

CHAPTER 7017

MINNESOTA POLLUTION CONTROL AGENCY MONITORING AND TESTING REQUIREMENTS

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7017.0100 ESTABLISHING VIOLATIONS.

Subpart 1. **Definitions.** For purposes of this part, the following terms have the meanings given them:

A. “applicable requirement” has the meaning given in part 7007.0100, subpart 7; and

B. “compliance document” has the meaning given in part 7017.2005, subpart 2.

Subp. 2. **Establishing violations.** Notwithstanding any other provision of an applicable requirement or compliance document, a violation of an applicable requirement or a compliance document may be established based on:

A. any of the monitoring methods which the source is required to use by an applicable requirement or compliance document; or

B. any other credible evidence.

Statutory Authority: *MS s 116.07*

History: *19 SR 1775*

COMPLIANCE ASSURANCE MONITORING

7017.0200 INCORPORATION BY REFERENCE.

Code of Federal Regulations, title 40, sections 64.1 to 64.10, as amended, entitled “Compliance Assurance Monitoring,” are adopted and incorporated by reference.

Statutory Authority: *MS s 116.07*

History: *28 SR 1482*

7017.1000 [Repealed, 23 SR 1764]

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CONTINUOUS MONITORING SYSTEMS

7017.1002 DEFINITIONS.

Subpart 1. **Scope.** For the purposes of parts 7017.1004 to 7017.1220, the definitions given in parts 7005.0100, 7007.0100, and 7017.2005, and the definitions given in Code of Federal Regulations, title 40, part 60.2, and in the federal rules incorporated by reference in part 7017.1010, apply unless otherwise defined in this part.

Subp. 2. **Calendar quarter.** “Calendar quarter” means any of the following four time periods during each year: January 1 to March 31; April 1 to June 30; July 1 to September 30; and October 1 to December 31.

Subp. 3. **Certification test.** “Certification test” means a test that includes all of the procedures listed in the appropriate performance specifications in Code of Federal Regulations, title 40, part 60, appendix B.

Subp. 4. **Continuous emission monitoring system or CEMS.** “Continuous emission monitoring system” or “CEMS” has the meaning given in Code of Federal Regulations, title 40, part 60, appendix B, Performance Specification No. 2, section 2.1.

Subp. 5. **Continuous opacity monitoring system or COMS.** “Continuous opacity monitoring system” or “COMS” has the meaning given in Code of Federal Regulations, title 40, part 60, appendix B, Performance Specification No. 1, section 2.1.

Subp. 6. **Data point.** “Data point” means the output recorded by a monitoring system after one cycle of sampling and analyzing.

Subp. 7. **Excess emissions.** “Excess emissions” means emissions that are greater than the numerical emission limit during both the period when the limit applies and any applicable periods of exemption, such as periods of startup, shutdown, and malfunction. Excess emissions do not include emissions during startup and shutdown that are based on values calculated using correction factors which, when applied outside the normal operating range, produce invalid values.

Subp. 8. **Linearity check.** “Linearity check” means a monitor audit procedure required by the Acid Rain Program at Code of Federal Regulations, title 40, part 75, appendix A, section 6.2.

Subp. 9. **Monitor bypass or bypass.** “Monitor bypass” or “bypass” means the diversion of emissions from their normal route such that the required CEMS or COMS is not able to sample the complete emissions stream.

Subp. 10. **Monitor downtime.** “Monitor downtime” means time periods when one or more of the following are true, excluding periods of monitor bypass:

A. the CEMS is not meeting the minimum data availability requirements of part 7017.1160, subpart 2;

B. the COMS is not meeting the data availability requirements of part 7017.1200, subpart 2; or

C. the CEMS or COMS is out of control.

Subp. 11. **Out of control.** “Out of control” has the following meanings:

A. for CEMS subject to the federal Acid Rain Program monitoring requirements, the out of control definitions in Code of Federal Regulations, title 40, part 75.24, apply;

B. for CEMS which are not subject to Code of Federal Regulations, title 40, part 75, the out of control definitions in Code of Federal Regulations, title 40, part 60, appendix F, sections 4.3.1 and 5.2, apply; and

C. for COMS, the beginning of the out of control period is the time corresponding to the completion of a calibration error audit in which the calibration error exceeds three percent of the average audit value. The end of the out of control period is the time corresponding to the completion of the next calibration error audit in which the calibration error is three percent or less of the average audit value.

Subp. 12. **Recertification test.** “Recertification test” means conducting a certification test on a CEMS or COMS which has been previously certified. Recertification tests shall be

conducted according to the same procedures and are subject to the same requirements as certification tests, except as noted in parts 7017.1004 to 7017.1220.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1004 APPLICABILITY.

Subpart 1. **Applicability.** Parts 7017.1002 to 7017.1220 apply to owners and operators of emission facilities that are required by a compliance document, applicable requirement, or order of the commissioner to operate a CEMS or COMS except as listed in items A to C.

A. If equivalent or more stringent requirements are mandated by a compliance document, applicable requirement, or order of the commissioner, those requirements supersede the corresponding requirements in parts 7017.1002 to 7017.1220.

B. CEMS or COMS required by Code of Federal Regulations, title 40, part 75, which are only operated for the Acid Rain Program, Title IV of the Clean Air Act, are not subject to parts 7017.1002 to 7017.1220, except for the incorporation by reference of federal requirements in parts 7017.1010 to 7017.1020.

C. CEMS required by Code of Federal Regulations, title 40, part 75, which are also required by a compliance document, applicable requirement, or order of the commissioner are not subject to parts 7017.1050 to 7017.1070, 7017.1170, and 7017.1180, subpart 1.

Part 7017.1006 applies to any owner or operator of an emission facility. Parts 7017.1002 to 7017.1130 apply to both CEMS and COMS. Parts 7017.1135 to 7017.1180 apply to CEMS only. Parts 7017.1185 to 7017.1220 apply to COMS only.

Subp. 2. **Transition to new rule.** Parts 7017.1002 to 7017.1220 supersede the requirements of those parts of air emission permits issued by the agency, prior to March 8, 1999, entitled Exhibit B, "Continuous Emission Monitoring Systems (CEMS)," and Exhibit G, "Quality Assurance Program for Continuous Emission Monitors."

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1006 REQUIREMENT TO INSTALL MONITOR.

The owner or operator of any emission facility, whether or not a CEMS or COMS is required by another part, may be required to install and operate a CEMS or COMS, upon order of the commissioner, if the commissioner finds that other methods of measurement or calculation do not provide adequate information on the level or variation of emissions to assure compliance with a compliance document or applicable requirement or to reliably estimate whether the emissions may pose a threat to public health or the environment.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1010 INCORPORATION OF FEDERAL MONITORING REQUIREMENTS BY REFERENCE.

Subpart 1. **New source performance standards.** The following regulations are adopted and incorporated by reference:

A. Code of Federal Regulations, title 40, part 60.13, as amended, entitled "Monitoring Requirements";

B. Code of Federal Regulations, title 40, part 60, Appendix B, as amended, entitled "Performance Specifications"; and

C. Code of Federal Regulations, title 40, part 60, Appendix F, as amended, entitled "Quality Assurance Procedures."

Subp. 2. **National Emissions Standards for Hazardous Air Pollutants.** The following regulations are adopted and incorporated by reference:

A. Code of Federal Regulations, title 40, section 61.14, as amended, entitled "Monitoring Requirements"; and

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B. National Emissions Standards for Hazardous Air Pollutants, Code of Federal Regulations, title 40, section 63.8, as amended, entitled "Monitoring Requirements."

Subp. 3. **Submission to commissioner.** All requests, reports, applications, and other communications to the administrator pursuant to subparts 1 and 2 must be submitted to the commissioner.

Statutory Authority: *MS s 116.07*

History: *18 SR 580; 20 SR 2254(NO. 42); 23 SR 1764*

7017.1020 CONTINUOUS EMISSION MONITORING BY AFFECTED SOURCES.

Affected sources, as defined in part 7007.0100, subpart 4, shall comply with Code of Federal Regulations, title 40, part 75, as amended, entitled "Continuous Emission Monitoring," which is adopted and incorporated by reference.

Statutory Authority: *MS s 116.07*

History: *19 SR 1666*

7017.1030 AGENCY ACCESS TO WITNESS OR CONDUCT TESTS.

Upon request of the agency or the commissioner, the owner or operator of an emission facility shall allow the agency or any authorized employee or agent of the agency to enter upon the premises of the owner or operator for the purposes of conducting or witnessing any of the following activities:

- A. certification tests;
- B. relative accuracy test audits;
- C. cylinder gas audits;
- D. linearity checks;
- E. calibration error audits; and
- F. daily calibration drift checks.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1035 TESTING REQUIRED.

The owner or operator of an emission facility shall arrange to conduct a relative accuracy test audit, cylinder gas audit, or calibration error audit as required to determine the accuracy of a continuous monitoring system at times requested by the commissioner.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1040 INSTALLATION REQUIREMENTS.

Subpart 1. **Notification of installation.** The owner or operator of any facility that intends to install a CEMS or COMS shall notify the commissioner at least 60 days prior to installation of the monitoring system. The notification shall include plans and drawings of the proposed system which show the configuration of the monitoring system including any monitor bypass routes.

Subp. 2. **Representative location.** A CEMS or COMS shall be installed in a location that provides data which is representative of emissions and which is in accordance with the requirements listed in the appropriate performance specifications in Code of Federal Regulations, title 40, part 60, appendix B. If the monitoring system is required by the Acid Rain Program, Title IV of the Clean Air Act, it must be installed according to the installation requirements of Code of Federal Regulations, title 40, part 75.

Subp. 3. **Combined or separated emissions.** When the emissions from two or more emission units are subject to the same emission limit and are combined before being released to the atmosphere, the owner or operator may install a CEMS or COMS on each emission unit

or may elect to monitor the combined emission stream of the emission units. When two or more emission units required to be monitored with a CEMS or COMS are not subject to the same emission limit, a separate CEMS or COMS shall be installed on each emission unit, except in cases where an extractive CEMS or COMS is time-shared between the emission units. When the effluent from one emission unit can be released to the atmosphere through more than one point, the owner or operator shall install a CEMS or COMS on each separate emission stream unless the installation of fewer systems is approved in writing by the commissioner.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1050 MONITOR CERTIFICATION AND RECERTIFICATION TEST.

Subpart 1. **Certification time frame.** The owner or operator must conduct and complete certification testing within 90 days after the due date of the first excess emissions report required for the CEMS or COMS. This subpart does not require a recertification test of a previously certified continuous monitoring system, unless the monitor has undergone a change which invalidates its certification.

Subp. 2. **Changes to a CEMS or COMS which invalidate certification.** Any of the following changes to a certified CEMS or COMS invalidates the certification status of the monitoring system:

- A. replacement of the analyzer;
- B. change in location or orientation of the sampling probe or site;
- C. modification to the flue gas handling system which changes its flow characteristics; or
- D. a change that in the commissioner's judgment significantly affects the ability of the system to measure or record the pollutant concentration, volumetric gas flow, or opacity.

Subp. 3. **Changes to a CEMS or COMS which do not invalidate certification.** The following changes to a monitoring system do not invalidate certification and do not require a recertification test:

- A. routine or normal corrective maintenance;
- B. replacement of parts on the manufacturer's recommended spare parts list; or
- C. software modifications in the automated data acquisition and handling system, where the modification is only for the purpose of generating additional or modified reports.

Subp. 4. **Notification of changes requiring recertification.** The owner or operator shall notify the commissioner in writing prior to making any planned changes which may invalidate the certification status of a CEMS or COMS. If the change was unforeseen, the owner or operator shall notify the commissioner in writing within two working days after making the change.

Subp. 5. **Deadline for recertification.** The owner or operator of a CEMS or COMS shall conduct a recertification test on a monitoring system within 90 days of completion of any change which invalidates the monitor's certification status.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1060 PRECERTIFICATION TEST REQUIREMENTS.

Subpart 1. **Certification test plan required.** Prior to a certification test, the owner or operator of the emission facility shall develop and submit to the commissioner a test plan which contains all of the information required in subpart 2. The certification test plan must be postmarked or received at least 30 days before the certification test date. No certification test may be conducted until a test plan has been submitted and approved by the commissioner.

Subp. 2. **Certification test plan contents.** The test plan must be submitted in the following format and include the elements in items A and B:

- A. General requirements:

- (1) name and address of emission facility;
- (2) name, title, and telephone number of contact person at facility;
- (3) permit number or name and data of applicable compliance document requiring test;
- (4) statement of whether the test is an initial certification or a recertification;
- (5) drawing of the monitoring system which indicates the location of the reference method ports and monitoring system probe location in relation to the nearest flow disturbances both upstream and downstream of the monitoring system as well as any monitor bypass routes;
- (6) make, model, and serial number of the monitor and data recording system;
- (7) name and telephone number of testing company; and
- (8) planned certification test date.

B. Testing procedures and operating conditions:

- (1) a list of the performance specifications from Code of Federal Regulations, title 40, part 60, appendix B, which will be followed during the test;
- (2) any fuel F-factors to be used;
- (3) a list of the reference methods from Code of Federal Regulations, title 40, part 60, appendix A, which will be followed during the test;
- (4) the units of measurement under which the monitor will be certified, for example, lb/hr, ppm, lb/MMBtu;
- (5) the monitoring system's span, range, and calibration levels; and
- (6) the planned emission unit operating range, for example, heat input, steam output, during the certification test.

Subp. 3. Certification pretest meeting. The owner or operator of the emission facility shall schedule a meeting with the agency to discuss the details of the proposed certification test. The meeting may be conducted in person or by a telephone conference call. When requested by the commissioner or the owner or operator, an in-person pretest meeting, held at the agency office between authorized employees of the agency and the owner is required. The pretest meeting shall be held at least seven days prior to the certification test date except that a shorter time shall be allowed upon commissioner approval. The commissioner may reject the results of a certification test if the owner or operator of the emission facility refused to participate in a pretest meeting.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1070 CERTIFICATION TEST PROCEDURES.

Subpart 1. Certification test procedure. A CEMS or COMS must be certified according to the appropriate performance specifications listed in Code of Federal Regulations, title 40, part 60, appendix B. The certification test shall also be conducted in accordance with the certification test plan approved by the commissioner.

Subp. 2. Determination of certification acceptance. A CEMS or COMS is considered certified only after the complete certification test report has been submitted to the commissioner and the commissioner gives written determination of certification. The commissioner shall provide a determination of certification acceptance if the commissioner finds that the requirements of parts 7017.1060 to 7017.1080 have been met. Upon the commissioner's determination of certification acceptance, the duration of the CEMS or COMS certification status retroactively begins with the completion date of the successful certification test.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1080 CERTIFICATION TEST REPORT REQUIREMENTS.

Subpart 1. Report required. The owner or operator of the emission facility shall prepare and submit a certification test report to the commissioner. A report must be submitted

for any certification test that was required, whether or not the test data indicate compliance with the appropriate performance specifications, and whether or not the test was completed according to the approved test plan.

Subp. 2. **Report submittal deadline.** The certification test report must be postmarked or received within 45 days following completion of the certification test unless an alternate schedule is given in the applicable compliance document.

Subp. 3. **Microfiche submittal deadline.** The owner or operator of the emission facility shall submit a microfiche copy of the certification test report to be postmarked or received within 105 days following completion of the certification test. A cover letter which certifies that the microfiche is an exact and complete copy of the original test report must be submitted with the microfiche copy of the test report.

Subp. 4. **Report contents.** Each certification test report shall contain the following information and be in the format shown in items A to D:

A. Introduction:

- (1) name and address of the emission facility;
- (2) facility permit identification number and the date and title of the compliance document which required the certification test;
- (3) date or dates of the test;
- (4) name and address of the independent testing company; and
- (5) signed and dated certification statement as listed in part 7017.2040, subparts 1 to 5.

B. General information:

- (1) identification of emissions units and pollutants being monitored;
- (2) make, model, and serial number of monitoring system;
- (3) indication of whether certification is initial certification or recertification;
- (4) names and titles of testing and facility personnel who conducted or assisted with the test; and
- (5) drawing of monitoring system probe location for extractive systems, or monitor location for in situ systems, showing its relationship to the nearest flow disturbances both up and downstream of the probe.

C. Test results: a summary table which compares the certification test results to the standards in the applicable performance specifications of Code of Federal Regulations, title 40, part 60, appendix B.

D. Testing procedures:

- (1) list of test methods and performance specifications followed during the certification test;
- (2) list of mathematical equations used to calculate values in the report;
- (3) copies of field data; and
- (4) description of any departures from the approved reference test methods of performance specifications requirements.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1090 MONITOR OPERATIONAL REQUIREMENTS.

Subpart 1. **Continuous operation.** A CEMS or COMS must be operated and data recorded during all periods of emission unit operation including periods of emission unit start-up, shutdown, or malfunction. This requirement to operate the monitor applies whether or not a numerical emission limit applies during these periods. A CEMS or COMS must not be bypassed except in emergencies where failure to bypass the CEMS or COMS would endanger human health, safety, or plant equipment.

Subp. 2. **Acceptable monitor downtime.** Monitor downtime is a violation of subpart 1, except for reasonable periods of monitor downtime due to the following causes:

A. damage to the monitoring system due to acts of God such as lightning strikes, tornadoes, or floods which render the monitor inoperative;

B. sudden and not reasonably preventable monitor breakdowns;

C. scheduled monitor maintenance based on equipment manufacturer's recommended maintenance schedule which cannot reasonably be conducted when the emission unit is not operating; or

D. unavoidable monitor downtime in order to conduct daily drift checks; calibration error audits, relative accuracy test audits, linearity checks, and cylinder gas audits which are required by a compliance document, applicable requirement, or by request of the commissioner.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1100 EVIDENCE OF NONCOMPLIANCE.

Data collected from a CEMS or COMS that is not in compliance with parts 7017.1002 to 7017.1220 may still be used in establishing violations under part 7017.0100 if the data represent credible evidence of such violations.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1110 EXCESS EMISSIONS REPORTS.

Subpart 1. **Excess emissions report required.** The owner or operator of a facility subject to parts 7017.1002 to 7017.1220 shall submit an excess emissions report each calendar quarter. The report must be submitted even if there were no excess emissions, monitor downtime, or monitor bypasses during the quarter. The report shall be submitted on a form approved by the commissioner within 30 days of the end of each calendar quarter. Any such form provided by the commissioner shall only seek information relevant to the excess emissions report.

Subp. 2. **Contents of excess emissions report.** The excess emissions report shall contain the information in items A to C.

A. Excess emissions:

(1) the date and time of commencement and completion of each period of excess emissions recorded by the CEMS, COMS, or approved alternative monitoring system including excess emissions even if they occurred during periods when the numerical emission limit was not in effect; for example, periods of excess emissions during periods of start-up, shutdown, and malfunction which are allowed by the applicable regulation;

(2) the cause of the excess emissions;

(3) the magnitude of the excess emissions and any conversion factor used to calculate the excess emissions; and

(4) the corrective action taken or preventive measures taken by the facility in response to the excess emissions.

B. Monitor downtime:

(1) the date and time of commencement and completion of each period of monitor downtime;

(2) identification of the cause of each period of monitor downtime, including periods of acceptable monitor downtime; and

(3) the corrective action taken or preventive measures adopted to stop or reduce monitor downtime.

C. Monitor bypass periods:

(1) the dates and times of commencement and completion of each period where emissions are generated but the monitor was bypassed;

(2) identification of the cause of each period of monitor bypass; and

(3) the corrective action taken or preventive measures adopted to stop or reduce monitor bypasses.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1120 SUBMITTALS.

Subpart 1. **Address.** All submittals required under parts 7017.1002 to 7017.1220 shall be sent to: Continuous Emissions Monitoring System Specialist, Minnesota Pollution Control Agency, 520 Lafayette Road, St. Paul, Minnesota 55155-4194.

Subp. 2. **Alternate format.** The commissioner shall accept paper, hard copy submittals. Submittals shall also be accepted in an alternate format such as electronic mail, computer disk, facsimile, or CD-ROM, provided that the commissioner has given prior approval for the use of the alternate delivery method or medium.

Subp. 3. **Date.** Submittals must be postmarked or received by the date specified in the applicable compliance document.

Subp. 4. **Certification.** All submittals, except for certification test-plans and relative accuracy test audits notifications, must be accompanied by a certification statement signed by a responsible official, pursuant to part 7007.0500, subpart 3. When a submittal required to be certified has been made by electronic mail or facsimile, a signed certification clearly indicating the submittal to which it applies shall be mailed or delivered to the agency, postmarked, or received within five days of the electronic mail or facsimile. When a submittal required to be certified is made by CD-ROM or computer disk, it shall be accompanied by a signed certification clearly indicating the submittal to which it applies.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1130 RECORD KEEPING.

The owner or operator of a facility subject to parts 7017.1002 to 7017.1220 shall maintain a file of all of the following CEMS or COMS information at the emission facility in a form suitable for inspection for at least five years from the date of each record: each one-hour emission average recorded by the CEMS; each six-minute opacity average recorded by the COMS; monitor certification test reports; excess emissions reports; cylinder gas audit reports; calibration error audit reports; relative accuracy test audits; linearity check reports; results of daily calibration drift checks; log of adjustments made to the CEMS or COMS and maintenance performed on the CEMS or COMS; and all other monitoring system information required by an applicable compliance document. The owner or operator shall also keep an updated copy of the facility's CEMS or COMS quality assurance plan on site.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1135 APPLICABILITY.

Parts 7017.1140 to 7017.1180 apply only to CEMS.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1140 CEMS DESIGN REQUIREMENTS.

A CEMS shall be designed to complete a minimum of one cycle of sampling, analyzing, and data recording in each 15-minute period.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1150 CEMS TESTING COMPANY REQUIREMENT.

The following CEMS tests shall be conducted by an independent testing company:

- A. relative accuracy test audits; and
- B. the relative accuracy testing portion of any certification test.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1160 CEMS MONITORING DATA.

Subpart 1. **Data points.** All data points collected by a CEMS shall be used to calculate individual hourly emission averages unless another applicable requirement or compliance document requires more frequent averaging. Each hourly average starts at the beginning of the hour and ends at the beginning of the following hour.

Subp. 2. **Minimum data points.** In order for an hour of data to be considered valid, it must contain the following minimum number of data points during the hour:

- A. four data points, equally spaced, if the emission unit operated during the entire hour;
- B. two data points, at least 15 minutes apart, during periods of monitor calibration, and periods of time to conduct quality control audits or routine maintenance; and
- C. one data point if the emission unit operated for 15 minutes or less during the hour.

Subp. 3. **Data reduction procedures.** Monitoring data shall be recorded in the same units of measurement and averaging period as the facility's emission standard.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1170 QUALITY ASSURANCE AND CONTROL REQUIREMENTS FOR CEMS.

Subpart 1. **Exclusion from applicability.** The owner or operator of a CEMS may submit to the commissioner a notification of exclusion from the applicability of the requirements of subparts 4 and 5 if the actual emissions of the emission unit or units being monitored by the CEMS are less than ten tons per year or if the emission unit or units being monitored by the CEMS operates less than 120 hours per quarter. Facilities with CEMS utilizing this exclusion shall comply with the following alternative quality assurance and control audit procedure:

- A. conduct a minimum of one cylinder gas audit annually, except that during calendar years in which a relative accuracy test audit (RATA) is performed on the CEMS no CGA is required; and
- B. conduct a minimum of one RATA every five calendar years.

The owner or operator of a CEMS that has utilized an exclusion under this subpart shall submit notification with the following quarterly excess emissions report, in the event that the conditions which made the CEMS eligible for the exclusion no longer apply. No exclusion under this subpart affects the owner's or operator's obligation to comply with similar quality assurance provisions that may be imposed under other applicable requirements or compliance documents.

Subp. 2. **Quality assurance plan required.** The owner or operator of the facility shall develop and implement a written quality assurance plan that covers each CEMS. The plan shall be on site and available for inspection within 60 days after March 8, 1999, or within 30 days after monitor certification, whichever is later. The plan shall be revised as needed in order to keep it up to date with the facility's current policies and procedures. The plan shall contain all of the information required by Code of Federal Regulations, title 40, part 60, appendix F, section 3. The plan shall include the manufacturer's spare parts list for each CEMS and require that those parts be kept at the facility unless the commissioner gives written approval to exclude specific spare parts from the list. The commissioner may approve requested exclusions if the commissioner determines that it is not reasonable to keep a specific part on site after consideration of the consequences of a malfunction of the part, the likelihood of a malfunction, the time required to obtain the part, and other pertinent factors.

Subp. 3. **Daily calibration drift assessment and adjustment.** The facility owner or operator shall conduct daily calibration drift assessments and make adjustments as needed

according to the procedure listed in items A and B and Code of Federal Regulations, title 40, section 60.13(d)(1), for each pollutant concentration and diluent monitor. The calibration drift assessment shall be conducted on each monitor range. The span value specified in the applicable requirement or compliance document shall be used to determine the zero and span calibration points. If no span value is specified in the applicable requirement or compliance document, the owner or operator shall use a span value equivalent to 1.5 times the emission limit.

A. For an extractive CEMS, minimum drift assessment procedures shall include introducing applicable zero and span gas mixtures into the measurement system as near the probe as is practical. Gases within \pm two percent of tag value shall be used to perform the span (upscale) drift assessment. The span and zero gas mixtures shall be the same composition as specified in the applicable performance specification.

B. For a nonextractive, in situ CEMS, minimum drift assessment procedures shall include upscale checks using a certified calibration gas cell or test cell which is functionally equivalent to a known gas concentration. The zero check may be performed by computing the zero value from upscale measurements or by mechanically producing a zero condition.

Subp. 4. **Semiannual cylinder gas audit (CGA).** The facility owner or operator shall conduct a CGA on each concentration and diluent monitor on each CEMS. The CGA must be conducted on each monitor range. A CGA is required at least once every calendar half year, except that a CGA is not required during any calendar half year in which a RATA was performed on the CEMS. The initial CGA must be completed within 180 days following March 8, 1999, for CEMS which were certified prior to that date or within 180 days following certification of the CEMS for CEMS which are certified on or after that date. The CGA's shall be conducted at least three months apart but no more than eight months apart. A CGA shall be conducted according to the procedures in Code of Federal Regulations, title 40, part 60, appendix F, section 5.1.2. If the monitored emission unit was operated for less than 24 hours during the calendar half year, a CGA is not required on that CEMS during that calendar half year.

Subp. 5. **Relative accuracy test audits (RATA).** An initial relative accuracy test audit (RATA) shall be completed on each CEMS within 365 days following March 8, 1999, for CEMS which are certified prior to that date or within 365 days following certification of the CEMS for CEMS which are certified on or after that date. An additional RATA is required on each CEMS periodically according to items A and B.

A. A RATA is required on each monitor range, every calendar year, with the following exceptions:

(1) a RATA is not required in any calendar year if a RATA conducted in the previous year, for that CEMS, demonstrated a relative accuracy value of less than 15 percent; and

(2) a RATA is not required on any monitor whose associated emission unit operated less than 48 hours during the calendar year.

If the facility uses either of the exceptions in subitem (1) or (2), the next RATA shall be conducted during the first half of the following calendar year.

B. RATA's shall be conducted at least three months apart and according to the procedures in Code of Federal Regulations, title 40, part 60, appendix F, section 5.1.1.

Subp. 6. **Criteria for excessive CEMS audit inaccuracy.** The criteria for excessive inaccuracy are:

A. for RATA's, the relative accuracy value specified in the appropriate Performance Specification of Code of Federal Regulations, title 40, part 60, appendix B; and

B. for CGA's, the average audit value must be within 15 percent of the cylinder gas value or five ppm, whichever is greater.

Subp. 7. **Calibration gases.** Gas mixtures must not be used after the manufacturer's certification expiration data. The expiration date must be clearly labeled on the container of each gas.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1180 QUALITY CONTROL REPORTING AND NOTIFICATION REQUIREMENTS FOR CEMS.

Subpart 1. **Cylinder gas audit summary.** A cylinder gas audit summary must be submitted on a form approved by the commissioner within 30 days following the end of the calendar quarter in which the audit was completed. Any such form provided by the commissioner shall only seek information relevant to the cylinder gas audit.

Subp. 2. **Relative accuracy test audit notification.** The owner or operator shall notify the commissioner in writing at least 30 days prior to conducting any relative accuracy test audit. The notification may be made by facsimile, mail, electronic mail, or hand-delivered document.

Subp. 3. **Relative accuracy test audit summary.** A relative accuracy test audit summary report must be submitted on a form approved by the commissioner within 30 days following the end of the calendar quarter in which the relative accuracy test audit was conducted. Any such form provided by the commissioner shall only seek information relevant to the relative accuracy test audit.

Subp. 4. **Linearity check results summary.** Facilities subject to Code of Federal Regulations, title 40, part 75, shall submit a linearity check summary within 30 days following the end of the calendar quarter in which the linearity check was conducted on a form approved by the commissioner. Any such form provided by the commissioner shall only seek information relevant to the linearity check.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1185 APPLICABILITY.

Parts 7017.1190 to 7017.1220 apply only to COMS.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1190 COMS DESIGN REQUIREMENTS.

A COMS must be designed to complete a minimum of one cycle of sampling and analyzing in each successive ten-second period and one cycle of data recording each one-minute period.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1200 COMS MONITORING DATA.

Subpart 1. **Averaging periods.** All COMS data must be reduced to six-minute averages.

Subp. 2. **Data points.** Compliance must be calculated from all data points collected in the averaging period by the COMS. A six-minute average is valid only if it contains data from at least five of the minutes within the averaging period.

Subp. 3. **Opacity data reduction procedures.** Six-minute opacity averages must be calculated as follows: each one-minute period, the one-minute average opacity value must be determined by summing the opacity values of the individual data points collected by the COMS and dividing that sum by the number of data points collected. This is the one-minute average opacity value. Next, the sum of the individual one-minute averages in the applicable averaging period must be determined and divided by the number of one-minute averages taken. The resulting average must be rounded to the nearest one percent opacity. The resulting value is the six-minute opacity average that shall be recorded by the monitoring system. There are ten individual six-minute averaging periods in each hour. The first six-minute period starts at the beginning of the clock hour and ends at the beginning of minute six of the clock hour. The second six-minute period immediately follows the first, and the pattern continues through the last of the ten six-minute periods in a clock hour.

Subp. 4. **Opacity exceedance.** An opacity exceedance has occurred if, having taken any allowable excursions into account, any six-minute average exceeds the applicable opacity standard. Exceedances must be expressed as the number of nonoverlapping six-minute averages that exceeded the standard.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1210 QUALITY ASSURANCE AND CONTROL REQUIREMENTS FOR COMS.

Subpart 1. **Quality assurance plan requirement.** The owner or operator of the facility shall develop and implement a written quality assurance plan which covers each COMS. The plan shall be on site and available for inspection within 60 days after March 8, 1999, or within 30 days after monitor certification, whichever is later. The plan shall be revised as needed in order to keep it up to date with the facility's current policies and procedures. The plan shall contain written procedures which should describe in detail complete, step-by-step procedures and operations for each of the following activities:

- A. calibration of a COMS;
- B. drift determination and adjustment of a COMS;
- C. preventative maintenance of the COMS, including the manufacturer's spare parts list for each COMS, and require that these parts be kept at the facility unless the commissioner gives written approval to exclude specific spare parts from the list. The commissioner may approve requested exclusions if the commissioner determines that it is not reasonable to keep a specific part on site after consideration of the consequences of a malfunction of the part, the likelihood of a malfunction, the time required to obtain the part, and other pertinent factors;
- D. data recording, calculations, and reporting;
- E. accuracy audit procedures; and
- F. program for corrective actions for a malfunctioning COMS.

Subp. 2. **Daily calibration drift assessments and monitor adjustments.** The owner or operator of a COMS shall conduct a daily zero and upscale calibration drift assessment and adjustments according to the requirements of Code of Federal Regulations, title 40, part 60.13(d)(2). The zero and upscale calibration levels must be determined by using the span value specified in the applicable requirement. If the applicable requirement does not specify a span value, a span value of 60, 70, or 80 percent opacity must be used unless an alternative span value is approved by the commissioner.

Subp. 3. **Semiannual calibration error audit.** An initial calibration error audit must be completed on each COMS within 180 days following March 8, 1999, for a COMS which is certified prior to that date, or within 180 days following certification of the COMS for a COMS which is certified on or after that date. An additional calibration error audit is required on each COMS semiannually, and at least three months apart, but no more than eight months apart, except that a calibration error audit need not be conducted during any semiannual period in which the emission unit operated less than 24 hours. The calibration error audit shall be conducted according to the procedures in Code of Federal Regulations, title 40, part 60, appendix B, Performance Specification No. 1, section 7.1.4. The calibration attenuators (i.e. neutral density filters) shall be selected according to the procedure in section 7.1.2. of Performance Specification No. 1 unless the commissioner determines that other attenuator values are needed to properly measure the accuracy of the monitor because the pertinent opacity limit is unusually high or low. In that case, the commissioner shall specify the appropriate neutral density filter values. The equations contained in Code of Federal Regulations, title 40, part 60, appendix B, Performance Specification No. 1, section 8, shall be used to calculate a COMS audit result. A COMS calibration error audit result shall not exceed three percent opacity.

Subp. 4. **Attenuator calibration.** The owner or operator shall have an independent testing company conduct calibrations of each of the neutral density filters used in the calibration error audit according to the procedure in Code of Federal Regulations, title 40, part 60,

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appendix B, section 7.1.3., within the time frame of opacity stability guaranteed by the attenuator manufacturer. The manufacturer's guarantee of stability shall be on site available for inspection.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.1220 QUALITY ASSURANCE AND CONTROL REPORTING REQUIREMENTS FOR COMS.

A summary of the results of each COMS calibration error audit must be submitted on a form approved by the commissioner within 30 days following the end of the calendar quarter in which the audit was completed. Any such form provided by the commissioner shall only seek information relevant to the COMS calibration error audit.

Statutory Authority: *MS s 116.07*

History: *23 SR 1764*

7017.2000 [Repealed, 18 SR 1412]

PERFORMANCE TESTS

7017.2001 APPLICABILITY.

Subpart 1. **Applicability.** For the purpose of conducting a performance test as required by an applicable requirement or compliance document or as a data submittal engineering test, parts 7017.2001 to 7017.2060 apply unless more stringent requirements or equivalent procedures are mandated by an applicable requirement or compliance document. However, for the purpose of conducting a data submittal engineering test, part 7017.2025 does not apply and the operating conditions for the test shall be defined in the test plan. If the commissioner determines that a data submittal engineering test was not conducted at appropriate operating conditions for the type of data submittal, the commissioner shall declare the results invalid for their intended purpose unless the results can be adjusted and made representative using a scaling factor or engineering judgment or, in the case of a permit application, the permit contains an operating limit based on the tested conditions.

Subp. 2. **Transition to new rule.** Parts 7017.2001 to 7017.2060 supersede the requirements of Exhibit C, entitled "Performance Test Procedures" as attached to air emission permits issued by the agency prior to November 1, 1993. For performance tests required by permits issued prior to November 1, 1993, if the commissioner cannot establish worst case operating conditions under part 7017.2025, subpart 2, operating conditions for the performance test shall be defined in the test plan. In this situation, if the performance test demonstrates compliance, then part 7017.2025, subpart 3, item B, applies.

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 23 SR 145*

7017.2005 DEFINITIONS.

Subpart 1. **Scope.** For the purposes of parts 7017.2001 to 7017.2060, the definitions given in part 7005.0100 shall apply unless otherwise defined in this part.

Subp. 1a. **Applicable requirement.** "Applicable requirement" has the meaning given in part 7007.0100, subpart 7.

Subp. 2. **Compliance document.** "Compliance document" means a permit, stipulation agreement, administrative penalty order, administrative order, compliance agreement, schedule of compliance, consent order, consent decree, or variance issued by the agency or EPA to control air pollution.

Subp. 2a. **Data submittal engineering test.** "Data submittal engineering test" means a performance test that is conducted voluntarily by the owner or operator of the emission facility for the purpose of submitting the results to support a permit application, emission inventory submittal, or any other type of data submittal. This does not include voluntary retests con-

ducted following a failure to demonstrate compliance or performance tests conducted voluntarily in order to relax an operating limit in accordance with part 7017.2025, subpart 3b.

Subp. 3. Federal regulation. "Federal regulation" means any regulation promulgated by EPA under the Clean Air Act, United States Code, title 42, section 7401, et seq.

Subp. 4. Performance test. "Performance test" means the quantification of emissions or determination of the physical, chemical, or aesthetic properties of those emissions from an emissions unit by means of conducting one or more test runs at an emission facility.

Subp. 5. Test plan. "Test plan" means the document which describes the objectives of a performance test, how the emissions unit will be operated during the performance test, how operating conditions will be monitored and recorded, which test methods will be used, and any other specific requirements of the applicable requirement or compliance document.

Subp. 6. Test run. "Test run" means the procedure for sampling or analyzing emissions at or before the emission point of an emissions unit over a defined length of time at specified operating conditions.

Subp. 7. Testing company. "Testing company" means a corporation, partnership, or sole proprietorship that conducts performance tests as a normal part of its business activities and that is not the owner or operator of the emission facility or a subsidiary, division, or subdivision of the owner or operator of the emission facility.

Subp. 8. Worst case conditions. "Worst case conditions" means the mode of operation of an emissions unit, including the air pollution control equipment, that is allowed under the applicable requirement or compliance document and which is known, through performance test data or mass balance calculation, to give the highest emission rate for an air pollutant within the allowed range of operating conditions. The type of operating conditions included in this definition shall be limited to the process or operating rate and any operational parameters that are regulated by the applicable requirement or compliance document.

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 23 SR 145; 23 SR 1764*

7017.2010 INCORPORATION OF TEST METHODS BY REFERENCE.

For the purpose of parts 7017.2020 to 7017.2060, the documents in items A to D are incorporated by reference. These documents are subject to frequent change.

A. Code of Federal Regulations, title 40, part 60, Appendix A, as amended, entitled "Appendix A – Test Methods."

B. Code of Federal Regulations, title 40, part 63, Appendix A, as amended, entitled "Appendix A to Part 63 – Test Methods."

C. Code of Federal Regulations, title 40, part 61, Appendix B, as amended, entitled "Appendix B – Test Methods."

D. Code of Federal Regulations, title 40, part 51, Appendix M, as amended, entitled "Appendix M to Part 51 – Recommended Test Methods for State Implementation Plans."

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 20 SR 2254(NO. 42)*

7017.2015 INCORPORATION OF FEDERAL TESTING REQUIREMENTS BY REFERENCE.

Subpart 1. Applicability. Subparts 1 to 4 apply to the owner or operator of an emission facility, emissions unit, or stationary source subject to New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants.

Subp. 2. New source performance standards. The following are adopted and incorporated by reference:

A. Code of Federal Regulations, title 40, section 60.8, as amended, entitled "Performance Tests," except that decisions made by the administrator under Code of Federal Regulations, title 40, sections 60.8(b)(2) and 60.8(b)(3), are not delegated to the commissioner and must be made by the administrator.

B. Code of Federal Regulations, title 40, section 60.11, as amended, entitled "Compliance with Standards and Maintenance Requirements," except that decisions made under Code of Federal Regulations, title 40, section 60.11(e), are not delegated to the commissioner and must be made by the administrator.

Subp. 3. **National Emission Standards for Hazardous Air Pollutants.** The following are adopted and incorporated by reference:

A. Code of Federal Regulations, title 40, section 63.7, as amended, entitled "Performance Testing Requirements."

B. Code of Federal Regulations, title 40, section 61.13, as amended, entitled "Emission Tests and Waiver of Emission Tests," except that decisions made by the administrator under Code of Federal Regulations, title 40, section 61.13(h)(1)(ii), are not delegated to the commissioner and must be made by the administrator.

Subp. 4. **Document submission.** All requests, reports, applications, submittals, and other communications to the administrator pursuant to subparts 2 and 3 must be submitted to the person identified in part 7017.2018, except that for those sections identified in this part as not delegated to the commissioner, the request, report, application, or submittal must be submitted to the EPA administrator.

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 20 SR 2254(NO. 42); 23 SR 145*

7017.2018 SUBMITTALS.

All notifications, applications, or submittals required under parts 7017.2015 to 7017.2060 shall be sent to the Supervisor, Compliance/Enforcement Unit, Majors and Remediation Division, Minnesota Pollution Control Agency, 520 Lafayette Road, St. Paul, Minnesota 55155-4194.

The performance test report required by parts 7017.2025, subpart 4, item A, subitem (3), and 7017.2035, subpart 2, shall be submitted as a bound, paper copy with the signed certification statements required by part 7017.2040. However, as an alternative to the microfiche copy of the performance test report, the commissioner shall accept the submittal in a format such as computer disk or CD-ROM, provided that the commissioner has given prior approval for the use of the alternative format in order that compatibility between the software and hardware configurations of the agency and the owner or operator of the emission facility can be assured. Similarly, performance test notifications and test plans shall be accepted in the type of format referenced above or by electronic mail subject to the commissioner's prior approval as described above.

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 23 SR 145; 28 SR 1482*

7017.2020 PERFORMANCE TESTS GENERAL REQUIREMENTS.

Subpart 1. **Testing required.** The owner or operator of an emission facility shall arrange to conduct a performance test to determine the characteristics and amount of emissions of air pollutants from any emission facility at the times required by an applicable requirement or compliance document and at additional times if the commissioner requests a performance test in order to:

A. evaluate a permit application;

B. determine compliance with an applicable requirement or compliance document;

C. determine compliance subsequent to a performance test that indicated noncompliance or where compliance could not be determined due to errors in following a test method, lack of or inaccurate documentation, or because the requirements of parts 7017.2001 to 7017.2060 were not met;

D. determine the compliance status of an emission facility following an inspection of the facility by agency staff during which indicators of noncompliance were found;

E. determine the compliance status of an emission facility following a modification to the emission facility that the commissioner determines could cause an increase in the amount of emissions of any air pollutant from that facility; or

F. quantify the emissions from an emission facility where the commissioner has determined a possible environmental or public health concern.

EPA may request a performance test under this part for the reasons listed in items A to F and may make the decisions that the commissioner makes under parts 7017.2001 to 7017.2060 and any other Minnesota rule or statute for that performance test. EPA's authority to require performance testing under its own regulations or under the Clean Air Act is not affected by this part.

Subp. 2. Testing company. The performance test shall be conducted by a testing company unless a compliance document allows the owner or operator to conduct the performance test or to contract with an alternative entity that does not meet the criteria of the definition of testing company, or unless the agency, EPA, or any authorized employee or agent of the agency or EPA is conducting the performance test.

Subp. 3. Safety and access. The owner or operator of the emission facility shall provide a safe working platform and safe access to the platform at the sampling site.

Subp. 4. Verification of test results. The results of a performance test are not final until a complete report, as defined in part 7017.2035, subpart 3, is submitted and the commissioner gives written verification of the compliance status of the emission facility. Upon verification of the test results, the duration of the compliance status that the performance test determines for the emission facility begins with the date of the performance test. Nothing in this subpart prevents the use of any evidence to establish the existence of a violation before the date of the performance test, or excuses noncompliance between the date of the performance test and the commissioner's written verification of it.

Subp. 5. Test runs. Each performance test shall consist of at least three separate test runs using the applicable test method, except that one test run shall be required for opacity determination. However, the commissioner shall require more test runs to be conducted if the applicable requirement or compliance document requires additional test runs or determination of emissions at more than one process or operating condition.

Data reduction for opacity shall be conducted in accordance with part 7017.2060, subparts 5 and 6. For all other pollutants, the arithmetic mean of the test runs is the result of the performance test. In the event that a sample is accidentally lost or conditions occur in which one of three test 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 control of the owner or operator and the testing company, compliance may, upon the commissioner's approval, be determined using the arithmetic mean of the two remaining test runs. The owner or operator shall document in the test report all reasons for excluding a test run or failing to conduct a test run.

Subp. 6. Evidence of noncompliance. The results of a performance test that have been rejected or deemed incomplete or indeterminate by the commissioner due to failure to comply with parts 7017.2001 to 7017.2060 and performance tests which are not subject to parts 7017.2001 to 7017.2060 may still be used in establishing violations pursuant to part 7017.0100 if they represent credible evidence of such violations. This includes, but is not limited to, results of tests:

- A. that were started but abandoned before completing all the required test runs;
- B. submitted without the required notification or test plan;
- C. that are incomplete due to lack of emission facility operating data in the test report; and
- D. conducted under unrepresentative operating conditions or conditions that deviated from the test plan.

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 21 SR 693; 23 SR 145; 23 SR 1764*

7017.2025 OPERATIONAL REQUIREMENTS AND LIMITATIONS.

Subpart 1. Scope. This part specifies criteria that the commissioner will use to determine which operating parameters, if any, will be subject to limitations based upon the mode

of operation during a performance test. Operations during periods of start-up, shutdown, and malfunction shall not constitute representative conditions of performance tests unless otherwise specified in an applicable requirement or compliance document.

Subp. 2. Operating conditions for performance testing. The performance test shall be conducted at worst case conditions for each air pollutant that is required to be tested unless:

A. the applicable requirement or compliance document specifies alternative operating conditions for performance testing;

B. the worst case condition is not known or calculable. In this case, worst case conditions shall be assumed to be the maximum achievable process or operating rate of the emissions unit; or

C. the owner or operator of the emission facility elects to conduct the performance test at conditions that are not worst case conditions.

Subp. 3. Compliance demonstrated at tested conditions. Upon the commissioner's written notice that the emission facility has demonstrated compliance under the conditions of the performance test, the owner or operator of the emission facility shall operate the affected emissions unit as specified in item A, B, C, or D, unless another performance test is conducted at alternative conditions and the commissioner gives written notification that the performance test demonstrated compliance at those conditions. This subpart does not apply to performance test runs for pollutants for which the owner or operator maintains a continuous emission monitor or continuous opacity monitor that meets the requirements of part 7017.1002 to 7017.1220.

A. If the owner or operator did not conduct the performance test at worst case conditions as required, or elected to conduct the performance test under alternative conditions under subpart 2, item C, the affected emissions unit shall not be operated at a process rate, operating rate, or regulated operating condition that is closer to the worst case conditions than the actual conditions of the performance test. The owner or operator of the emission facility shall maintain at the emission facility adequate records to demonstrate continuous compliance with these operating condition limitations.

B. If the owner or operator conducted the performance test under the conditions specified in subpart 2, item A, the owner or operator shall comply with any operational limitations imposed by the applicable requirement or compliance document.

C. If the owner or operator conducted the performance test at the maximum achievable process or operating rate under subpart 2, item B, the emissions unit may not be operated at a higher process or operating rate than was recorded during the performance test.

D. If the owner or operator conducted the performance test at worst case conditions, no new operating limits are imposed by this part but the owner or operator shall comply with any applicable requirement or compliance document. When the worst case testing condition is defined in terms of an operating rate for the affected emissions units, no new operating rate limit may be imposed by this part if the performance test was conducted at 90 percent or greater of the defined worst case condition.

Subp. 3a. Compliance with new operating limits. If a new operating limit is imposed pursuant to subpart 3, it shall be implemented according to items A to C, unless otherwise defined in an applicable requirement or compliance document.

A. For operating rate limits, the new limit shall be expressed as an eight-hour block average calculated by totaling total throughput, input, or output as applicable during the eight-hour period and dividing by the total operating time during the eight-hour period. Periods of downtime of 15 or more minutes shall not be counted as operating time. The commissioner may shorten the averaging time or modify the calculation method in cases where the operating mode of the affected emissions unit is not continuous or consistent and in cases where the results of the performance test were greater than 80 percent of the applicable limits.

B. For operating rate limits imposed following a performance test where the results were less than or equal to 80 percent of the value of the applicable emission limits for all of the air pollutants that were required to be tested, the new limit shall be set at 110 percent of

the tested rate except as otherwise provided in this item. The tested rate is the average of the operating rates recorded during the required number of test runs. The commissioner may set the new operating limit at 100 percent of the tested rate if the new limit would otherwise conflict with an existing operating limit or the description of the emission unit in the applicable air emission permit or if engineering judgment indicates that increasing the allowable operating rate would cause a likely violation of an emission limit.

C. For new operating limits other than operating rate limits, the averaging time and any extension of the range of values shall be defined in the test plan based upon the type of emissions unit or air pollution control equipment affected, the parameter being monitored, the accuracy of the monitoring equipment, the frequency and method of monitoring, and any specific requirements defined in an applicable requirement or compliance document.

Subp. 3b. Relaxation of operating limits by retesting. The owner or operator of the emission facility may conduct a retest at alternate operating conditions in order to relax an operating limit set pursuant to subpart 3. The retest shall be subject to parts 7017.2001 to 7017.2060. The owner or operator must submit the test results to the commissioner and identify what the new operating conditions will be and how compliance with those new conditions will be monitored. The owner or operator shall comply with any relaxed conditions established under this subpart.

Subp. 4. Failure to demonstrate compliance.

A. Upon the commissioner's written notice that the emission facility has failed to demonstrate compliance with an applicable emission limit, the owner or operator of the emission facility, unless an alternative schedule is given in an applicable requirement or compliance document, shall:

(1) conduct a retest within 30 days of receipt of the commissioner's written notice;

(2) submit to the commissioner written notice of testing, submit a test plan for the retest, and schedule a pretest meeting at least 21 days in advance of the date of the retest. The pretest meeting shall be held at least seven days prior to the date of the retest, except that a shorter period shall be allowed if the commissioner has approved a test notification of less than 30 days; and

(3) submit a complete report of the results of the retest and a microfiche version of the report to the commissioner according to the requirements of part 7017.2035.

B. The owner or operator may receive an extension to the schedule in item A if one of the following special circumstances applies:

(1) seasonal or temporary shutdown of the affected emissions units;

(2) malfunction or breakdown of the affected emissions units, unless the commissioner determines that a retest under such conditions is warranted in order to determine the effect of the malfunction or breakdown on emissions or where such conditions are representative of past operation of the emissions units;

(3) weather conditions that prevent using the applicable test methods or prevent operation of the affected emission units at the required operating conditions;

(4) any other conditions beyond the control of the owner or operator that prevent using the applicable test methods or prevent operation of the affected emissions units at the required operating conditions;

(5) any other condition beyond the control of the owner or operator that prevents completion of a retest within the required schedule; or

(6) the owner or operator accepts that the retest would not demonstrate compliance and submits a compliance plan to the commissioner on or before the deadline for conducting the retest and the commissioner gives written approval of the compliance plan.

C. Any request for an extension of the time schedule shall be submitted to the commissioner in writing by the owner or operator prior to the date by which retesting is required. The request shall specify the reason why the extension is needed, include an alternative retest schedule, and include a detailed summary of the measures the owner or operator will take to bring the affected emission unit into compliance. The commissioner shall grant the request for extension if the commissioner finds that one or more of the special conditions in item B

apply. If the commissioner grants an extension, the owner or operator shall implement the alternative retest schedule and compliance measures. A requested extension shall not be effective unless the commissioner has given written approval of the extension. The commissioner shall not extend a retest date more than 30 days after the start-up, completion of maintenance, seasonal weather change, or other improvement in conditions occurs under item B, subitems (1) to (4). The commissioner shall not extend a retest date under item B, subitem (5), for more than 30 days.

Subp. 5. Failure of retest. If a retest has been conducted under subpart 4 and the commissioner provides written notice to the owner or operator of the emission facility that the retest provides a second demonstration of noncompliance with an applicable emission limit, the owner or operator shall shut down the affected emissions units unless items A to C of this subpart apply.

A. The owner or operator is able to demonstrate to the commissioner that corrective actions or procedural changes have been made which will be applied consistently and which will, when properly executed, ensure that the emission units will demonstrate compliance at all times with all applicable emission limits and capture, removal, or destruction efficiency requirements.

B. The owner or operator has received the commissioner's written acceptance of demonstrating the conditions in item A. This written acceptance may be given at the same time as the notification of noncompliance if a compliance plan has already been submitted under subpart 4 or otherwise and it satisfies the requirements of item A.

C. Upon receipt of the commissioner's approval to operate the affected emissions units, the owner or operator complies with any new operating limits arising from the demonstration in item A.

Subp. 6. Agency tests. Upon request of the agency or the commissioner, the owner or operator of an emission facility shall allow the agency or EPA, or any authorized employee or agent of the agency or EPA, to enter upon the premises of the owner or operator for the purposes of conducting performance tests. The owner or operator shall provide performance testing facilities that enable the agency or its employees or agents to conduct performance tests, including:

- A. sampling ports adequate for the applicable test methods;
- B. safe sampling platforms;
- C. safe access to sampling platforms; and
- D. utilities for sampling and testing equipment.

The owner or operator shall operate the emission facility at worst case conditions or other conditions as requested by the commissioner or EPA, and shall provide assistance in process monitoring and process material sampling as requested.

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 23 SR 145; 23 SR 1764*

7017.2030 PERFORMANCE TEST PRETEST REQUIREMENTS.

Subpart 1. Notification of testing. Written notification of the planned test date shall be postmarked or received at least 30 days before the planned test date. The commissioner shall reject the results of a test if less than 30 days' notice was given unless written authorization of a shorter notice was given by the commissioner.

Subp. 2. Submittal and approval of test plan. The owner or operator of the emission facility shall submit to the commissioner a test plan with or in advance of the test notification required under subpart 1 or in response to the commissioner's request for supplemental permit application information. If the proposed test plan does not contain sufficient or accurate enough detail to ensure that the performance test meets the requirements of the applicable requirement or compliance document, the commissioner shall ask for an updated test plan to be submitted or shall write a test plan in place of the submitted document.

The commissioner shall give written approval of the test plan when the commissioner determines that it meets the requirements of parts 7017.2001 to 7017.2060. Written approval

means any signed letter, note, or facsimile transmission which states that a given test plan may be used during a specific performance test. The commissioner shall reject the results of a performance test if it was conducted without written approval of the test plan or if no test plan was submitted.

Subp. 3. **Format and content of test plan.** The test plan shall be submitted in the following format and include the following elements:

A. Part I. General information:

- (1) name and address of emission facility;
- (2) name, title, telephone number, and facsimile number of contact person at emission facility;
- (3) permit number or name of other applicable compliance document;
- (4) reason for testing;
- (5) schematic drawing of stack and sample ports;
- (6) location of plant; and
- (7) name, contact person, telephone number, and facsimile number for testing company contracted to conduct the test.

B. Part II. Testing requirements:

- (1) list of the emission units, as identified in the applicable requirement or compliance document, and pollutants to be tested, the emission limit for each pollutant, and the applicable rule or regulation for each emission limit; and
- (2) description of procedure for fuel sampling and analysis, where applicable.

C. Part III. Operating conditions:

- (1) list of the process or operating rate and conditions of the process equipment and air pollution control equipment for the test;
- (2) explanation of why the proposed conditions are considered to be in accordance with part 7017.2025, subpart 2, for required testing conditions;
- (3) list of the range of process or operating rates for each emissions unit; and
- (4) description of how air pollution control and process equipment will be monitored.

D. Part IV. Test methods:

- (1) list of the methods to be used to determine the emission rate of each pollutant;
- (2) number of test runs, length of test run, and sampling rate for each method;
- (3) reference to any applicable requirement or compliance document requiring use of specific methods or procedures;
- (4) summary of reasons for proposing to use any alternative or equivalent method; and
- (5) for test methods other than reference methods, statement of the detection limit and the degree of accuracy of that method at the expected emission rate and under the conditions of the performance test.

Subp. 4. **Pretest meeting.** The owner or operator of the emission facility shall contact the supervisor of the compliance determination unit to schedule a pretest meeting to be held between authorized employees of the agency and the owner or operator of the emission facility, with optional representation by the testing company. The pretest meeting shall be held at least seven days prior to the performance test date except that a shorter period shall be allowed if the commissioner has approved a test notification of less than 30 days. If the commissioner determines that an in-person meeting is not necessary, the pretest meeting will be conducted by telephone conference call unless the owner or operator of the emission facility requests an in-person meeting.

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 23 SR 145; 23 SR 1764*

7017.2035 PERFORMANCE TEST REPORTING REQUIREMENTS.

Subpart 1. **Submittal of performance test results.** The owner or operator of the emission facility shall submit a test report and any additional information required by the applicable requirement, compliance document, or test plan. A report shall be submitted for any performance test that was required pursuant to part 7017.2020, subpart 1, whether or not the test data indicates compliance with the applicable emission limits or operating conditions and whether or not the test was completed according to the approved test plan.

Subp. 2. **Submittal schedule.** The performance test report shall be postmarked or received within 45 days following completion of the performance test unless an alternate schedule is given in the applicable compliance document. The owner or operator of the emission facility may request in the test plan that the submittal deadline be extended by up to 15 days if the complexity of the test schedule or the laboratory analysis is such that submittal within 45 days is impractical.

The owner or operator of the emission facility shall provide to the commissioner a microfiche copy of the performance test report to be postmarked or received within 60 days of the deadline for submittal of the test report. The complete permit file number, complete emission facility name, and exact date of testing shall be provided.

Subp. 3. **Complete report.** The report shall include the following elements:

A. Cover:

- (1) name and location of the emission facility;
- (2) identification of emissions unit tested;
- (3) date of the performance test; and
- (4) name and address of testing company or agency.

B. Certification: signed and dated certification statements in the format required by part 7017.2040.

C. Introduction:

- (1) reason for testing, for example, required by permit or notice of violation, including permit number or name of other applicable compliance document;
- (2) test location, type of process;
- (3) test dates;
- (4) pollutants tested;
- (5) observers' names including industry and agency observers; and
- (6) any other important background information.

D. Summary of results:

- (1) emission results, expressed in the same units as the emission limits;
- (2) process data, as related to determination of compliance;
- (3) emission limits and applicable regulations;
- (4) description of collected samples;
- (5) visible emissions summary if applicable; and
- (6) discussion of errors, both real and apparent.

E. Operating parameters: readings of discrete data from monitoring instruments must be recorded at least every 15 minutes or other reasonable time interval as approved by the commissioner during the test and strip charts or retrieved electronic data from continuous monitors must be included in the test report.

- (1) description of process and air pollution control devices;
- (2) process and control equipment flow diagram;
- (3) process data and results, with example calculations; and
- (4) any specially required operation demonstrations.

F. Maintenance: description, including dates, of all maintenance and operational inspections, including major cleaning operations and replacement, repair, or modification of functional components of process or control equipment done in the month prior to the test.

G. Sampling and analysis procedures:

- (1) sampling port location and dimensioned cross section, showing all flow disturbances including elbows, dampers, fans, constrictions, and collection equipment;
- (2) description of sampling point;
- (3) description of sampling train;
- (4) brief description of sampling procedures and analytical methods, with discussion of deviations from standard methods, including a statement of source methods used, but not including complete copies of reference methods in the report; and
- (5) if a method other than a United States EPA reference method was used, statement of the detection limit and the level of accuracy of the method under the conditions of the test and at the concentration of air pollutant that is reported.

H. Appendix:

- (1) complete results, including any fuel analysis, with example calculations, showing equations used and actual results in equation form on same or adjacent pages, using applicable equations shown in the reference method;
- (2) copies of raw field data;
- (3) laboratory report, with record of chain of custody;
- (4) raw production data, signed by plant official who can interpret the data and can be held accountable for the data;
- (5) test log;
- (6) calibration procedures and results, including Pitot tube, nozzle, meter box, thermometer, and barometer calibrations;
- (7) project participants and titles; and
- (8) a copy of the most recent version of the test plan and a copy of the commissioner's written approval of the test plan.

I. Additional information:

- (1) any other special requirement of the test method, test plan, applicable requirement, or compliance document; and
- (2) any other information necessary to evaluate compliance with parts 7017.2020 and 7017.2025 as requested by the commissioner.

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 23 SR 145*

7017.2040 CERTIFICATION OF PERFORMANCE TEST RESULTS.

Subpart 1. **Certification required.** The test report shall contain a certification by the responsible parties that the test results have been reported accurately, that the field data are a true representation of the sampling procedures, and that the process data are a true indicator of the operating parameters of the emissions unit at the time of the performance test. The commissioner shall reject the results of a performance test if the test report does not contain the certifications required by subparts 2 to 5 or if any of the certifications in subparts 2 to 5 are determined to be false.

Subp. 2. **Certification of sampling procedures.** The team leader of the personnel conducting the sampling procedures shall certify that the data presented in the test report is true, accurate, and complete. The following statement shall be signed and dated by that person:

"I certify under penalty of law that the sampling procedures were performed in accordance with the approved test plan and that the data presented in this test report are, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below."

Subp. 3. **Certification of analytical procedures.** The person responsible for the laboratory analysis of field samples from a performance test shall certify that the data presented for use in the test report is true, accurate, and complete. The following statement shall be signed and dated by that person:

"I certify under penalty of law that the analytical procedures were performed in accordance with the requirements of the test methods and that the data presented

for use in the test report were, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.”

Subp. 4. Certification of test report by testing company. The senior staff person at the testing company who is responsible for compiling and checking the test report shall certify that the information contained within the test report is true, accurate, and complete. The following statement shall be signed and dated by that person:

“I certify under penalty of law that this test report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the test information submitted. Based on my inquiry of the person or persons who performed sampling and analysis relating to the performance test, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.”

Subp. 5. Certification of test report by owner or operator of emission facility. The owner or operator of the emission facility shall certify that the report accurately reflects the operating conditions at the emission facility during the performance test and that the required operational and maintenance data for the month prior to the performance test has been reported in a true, accurate, and complete manner. The following statement shall be signed and dated by that person:

“I certify under penalty of law that the information submitted in this test report accurately reflects the operating conditions at the emission facility during this performance test and describes the date and nature of all operational and maintenance activities that were performed on process and control equipment during the month prior to the performance test. Based on my inquiry of the person or persons who performed the operational and maintenance activities, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below.”

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 20 SR 2316*

7017.2045 QUALITY ASSURANCE REQUIREMENTS.

Subpart 1. Witnessing. A performance test may be witnessed by either the commissioner or an authorized employee or agent of the commissioner or by EPA staff.

Subp. 2. EPA audit samples. The owner or operator of the emission facility shall have the testing company conducting the performance test analyze any EPA audit sample issued by EPA or the commissioner in accordance with EPA protocol. If the audit sample is a reusable sample that EPA requires to be returned, the owner or operator of the emission facility shall return the sample as directed by EPA, in good condition and within the time allowed by EPA. The results of the audit shall be included in the test report.

Subp. 3. Quality assurance. Any performance test shall meet the minimum requirements for quality assurance, performance standards, and specifications as stated in the reference method or in the alternative or equivalent method. The provisions in items A and B also apply.

A. All test runs for a given air pollutant shall be completed within a single 24-hour period unless process variables make this impractical or the method requires test runs of three hours or greater, in which case the runs may be conducted on consecutive days provided that the test is conducted according to the provisions of the approved test plan on each day.

B. Only employees of the testing company may operate source sampling equipment or otherwise be a part of the emission sampling or analysis of air pollutants from the emission facility during a performance test. The owner or operator or employees of the emission facility may not assist in any sampling or any analysis of samples unless authorized within an approved test plan.

Any request to deviate from the requirements of this subpart shall be submitted at least seven working days before the performance test. The commissioner shall reject the results of each test run where deviations from quality assurance or methodology or test plan requirements exceeded those allowed under subpart 4.

Subp. 4. **Deviation from quality assurance, test method, or test plan.** The commissioner shall reject the results of a performance test if there was a deviation from the quality assurance requirements of this part, from the test method, or from the approved test plan unless:

- A. the deviation was approved in writing by the commissioner prior to the test;
- B. the deviation was from the test method and did not adversely affect the precision or scope of the test method under the conditions of the performance test, and the test requirement was not subject to federal regulation;
- C. the deviation was from the test method and was within the guidelines of that method and was necessitated by field conditions; or
- D. the deviation was from the operating conditions required of the emissions unit and was within the range of operating conditions allowed by the applicable requirement or compliance document such that the compliance status of the emission facility can be determined under the test conditions. In this case, the conditions of part 7017.2025 apply.

Subp. 5. **Precision of test methods.** The inherent precision, level of confidence, and bias of any test method approved by the commissioner for use during a performance test shall not be a factor in determining the compliance status of an emission facility. However, the commissioner shall reject any test runs that were not conducted with acceptable accuracy within the limits of the test method and the sampling conditions or if the detection limit of the test method was higher than the applicable emission standard.

If the commissioner determines that the test results are valid under the quality assurance requirements of the method and that the performance test was conducted in accordance with parts 7017.2001 to 7017.7060 and the applicable requirement or compliance document and the test result exceeds the applicable emission limit by any amount, the owner or operator is in violation of that emission limit.

Subp. 6. **Adjustments for detection limit.** The commissioner shall require that the sample volume to be collected be increased above the minimum amount specified in an applicable requirement or compliance document, if necessary to ensure that the amount or concentration of the pollutant collected is greater than the detection limit given by the analytical procedure employed upon the field samples. If the commissioner requires this, the minimum sample volume shall be determined by the following equation:

$$V = A \times \frac{100}{B} \times \frac{100}{C} \times \frac{I}{D}$$

Where: V = minimum sample volume to be collected (dscm)
 A = the analytical detection limit in g
 B = percent of the sample required per analytical run
 C = sample recovery (%)
 D = stack emission limit or expected emission rate (g/dscm)

In cases where a performance test for a pollutant yields a result that is less than the detection limit of the method as utilized, the results shall be calculated and reported as less than or equal to that detection limit.

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 23 SR 145*

7017.2050 PERFORMANCE TEST METHODS.

Subpart 1. **Test methods.** Unless a different method is given in an applicable requirement or compliance document, the owner or operator of an emission facility shall conduct performance tests using the methods incorporated by reference in part 7017.2010 and following the requirements in part 7017.2060, unless an alternative or equivalent method is approved or required by the commissioner in accordance with subpart 2.

Subp. 2. **Alternative or equivalent test methods.** In lieu of the test method described in subpart 1, the commissioner may, if the performance test is not required for demonstration of compliance with a federal regulation:

A. specify or approve minor changes that will not adversely affect the precision or scope of the test method as applied to the conditions of the performance test;

B. approve the use of an equivalent method; or

C. approve the use of an alternative method.

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 23 SR 145*

7017.2060 PERFORMANCE TEST PROCEDURES.

Subpart 1. **Applicability.** For the purpose of using the methods referenced in part 7017.2050, the requirements in this part apply unless otherwise stated in the applicable requirement or compliance document.

Subp. 2. **Sample port location.** The sampling location, as selected by Method 1, shall be the same for each pollutant during a performance test.

Subp. 3. Total particulate matter determination.

A. For Method 5, the sampling time for each test run shall be at least 60 minutes and the minimum sampling volume will be 32 dscf (0.9 dscm).

B. For particulate matter determination where the applicable emission limit includes organic condensibles, results for particulate matter emissions shall include organic condensible particulate matter emissions as determined by the amendment to Method 5 given in part 7011.0725. The results shall be reported as both total particulate matter including organic condensibles and as particulate matter excluding organic condensibles.

C. The determination of condensible particulate matter may be waived if it can be demonstrated to the commissioner through mass balance calculations or previous performance test results that the emissions unit is not a source of organic condensible particulate matter emissions.

Subp. 4. PM-10 determination.

A. Method 201 or 201A shall be used unless the commissioner has approved an alternate or equivalent method. The sampling time for each run shall be at least 60 minutes and the minimum sampling volume will be 32 dscf (0.9 dscm).

B. Results for PM-10 emissions shall include condensible particulate matter emissions as determined by Method 202. The results shall be reported as both total PM-10 including condensibles and as PM-10 excluding condensibles.

C. The compliance status of the emission facility shall be based on the result for total PM-10 including condensible particulate matter.

D. The determination of condensible particulate matter may be waived if it can be demonstrated to the commissioner through mass balance calculations or previous performance test results that the emissions unit is not a source of condensible particulate matter emissions.

Subp. 5. **Opacity determination by Method 9.** Opacity observations shall be performed by a certified observer and in accordance with the requirements of Method 9. In addition, the requirements of subpart 6 and the following items shall apply:

A. The commissioner may reject the opacity results if the commissioner cannot determine the compliance status of the emission facility due to error, bias, or insufficient documentation during the performance test. The recommendations of Method 9 and EPA document EPA-600/4-77-027b, Addition Section 3.12 (Feb. 1984), as amended, entitled "Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. Stationary Source Specific Methods," which is incorporated by reference, shall be used in determining the acceptability of opacity results. This document is available at the State Law Library and is not subject to frequent change.

B. One series of readings is required for each condition where opacity is required to be tested. Each test run shall comprise 240 consecutive readings at 15-second intervals

and shall be obtained concurrently with a test run for particulate matter, where applicable. Copies of the opacity form showing all readings and required notation shall be included in the performance test report.

C. The results of continuous monitoring by transmissometer which indicate that the opacity at the time visual observations were made was not in excess of the standard are probative but not conclusive evidence of the actual opacity of an emission, provided that the owner or operator shall meet the burden of proving that the instrument used met, at the time of the alleged violation, Performance Specification 1, had been properly maintained and, at the time of the alleged violation, calibrated, and that the resulting data have not been tampered with in any way. The data shall be subject to the reduction processes in subpart 6.

D. Data reduction shall be performed in accordance with Paragraph 2.5 of Method 9 and subpart 6. A one-hour period means any 60 consecutive minutes and a six-minute period means any set of 24 consecutive 15-second intervals.

Subp. 6. Opacity data reduction procedures. For the purpose of this part, "excursion" means an opacity higher than the base standard that is allowed for a limited number of minutes within a time period. Compliance with opacity limits shall be determined from all data points collected in an averaging period and according to items A and B.

A. For opacity standards which allow excursions based on six-minute periods, an exceedance of the standard has occurred if, having taken the allowable excursion into account, any six-minute average exceeds the standard. The exceedance shall be expressed as the value of the highest six-minute average and the number of nonoverlapping six-minute averages that exceed the standard within the period of the test run.

B. For opacity standards that do not allow excursions, an exceedance of the standard has occurred if any six-minute average exceeds the standard. The exceedance shall be expressed as the value of the highest six-minute average and the number of nonoverlapping six-minute averages that exceed the standard within the period of the test run.

Subp. 7. Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans determination. For Method 23, each sample run shall be at least three hours in duration at an average sampling rate of 0.5 dscf/minute or higher. The minimum sample volume shall be 90 dscf. Longer test runs may be required by the commissioner in order to collect a greater sample volume if low resolution mass spectroscopy is to be used for analysis of the field samples or as otherwise required by part 7017.2045, subpart 6.

Statutory Authority: *MS s 116.07*

History: *18 SR 1412; 23 SR 145*