium emissions from decorative and hard chromium electroplating and anodizing operations
Method 306a	Determination of chromium emissions from decorative and hard chromium electroplating and anodizing operations
Method 306b	Surface tensions measurement and recordkeeping for chromium plating tanks used at electroplating and anodizing facilities
Method 307	Determination of emissions from halogenated solvent vapor cleaning machines using a liquid level procedure
Method 308	Determination of methanol emissions from stationary sources
Method 310a	Determination of residual hexane through gas chromatography
Method 310b	Determination of residual solvent through gas chromatography
Method 310c	Determination of residual n-hexane in EDPM rubber through gas chromatography
Method 311	Analysis of hazardous air pollutant compounds in paints and coatings by direct injection into a gas chromatograph
Method 312a	Determination of residual styrene in latex styrene-butadiene by gas chromatography
Method 312b	Determination of residual styrene in styrene-butadiene rubber (SBR) latex by capillary gas chromatography
Method 312c	Determination of residual styrene in SBR latex produced by emulsion polymerization
Method 313a	Determination of residual hydrocarbons in crumb rubber
Method 313b	Determination of residual hydrocarbons in solution polymers by capillary gas chromatography
Method 315	Determination of particulate and methylene chloride extractable matter (MCEM) from selected sources at primary aluminum production facilities
Method 316	Determination of formaldehyde emissions from the mineral, wood and fiberglass industries
Method 318	Extractive FTIR for measurement of emissions from the mineral, wood and fiberglass industries
Method 320	Vapor phase organic and inorganic emissions by extractive FTIR
Method 321	Gaseous Hd emissions at Portland cement kilns by FTIR