**Section 225.APPENDIX B Continuous Emission Monitory Systems for Mercury**

**Section 225.EXHIBIT B** [**Quality Assurance and Quality Control Procedures**](http://www.westlaw.com/Find/Default.wl?rs=dfa1.0&vr=2.0&DB=CFR&DocName=LK%2840CFRPT75APPB%29&FindType=l)

1. Quality Assurance/Quality Control Program

Develop and implement a quality assurance/quality control (QA/QC) program for the continuous emission monitoring systems and their components. At a minimum, include in each QA/QC program a written plan that describes in detail (or that refers to separate documents containing) complete, step-by-step procedures and operations for each of the following activities. Upon request from regulatory authorities, the source must make all procedures, maintenance records, and ancillary supporting documentation from the manufacturer (e.g., software coefficients and troubleshooting diagrams) available for review during an audit. Electronic storage of the information in the QA/QC plan is permissible, provided that the information can be made available in hardcopy upon request during an audit.

1.1 Requirements for All Monitoring Systems

1.1.1 Preventive Maintenance

Keep a written record of procedures needed to maintain the monitoring system in proper operating condition and a schedule for those procedures. This must, at a minimum, include procedures specified by the manufacturers of the equipment and, if applicable, additional or alternate procedures developed for the equipment.

1.1.2 Recordkeeping and Reporting

Keep a written record describing procedures that will be used to implement the recordkeeping and reporting requirements in subparts E and G of 40 CFR 75, incorporated by reference in Section 225.140, and Sections 1.10 through 1.13 of Appendix B, as applicable.

1.1.3 Maintenance Records

Keep a record of all testing, maintenance, or repair activities performed on any monitoring system or component in a location and format suitable for inspection. A maintenance log may be used for this purpose. The following records should be maintained: date, time, and description of any testing, adjustment, repair, replacement, or preventive maintenance action performed on any monitoring system and records of any corrective actions associated with a monitor's outage period. Additionally, any adjustment that recharacterizes a system's ability to record and report emissions data must be recorded (e.g., changing of flow monitor or moisture monitoring system polynomial coefficients, K factors or mathematical algorithms, changing of temperature and pressure coefficients and dilution ratio settings), and a written explanation of the procedures used to make the adjustments must be kept.

1.1.4

The requirements in Section 6.1.2 of Exhibit A to Appendix B must be met by any Air Emissions Testing Body (AETB) performing the semiannual/annual RATAs described in Section 2.3 of this Exhibit and the mercury emission tests described in Sections 1.15(c) and 1.15(d)(4) of Appendix B.

1.2 Specific Requirements for Continuous Emissions Monitoring Systems

1.2.1 Calibration Error Test and Linearity Check Procedures

Keep a written record of the procedures used for daily calibration error tests and linearity checks (e.g., how gases are to be injected, adjustments of flow rates and pressure, introduction of reference values, length of time for injection of calibration gases, steps for obtaining calibration error or error in linearity, determination of interferences, and when calibration adjustments should be made). Identify any calibration error test and linearity check procedures specific to the continuous emission monitoring system that vary from the procedures in Exhibit A to Appendix B.

1.2.2 Calibration and Linearity Adjustments

Explain how each component of the continuous emission monitoring system will be adjusted to provide correct responses to calibration gases, reference values, and/or indications of interference both initially and after repairs or corrective action. Identify equations, conversion factors and other factors affecting calibration of each continuous emission monitoring system.

1.2.3 Relative Accuracy Test Audit Procedures

Keep a written record of procedures and details peculiar to the installed continuous emission monitoring systems that are to be used for relative accuracy test audits, such as sampling and analysis methods.

1.2.4 Parametric Monitoring for Units With Add-on Emission Controls

The owner or operator shall keep a written (or electronic) record including a list of operating parameters for the add-on mercury emission controls, as applicable, and the range of each operating parameter that indicates the add-on emission controls are operating properly. The owner or operator shall keep a written (or electronic) record of the parametric monitoring data during each mercury missing data period.

1.3 Requirements for Sorbent Trap Monitoring Systems

1.3.1 Sorbent Trap Identification and Tracking

Include procedures for inscribing or otherwise permanently marking a unique identification number on each sorbent trap for tracking purposes. Keep records of the ID of the monitoring system in which each sorbent trap is used and the dates and hours of each mercury collection period.

1.3.2 Monitoring System Integrity and Data Quality

Explain the procedures used to perform the leak checks when sorbent traps are placed in service and removed from service. Also explain the other QA procedures used to ensure system integrity and data quality, including, but not limited to, gas flow meter calibrations, verification of moisture removal, and ensuring air-tight pump operation. In addition, the QA plan must include the data acceptance and quality control criteria in [Section 8](http://www.westlaw.com/Find/Default.wl?rs=dfa1.0&vr=2.0&DB=1000546&DocName=40USCAS8&FindType=L) of Exhibit D to Appendix B. All reference meters used to calibrate the gas flow meters (e.g., wet test meters) must be periodically recalibrated. Annual, or more frequent, recalibration is recommended. If a NIST-traceable calibration device is used as a reference flow meter, the QA plan must include a protocol for ongoing maintenance and periodic recalibration to maintain the accuracy and NIST-traceability of the calibrator.

1.3.3 Mercury Analysis

Explain the chain of custody employed in packing, transporting, and analyzing the sorbent traps (see Sections 7.2.8 and 7.2.9 in Exhibit D to Appendix B). Keep records of all mercury analyses. The analyses must be performed in accordance with the procedures described in [Section 10](http://www.westlaw.com/Find/Default.wl?rs=dfa1.0&vr=2.0&DB=1000546&DocName=40USCAS10&FindType=L) of Exhibit D to Appendix B.

1.3.4 Laboratory Certification

The QA Plan must include documentation that the laboratory performing the analyses on the carbon sorbent traps is certified by the International Organization for Standardization (ISO) to have a proficiency that meets the requirements of ISO 17025. Alternatively, if the laboratory performs the spike recovery study described in [Section 10.3 of Exhibit D to Appendix](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS10.3&FindType=VP) B and repeats that procedure annually, ISO certification is not required.

1.3.5 Data Collection Period

State, and provide the rationale for, the minimum acceptable data collection period (e.g., one day, one week, etc.) for the size of the sorbent trap selected for the monitoring. Include in the discussion such factors as the mercury concentration in the stack gas, the capacity of the sorbent trap, and the minimum mass of mercury required for the analysis.

1.3.6 Relative Accuracy Test Audit Procedures

Keep records of the procedures and details peculiar to the sorbent trap monitoring systems that are to be followed for relative accuracy test audits, such as sampling and analysis methods.

2. Frequency of Testing

A summary chart showing each quality assurance test and the frequency at which each test is required is located at the end of this Exhibit in Figure 1.

2.1 Daily Assessments

Perform the following daily assessments to quality-assure the hourly data recorded by the monitoring systems during each period of unit operation, or, for a bypass stack or duct, each period in which emissions pass through the bypass stack or duct. These requirements are effective as of the date when the monitor or continuous emission monitoring system completes certification testing.

2.1.1 Calibration Error Test

Except as provided in Section 2.1.1.2 of this Exhibit, perform the daily calibration error test of each gas monitoring system (including moisture monitoring systems consisting of wet- and dry-basis O2 analyzers) according to the procedures in Section 6.3.1 of Exhibit A to Appendix B, and perform the daily calibration error test of each flow monitoring system according to the procedure in Section 6.3.2 of Exhibit A to Appendix B. When two measurement ranges (low and high) are required for a particular parameter, perform sufficient calibration error tests on each range to validate the data recorded on that range, according to the criteria in Section 2.1.5 of this Exhibit.

For units with add-on emission controls and dual-span or auto-ranging monitors, and other units that use the maximum expected concentration to determine calibration gas values, perform the daily calibration error tests on each scale that has been used since the previous calibration error test. For example, if the pollutant concentration has not exceeded the low-scale value (based on the maximum expected concentration) since the previous calibration error test, the calibration error test may be performed on the low-scale only. If, however, the concentration has exceeded the low-scale span value for one hour or longer since the previous calibration error test, perform the calibration error test on both the low- and high-scales.

2.1.1.1 On-line Daily Calibration Error Tests

Except as provided in Section 2.1.1.2 of this Exhibit, all daily calibration error tests must be performed while the unit is in operation at normal, stable conditions (i.e., "on-line").

2.1.1.2 Off-line Daily Calibration Error Tests

Daily calibrations may be performed while the unit is not operating (i.e., "off-line") and may be used to validate data for a monitoring system that meets the following conditions:

1) An initial demonstration test of the monitoring system is successfully completed and the results are reported in the quarterly report required under [40 CFR 75.64](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.64&FindType=VP), incorporated by reference in Section 225.140. The initial demonstration test, hereafter called the "off-line calibration demonstration", consists of an off-line calibration error test followed by an on-line calibration error test. Both the off-line and on-line portions of the off-line calibration demonstration must meet the calibration error performance specification in [Section 3.1 of Exhibit A to Appendix B.](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS3.1&FindType=VP) Upon completion of the off-line portion of the demonstration, the zero and upscale monitor responses may be adjusted, but only toward the true values of the calibration gases or reference signals used to perform the test and only in accordance with the routine calibration adjustment procedures specified in the quality control program required under [Section 1](http://www.westlaw.com/Find/Default.wl?rs=dfa1.0&vr=2.0&DB=1000546&DocName=40USCAS1&FindType=L) of this Exhibit. Once these adjustments are made, no further adjustments may be made to the monitoring system until after completion of the on-line portion of the off-line calibration demonstration. Within 26 clock hours after the completion hour of the off-line portion of the demonstration, the monitoring system must successfully complete the first attempted calibration error test, i.e., the on-line portion of the demonstration.

2) For each monitoring system that has passed the off-line calibration demonstration, off-line calibration error tests may be used on a limited basis to validate data, in accordance with subsection (2) in Section 2.1.5.1 of this Exhibit.

2.1.2 Daily Flow Interference Check

Perform the daily flow monitor interference checks specified in Section 2.2.2.2 of Exhibit A to Appendix B while the unit is in operation at normal, stable conditions.

2.1.3 Additional Calibration Error Tests and Calibration Adjustments

a) In addition to the daily calibration error tests required under Section 2.1.1 of this Exhibit, a calibration error test of a monitor must be performed in accordance with Section 2.1.1 of this Exhibit, as follows: whenever a daily calibration error test is failed; whenever a monitoring system is returned to service following repair or corrective maintenance that could affect the monitor's ability to accurately measure and record emissions data; or after making certain calibration adjustments, as described in this Section. Except in the case of the routine calibration adjustments described in this Section, data from the monitor are considered invalid until the required additional calibration error test has been successfully completed.

b) Routine calibration adjustments of a monitor are permitted after any successful calibration error test. These routine adjustments must be made so as to bring the monitor readings as close as practicable to the known values of the calibration gases or to the actual value of the flow monitor reference signals. An additional calibration error test is required following routine calibration adjustments where the monitor's calibration has been physically adjusted (e.g., by turning a potentiometer) to verify that the adjustments have been made properly. An additional calibration error test is not required, however, if the routine calibration adjustments are made by means of a mathematical algorithm programmed into the data acquisition and handling system. It is recommended that routine calibration adjustments be made, at a minimum, whenever the daily calibration error exceeds the limits of the applicable performance specification in Exhibit A to Appendix B for the pollutant concentration monitor, CO2 or O2 monitor, or flow monitor.

c) Additional (non-routine) calibration adjustments of a monitor are permitted prior to (but not during) linearity checks and RATAs and at other times, provided that an appropriate technical justification is included in the quality control program required under [Section 1](http://www.westlaw.com/Find/Default.wl?rs=dfa1.0&vr=2.0&DB=1000546&DocName=40USCAS1&FindType=L) of this Exhibit. The allowable non-routine adjustments are as follows. The owner or operator may physically adjust the calibration of a monitor (e.g., by means of a potentiometer), provided that the post-adjustment zero and upscale responses of the monitor are within the performance specifications of the instrument given in [Section 3.1 of Exhibit A to Appendix](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS3.1&FindType=VP) B. An additional calibration error test is required following such adjustments to verify that the monitor is operating within the performance specifications at both the zero and upscale calibration levels.

2.1.4 Data Validation

a) An out-of-control period occurs when the calibration error of a CO2 or O2 monitor (including O2 monitors used to measure CO2 emissions or percent moisture) exceeds 1.0 percent CO2 or O2, or when the calibration error of a flow monitor or a moisture sensor exceeds 6.0 percent of the span value, which is twice the applicable specification of Exhibit A to this Appendix. Notwithstanding, a differential pressure-type flow monitor for which the calibration error exceeds 6.0 percent of the span value will not be considered out-of-control if , the absolute value of the difference between the monitor response and the reference value in Equation A-6 of Exhibit A to Appendix B, is < 0.02 inches of water. For a mercury monitor, an out-of-control period occurs when the calibration error exceeds 5.0% of the span value. Notwithstanding, the mercury monitor will not be considered out-of-control if  in Equation A-5 does not exceed 1.0 µg/scm. The out-of-control period begins upon failure of the calibration error test and ends upon completion of a successful calibration error test. Note, that if a failed calibration, corrective action, and successful calibration error test occur within the same hour, emission data for that hour recorded by the monitor after the successful calibration error test may be used for reporting purposes, provided that two or more valid readings are obtained as required by Section 1.2 of Appendix B. Emission data must not be reported from an out-of-control monitor.

b) An out-of-control period also occurs whenever interference of a flow monitor is identified. The out-of-control period begins with the hour of completion of the failed interference check and ends with the hour of completion of an interference check that is passed.

2.1.5 Quality Assurance of Data With Respect to Daily Assessments

When a monitoring system passes a daily assessment (i.e., daily calibration error test or daily flow interference check), data from that monitoring system are prospectively validated for 26 clock hours (i.e., 24 hours plus a 2-hour grace period) beginning with the hour in which the test is passed, unless another assessment (i.e., a daily calibration error test, an interference check of a flow monitor, a quarterly linearity check, a quarterly leak check, or a relative accuracy test audit) is failed within the 26-hour period.

2.1.5.1 Data Invalidation with Respect to Daily Assessments

The following specific rules apply to the invalidation of data with respect to daily assessments:

1) Data from a monitoring system are invalid, beginning with the first hour following the expiration of a 26-hour data validation period or beginning with the first hour following the expiration of an 8-hour start-up grace period (as provided under Section 2.1.5.2 of this Exhibit), if the required subsequent daily assessment has not been conducted.

2) For a monitor that has passed the off-line calibration demonstration, a combination of on-line and off-line calibration error tests may be used to validate data from the monitor, as follows. For a particular unit (or stack) operating hour, data from a monitor may be validated using a successful off-line calibration error test if:

a) An on-line calibration error test has been passed within the previous 26 unit (or stack) operating hours; and

b) the 26 clock hour data validation window for the off-line calibration error test has not expired. If either of these conditions is not met, then the data from the monitor are invalid with respect to the daily calibration error test requirement. Data from the monitor must remain invalid until the appropriate on-line or off-line calibration error test is successfully completed so that both conditions in subsections (a) and (b) are met.

3) For units with two measurement ranges (low and high) for a particular parameter, when separate analyzers are used for the low and high ranges, a failed or expired calibration on one of the ranges does not affect the quality-assured data status on the other range. For a dual-range analyzer (i.e., a single analyzer with two measurement scales), a failed calibration error test on either the low or high scale results in an out-of-control period for the monitor. Data from the monitor remain invalid until corrective actions are taken and "hands-off" calibration error tests have been passed on both ranges. However, if the most recent calibration error test on the high scale was passed but has expired, while the low scale is up-to-date on its calibration error test requirements (or vice-versa), the expired calibration error test does not affect the quality-assured status of the data recorded on the other scale.

2.1.5.2 Daily Assessment Start-Up Grace Period

For the purpose of quality assuring data with respect to a daily assessment (i.e., a daily calibration error test or a flow interference check), a start-up grace period may apply when a unit begins to operate after a period of non-operation. The start-up grace period for a daily calibration error test is independent of the start-up grace period for a daily flow interference check. To qualify for a start-up grace period for a daily assessment, there are two requirements:

1) The unit must have resumed operation after being in outage for 1 or more hours (i.e., the unit must be in a start-up condition) as evidenced by a change in unit operating time from zero in one clock hour to an operating time greater than zero in the next clock hour.

2) For the monitoring system to be used to validate data during the grace period, the previous daily assessment of the same kind must have been passed on-line within 26 clock hours prior to the last hour in which the unit operated before the outage. In addition, the monitoring system must be in-control with respect to quarterly and semi-annual or annual assessments.

If both of the above conditions are met, then a start-up grace period of up to 8 clock hours applies, beginning with the first hour of unit operation following the outage. During the start-up grace period, data generated by the monitoring system are considered quality-assured. For each monitoring system, a start-up grace period for a calibration error test or flow interference check ends when either: (1) a daily assessment of the same kind (i.e., calibration error test or flow interference check) is performed; or (2) 8 clock hours have elapsed (starting with the first hour of unit operation following the outage), whichever occurs first.

2.1.6 Data Recording

Record and tabulate all calibration error test data according to month, day, clock-hour, and magnitude in either ppm, percent volume, or scfh. Program monitors that automatically adjust data to the corrected calibration values (e.g., microprocessor control) to record either: (1) the unadjusted concentration or flow rate measured in the calibration error test prior to resetting the calibration, or (2) the magnitude of any adjustment. Record the following applicable flow monitor interference check data: (1) sample line/sensing port pluggage, and (2) malfunction of each RTD, transceiver, or equivalent.

2.2 Quarterly Assessments

For each primary and redundant backup monitor or monitoring system, perform the following quarterly assessments. This requirement applies as of the calendar quarter following the calendar quarter in which the monitor or continuous emission monitoring system is provisionally certified.

2.2.1 Linearity Check

Perform a linearity check, in accordance with the procedures in Section 6.2 of Exhibit A to Appendix B, for each primary and redundant backup, mercury monitor and each primary and redundant backup CO2 or O2 monitor (including O2 monitors used to measure CO2 emissions or to continuously monitor moisture) at least once during each QA operating quarter, as defined in [40 CFR 72.2](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS72.2&FindType=VP), incorporated by reference in Section 225.140. For mercury monitors, perform the linearity checks using elemental mercury standards. Alternatively, you may perform 3-level system integrity checks at the same three calibration gas levels (i.e., low, mid, and high), using a NIST-traceable source of oxidized mercury. If you choose this option, the performance specification in [Section 3.2(c)](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS3.2&FindType=VP&ReferencePositionType=T&ReferencePosition=SP_4b24000003ba5) of Exhibit A to Exhibit B must be met at each gas level. For units using both a low and high span value, a linearity check is required only on the ranges used to record and report emission data during the QA operating quarter. Conduct the linearity checks no less than 30 days apart, to the extent practicable. The data validation procedures in Section 2.2.3(e) of this Exhibit must be followed.

2.2.2 Leak Check

For differential pressure flow monitors, perform a leak check of all sample lines (a manual check is acceptable) at least once during each QA operating quarter. For this test, the unit does not have to be in operation. Conduct the leak checks no less than 30 days apart, to the extent practicable. If a leak check is failed, follow the applicable data validation procedures in Section 2.2.3(g) of this Exhibit.

2.2.3 Data Validation

a) A linearity check must not be commenced if the monitoring system is operating out-of-control with respect to any of the daily or semiannual quality assurance assessments required by Sections 2.1 and 2.3 of this Exhibit or with respect to the additional calibration error test requirements in Section 2.1.3 of this Exhibit.

b) Each required linearity check must be done according to subsection (b)(1), (b)(2) or (b)(3) of this Section:

1) The linearity check may be done "cold", i.e., with no corrective maintenance, repair, calibration adjustments, re-linearization or reprogramming of the monitor prior to the test.

2) The linearity check may be done after performing only the routine or non-routine calibration adjustments described in Section 2.1.3 of this Exhibit at the various calibration gas levels (zero, low, mid or high), but no other corrective maintenance, repair, re-linearization or reprogramming of the monitor. Trial gas injection runs may be performed after the calibration adjustments and additional adjustments within the allowable limits in Section 2.1.3 of this Exhibit may be made prior to the linearity check, as necessary, to optimize the performance of the monitor. The trial gas injections need not be reported, provided that they meet the specification for trial gas injections in [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(G)(v) of Appendix B. However, if, for any trial injection, the specification in [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(G)(v) is not met, the trial injection must be counted as an aborted linearity check.

3) The linearity check may be done after repair, corrective maintenance or reprogramming of the monitor. In this case, the monitor must be considered out-of-control from the hour in which the repair, corrective maintenance or reprogramming is commenced until the linearity check has been passed. Alternatively, the data validation procedures and associated timelines in [Sections](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(B) through [(I)](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP&ReferencePositionType=T&ReferencePosition=SP_a15b0000291b0) of Appendix B may be followed upon completion of the necessary repair, corrective maintenance, or reprogramming. If the procedures in [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3) are used, the words "quality assurance" apply instead of the word "recertification".

c) Once a linearity check has been commenced, the test must be done hands-off. That is, no adjustments of the monitor are permitted during the linearity test period, other than the routine calibration adjustments following daily calibration error tests, as described in Section 2.1.3 of this Exhibit. If a routine daily calibration error test is performed and passed just prior to a linearity test (or during a linearity test period) and a mathematical correction factor is automatically applied by the DAHS, the correction factor must be applied to all subsequent data recorded by the monitor, including the linearity test data.

d) If a daily calibration error test is failed during a linearity test period, prior to completing the test, the linearity test must be repeated. Data from the monitor are invalidated prospectively from the hour of the failed calibration error test until the hour of completion of a subsequent successful calibration error test. The linearity test must not be commenced until the monitor has successfully completed a calibration error test.

e) An out-of-control period occurs when a linearity test is failed (i.e., when the error in linearity at any of the three concentrations in the quarterly linearity check (or any of the six concentrations, when both ranges of a single analyzer with a dual range are tested) exceeds the applicable specification in Section 3.2 of Exhibit A to Appendix B) or when a linearity test is aborted due to a problem with the monitor or monitoring system. The out-of-control period begins with the hour of the failed or aborted linearity check and ends with the hour of completion of a satisfactory linearity check following corrective action and/or monitor repair, unless the option in subsection (b)(3) of this Section to use the data validation procedures and associated timelines in [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(B) through [(I)](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP&ReferencePositionType=T&ReferencePosition=SP_a15b0000291b0) of this Appendix has been selected, in which case the beginning and end of the out-of-control period must be determined in accordance with [Sections](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(G)(i) and (ii). For a dual-range analyzer, "hands-off" linearity checks must be passed on both measurement scales to end the out-of-control period.

f) No more than four successive calendar quarters must elapse after the quarter in which a linearity check of a monitor or monitoring system (or range of a monitor or monitoring system) was last performed without a subsequent linearity test having been conducted. If a linearity test has not been completed by the end of the fourth calendar quarter since the last linearity test, then the linearity test must be completed within a 168 unit operating hour or stack operating hour "grace period" (as provided in Section 2.2.4 of this Exhibit) following the end of the fourth successive elapsed calendar quarter, or data from the CEMS (or range) will become invalid.

g) An out-of-control period also occurs when a flow monitor sample line leak is detected. The out-of-control period begins with the hour of the failed leak check and ends with the hour of a satisfactory leak check following corrective action.

h) For each monitoring system, report the results of all completed and partial linearity tests that affect data validation (i.e., all completed, passed linearity checks; all completed, failed linearity checks; and all linearity checks aborted due to a problem with the monitor, including trial gas injections counted as failed test attempts under subsection (b)(2) of this Section or under Section 1.4(b)(3)(G)(vi) of Appendix B), in the quarterly report required under [40 CFR 75.64](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.64&FindType=VP), incorporated by reference in Section 225.140. Note that linearity attempts that are aborted or invalidated due to problems with the reference calibration gases or due to operational problems with the affected units need not be reported. Such partial tests do not affect the validation status of emission data recorded by the monitor. A record of all linearity tests, trial gas injections and test attempts (whether reported or not) must be kept on-site as part of the official test log for each monitoring system.

2.2.4 Linearity and Leak Check Grace Period

a) When a required linearity test or flow monitor leak check has not been completed by the end of the QA operating quarter in which it is due or if, due to infrequent operation of a unit or infrequent use of a required high range of a monitor or monitoring system, four successive calendar quarters have elapsed after the quarter in which a linearity check of a monitor or monitoring system (or range) was last performed without a subsequent linearity test having been done, the owner or operator has a grace period of 168 consecutive unit operating hours, as defined in [40 CFR 72.2](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS72.2&FindType=VP), incorporated by reference in Section 225.140 (or, for monitors installed on common stacks or bypass stacks, 168 consecutive stack operating hours, as defined in [40 CFR 72.2](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS72.2&FindType=VP)) in which to perform a linearity test or leak check of that monitor or monitoring system (or range). The grace period begins with the first unit or stack operating hour following the calendar quarter in which the linearity test was due. Data validation during a linearity or leak check grace period must be done in accordance with the applicable provisions in Section 2.2.3 of this Exhibit.

b) If, at the end of the 168 unit (or stack) operating hour grace period, the required linearity testor leak check has not been completed, data from the monitoring system (or range) will be invalid, beginning with the first unit operating hour following the expiration of the grace period. Data from the monitoring system (or range) remain invalid until the hour of completion of a subsequent successful hands-off linearity test or leak check of the monitor or monitoring system (or range). Note that when a linearity test or a leak check is conducted within a grace period for the purpose of satisfying the linearity test or leak check requirement from a previous QA operating quarter, the results of that linearity test or leak check may only be used to meet the linearity check or leak check requirement of the previous quarter, not the quarter in which the missed linearity test or leak check is completed.

2.2.5 Flow-to-Load Ratio or Gross Heat Rate Evaluation

a) Applicability and Methodology. Unless exempted from the flow-to-load ratio test under Section 7.6 of Exhibit A to Appendix B, the owner or operator must, for each flow rate monitoring system installed on each unit, common stack or multiple stack, evaluate the flow-to-load ratio quarterly, i.e., for each QA operating quarter (as defined in [40 CFR 72.2](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS72.2&FindType=VP), incorporated by reference in Section 225.140). At the end of each QA operating quarter, the owner or operator must use Equation B-1 to calculate the flow-to-load ratio for every hour during the quarter in which: the unit (or combination of units, for a common stack) operated within ± 10.0 percent of Lavg, the average load during the most recent normal-load flow RATA; and a quality assured hourly average flow rate was obtained with a certified flow rate monitor. Alternatively, for the reasons stated in subsections (c)(1) through (6) of this Section, the owner or operator may exclude from the data analysis certain hours within ± 10.0 percent of Rh and may calculate Rh values for only the remaining hours.

 (Eq. B-1)

Where:

|  |  |  |
| --- | --- | --- |
| Rh | = | Hourly value of the flow-to-load ratio, scfh/megawatts, scfh/1000 lb/hr of steam, or scfh/(mmBtu/hr thermal output). |
| Qh | = | Hourly stack gas volumetric flow rate, as measured by the flow rate monitor, scfh. |
| Lh | = | Hourly unit load, megawatts, 1000 lb/hr of steam, or mmBtu/hr thermal output; must be within + 10.0 percent of *Lavg* during the most recent normal-load flow RATA. |

1) In Equation B-1, the owner or operator may use either bias-adjusted flow rates or unadjusted flow rates, provided that all of the ratios are calculated the same way. For a common stack, Lh will be the sum of the hourly operating loads of all units that discharge through the stack. For a unit that discharges its emissions through multiple stacks or that monitors its emissions in multiple breechings, Qh will be either the combined hourly volumetric flow rate for all of the stacks or ducts (if the test is done on a unit basis) or the hourly flow rate through each stack individually (if the test is performed separately for each stack). For a unit with a multiple stack discharge configuration consisting of a main stack and a bypass stack, each of which has a certified flow monitor (e.g., a unit with a wet SO2 scrubber), calculate the hourly flow-to-load ratios separately for each stack. Round off each value of Rh to two decimal places.

2) Alternatively, the owner or operator may calculate the hourly gross heat rates (GHR) in lieu of the hourly flow-to-load ratios. The hourly GHR must be determined only for those hours in which quality assured flow rate data and diluent gas (CO2 or O2) concentration data are both available from a certified monitor or monitoring system or reference method. If this option is selected, calculate each hourly GHR value as follows:

 (Eq. B-1a)

Where:

|  |  |  |
| --- | --- | --- |
| (GHR)h | = | Hourly value of the gross heat rate, Btu/kwh, Btu/lb steam load, or 1000 mmBtu heat input/mmBtu thermal output. |
| (HeatInput)h | = | Hourly heat input, as determined from the quality assured flow rate and diluent data, using the applicable equation in Exhibit C to Appendix B, mmBtu/hr. |
| Lh | = | Hourly unit load, megawatts, 1000 lb/hr of steam, or mmBtu/hr thermal output; must be within + 10.0 percent of Lavg during the most recent normal-load flow RATA. |

3) In Equation B-1a, the owner or operator may either use bias-adjusted flow rates or unadjusted flow rates in the calculation of (HeatInput)h, provided that all of the heat input values are determined in the same manner.

4) The owner or operator must evaluate the calculated hourly flow-to-load ratios (or gross heat rates) as follows. A separate data analysis must be performed for each primary and each redundant backup flow rate monitor used to record and report data during the quarter. Each analysis must be based on a minimum of 168 acceptable recorded hourly average flow rates (i.e., at loads within ± 10 percent of Lavg). When two RATA load levels are designated as normal, the analysis must be performed at the higher load level, unless there are fewer than 168 acceptable data points available at that load level, in which case the analysis must be performed at the lower load level. If, for a particular flow monitor, fewer than 168 acceptable hourly flow-to-load ratios (or GHR values) are available at any of the load levels designated as normal, a flow-to-load (or GHR) evaluation is not required for that monitor for that calendar quarter.

5) For each flow monitor, use Equation B-2 in this Exhibit to calculate Eh, the absolute percentage difference between each hourly Rh value and Rref, the reference value of the flow-to-load ratio, as determined in accordance with Section 7.5 of Exhibit A to Appendix B. Note that Rref must always be based upon the most recent normal-load RATA, even if that RATA was performed in the calendar quarter being evaluated.

 (Eq. B-2)

Where:

|  |  |  |
| --- | --- | --- |
| Eh | = | Absolute percentage difference between the hourly average flow-to-load ratio and the reference value of the flow-to-load ratio at normal load. |
| Rh | = | The hourly average flow-to-load ratio, for each flow rate recorded at a load level within ± 10.0 percent of Lavg. |
| Rref | = | The reference value of the flow-to-load ratio from the most recent normal-load flow RATA, determined in accordance with Section 7.5 of Exhibit A to this Appendix. |

6) Equation B-2 must be used in a consistent manner. That is, use Rref and Rh if the flow-to-load ratio is being evaluated, and use (GHR)ref and (GHR)h if the gross heat rate is being evaluated. Finally, calculate Ef, the arithmetic average of all of the hourly Eh values. The owner or operator must report the results of each quarterly flow-to-load (or gross heat rate) evaluation, as determined from Equation B-2, in the electronic quarterly report required under [40 CFR 75.64](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.64&FindType=VP), incorporated by reference in Section 225.140.

b) Acceptable Results. The results of a quarterly flow-to-load (or gross heat rate) evaluation are acceptable, and no further action is required, if the calculated value of Efis less than or equal to: (1) 15.0 percent, if Lavg for the most recent normal-load flow RATA is ≥ 60 megawatts (or ≥ 500 klb/hr of steam) and if unadjusted flow rates were used in the calculations; or (2) 10.0 percent, if Lavg for the most recent normal-load flow RATA is ≥ 60 megawatts (or ≥ 500 klb/hr of steam) and if bias-adjusted flow rates were used in the calculations; or (3) 20.0 percent, if Lavg for the most recent normal-load flow RATA is < 60 megawatts (or < 500 klb/hr of steam) and if unadjusted flow rates were used in the calculations; or (4) 15.0 percent, if Lavg for the most recent normal-load flow RATA is < 60 megawatts (or < 500 klb/hr of steam) and if bias-adjusted flow rates were used in the calculations. If Ef is above these limits, the owner or operator must either: implement Option 1 in Section 2.2.5.1 of this Exhibit; or perform a RATA in accordance with Option 2 in Section 2.2.5.2 of this Exhibit; or re-examine the hourly data used for the flow-to-load or GHR analysis and recalculate Ef, after excluding all non-representative hourly flow rates. If Ef is above these limits, the owner or operator must either: implement Option 1 in Section 2.2.5.1 of this Exhibit; perform a RATA in accordance with Option 2 in Section 2.2.5.2 of this Exhibit; or (if applicable) re-examine the hourly data used for the flow-to-load or GHR analysis and recalculate Ef, after excluding all non-representative hourly flow rates, as provided in subsection (c) of this Section.

c) Recalculation of Ef. If the owner or operator did not exclude any hours within ± 10 percent of Lavg from the original data analysis and chooses to recalculate Ef, the flow rates for the following hours are considered non-representative and may be excluded from the data analysis:

1) Any hour in which the type of fuel combusted was different from the fuel burned during the most recent normal-load RATA. For purposes of this determination, the type of fuel is different if the fuel is in a different state of matter (i.e., solid, liquid, or gas) than is the fuel burned during the RATA or if the fuel is a different classification of coal (e.g., bituminous versus sub-bituminous). Also, for units that co-fire different types of fuels, if the reference RATA was done while co-firing, then hours in which a single fuel was combusted may be excluded from the data analysis as different fuel hours (and vice-versa for co-fired hours, if the reference RATA was done while combusting only one type of fuel);

2) For a unit that is equipped with an SO2 scrubber and that always discharges its flue gases to the atmosphere through a single stack, any hour in which the SO2 scrubber was bypassed;

3) Any hour in which "ramping" occurred, i.e., the hourly load differed by more than ± 15.0 percent from the load during the preceding hour or the subsequent hour;

4) For a unit with a multiple stack discharge configuration consisting of a main stack and a bypass stack, any hour in which the flue gases were discharged through both stacks;

5) If a normal-load flow RATA was performed and passed during the quarter being analyzed, any hour prior to completion of that RATA; and

6) If a problem with the accuracy of the flow monitor was discovered during the quarter and was corrected (as evidenced by passing the abbreviated flow-to-load test in Section 2.2.5.3 of this Exhibit), any hour prior to completion of the abbreviated flow-to-load test.

7) After identifying and excluding all non-representative hourly data in accordance with subsections (c)(1) through (6) of this Section, the owner or operator may analyze the remaining data a second time. At least 168 representative hourly ratios or GHR values must be available to perform the analysis; otherwise, the flow-to-load (or GHR) analysis is not required for that monitor for that calendar quarter.

8) If, after re-analyzing the data, Ef meets the applicable limit in subsection (b)(1), (b)(2), (b)(3), or (b)(4) of this Section, no further action is required. If, however, Ef is still above the applicable limit, data from the monitor will be declared out-of-control, beginning with the first unit operating hour following the quarter in which Ef exceeded the applicable limit. Alternatively, if a probationary calibration error test is performed and passed according to [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(B) of Appendix B, data from the monitor may be declared conditionally valid following the quarter in which Ef exceeded the applicable limit. The owner or operator must then either implement Option 1 in Section 2.2.5.1 of this Exhibit or Option 2 in Section 2.2.5.2 of this Exhibit.

2.2.5.1 Option 1

Within 14 unit operating days of the end of the calendar quarter for which the Ef value is above the applicable limit, investigate and troubleshoot the applicable flow monitors. Evaluate the results of each investigation as follows:

a) If the investigation fails to uncover a problem with the flow monitor, a RATA must be performed in accordance with Option 2 in Section 2.2.5.2 of this Exhibit.

b) If a problem with the flow monitor is identified through the investigation (including the need to re-linearize the monitor by changing the polynomial coefficients or K factors), data from the monitor are considered invalid back to the first unit operating hour after the end of the calendar quarter for which Ef was above the applicable limit. If the option to use conditional data validation was selected under Section 2.2.5(c)(8) of this Exhibit, all conditionally valid data will be invalidated, back to the first unit operating hour after the end of the calendar quarter for which Ef was above the applicable limit. Corrective actions must be taken. All corrective actions (e.g., non-routine maintenance, repairs, major component replacements, re-linearization of the monitor, etc.) must be documented in the operation and maintenance records for the monitor. The owner or operator then must either complete the abbreviated flow-to-load test in Section 2.2.5.3 of this Exhibit, or, if the corrective action taken has required relinearization of the flow monitor, must perform a 3-load RATA. The conditional data validation procedures in [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3) of Appendix B may be applied to the 3-load RATA.

2.2.5.2 Option 2

Perform a single-load RATA (at a load designated as normal under Section 6.5.2.1 of Exhibit A to Appendix B) of each flow monitor for which Ef is outside of the applicable limit. If the RATA is passed hands-off, in accordance with Section 2.3.2(c) of this Exhibit, no further action is required and the out-of-control period for the monitor ends at the date and hour of completion of a successful RATA, unless the option to use conditional data validation was selected under Section 2.2.5(c)(8) of this Exhibit. In that case, all conditionally valid data from the monitor are considered to be quality-assured, back to the first unit operating hour following the end of the calendar quarter for which the Ef value was above the applicable limit. If the RATA is failed, all data from the monitor will be invalidated, back to the first unit operating hour following the end of the calendar quarter for which the Ef value was above the applicable limit. Data from the monitor remain invalid until the required RATA has been passed. Alternatively, following a failed RATA and corrective actions, the conditional data validation procedures of [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3) of Appendix B may be used until the RATA has been passed. If the corrective actions taken following the failed RATA included adjustment of the polynomial coefficients or K factors of the flow monitor, a 3-level RATA is required, except as otherwise specified in Section 2.3.1.3 of this Exhibit.

2.2.5.3 Abbreviated Flow-to-Load Test

a) The following abbreviated flow-to-load test may be performed after any documented repair, component replacement, or other corrective maintenance to a flow monitor (except for changes affecting the linearity of the flow monitor, such as adjusting the flow monitor coefficients or K factors) to demonstrate that the repair, replacement, or other maintenance has not significantly affected the monitor's ability to accurately measure the stack gas volumetric flow rate. Data from the monitoring system are considered invalid from the hour of commencement of the repair, replacement, or maintenance until either the hour in which the abbreviated flow-to-load test is passed, or the hour in which a probationary calibration error test is passed following completion of the repair, replacement, or maintenance and any associated adjustments to the monitor. If the latter option is selected, the abbreviated flow-to-load test must be completed within 168 unit operating hours of the probationary calibration error test (or, for peaking units, within 30 unit operating days, if that is less restrictive). Data from the monitor are considered to be conditionally valid (as defined in [40 CFR 72.2](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS72.2&FindType=VP), incorporated by reference in Section 225.140), beginning with the hour of the probationary calibration error test.

b) Operate the units in such a way as to reproduce, as closely as practicable, the exact conditions at the time of the most recent normal-load flow RATA. To achieve this, it is recommended that the load be held constant to within ± 10.0 percent of the average load during the RATA and that the diluent gas (CO2 or O2) concentration be maintained within ± 0.5 percent CO2 or O2 of the average diluent concentration during the RATA. For common stacks, to the extent practicable, use the same combination of units and load levels that were used during the RATA. When the process parameters have been set, record a minimum of six and a maximum of 12 consecutive hourly average flow rates, using the flow monitors for which Ef was outside the applicable limit. For peaking units, a minimum of three and a maximum of 12 consecutive hourly average flow rates are required. Also record the corresponding hourly load values and, if applicable, the hourly diluent gas concentrations. Calculate the flow-to-load ratio (or GHR) for each hour in the test hour period, using Equation B-1 or B-1a. Determine Eh for each hourly flow-to-load ratio (or GHR), using Equation B-2 of this Exhibit and then calculate Ef, the arithmetic average of the Eh values.

c) The results of the abbreviated flow-to-load test will be considered acceptable, and no further action is required if the value of Eh does not exceed the applicable limit specified in Section 2.2.5 of this Exhibit. All conditionally valid data recorded by the flow monitor will be considered quality assured, beginning with the hour of the probationary calibration error test that preceded the abbreviated flow-to-load test (if applicable). However, if Ef is outside the applicable limit, all conditionally valid data recorded by the flow monitor (if applicable) will be considered invalid back to the hour of the probationary calibration error test that preceded the abbreviated flow-to-load test, and a single-load RATA is required in accordance with Section 2.2.5.2 of this Exhibit. If the flow monitor must be re-linearized, however, a 3-load RATA is required.

2.3 Semiannual and Annual Assessments

For each primary and redundant backup monitoring system, perform relative accuracy assessments either semiannually or annually, as specified in Section 2.3.1.1 or 2.3.1.2 of this Exhibit for the type of test and the performance achieved. This requirement applies as of the calendar quarter following the calendar quarter in which the monitoring system is provisionally certified. A summary chart showing the frequency with which a relative accuracy test audit must be performed, depending on the accuracy achieved, is located at the end of this Exhibit in Figure 2.

2.3.1 Relative Accuracy Test Audit (RATA)

2.3.1.1 Standard RATA Frequencies

a) Except for mercury monitoring systems, and as otherwise specified in Section 2.3.1.2 of this Exhibit, perform relative accuracy test audits semiannually, i.e., once every two successive QA operating quarters (as defined in [40 CFR 72.2](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS72.2&FindType=VP), incorporated by reference in Section 225.140) for each primary and redundant backup flow monitor, CO2 or O2 diluent monitor used to determine heat input and moisture monitoring system. For each primary and redundant backup mercury concentration monitoring system and each sorbent trap monitoring system, RATAs must be performed annually, i.e., once every four successive QA operating quarters (as defined in [40 CFR 72.2](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS72.2&FindType=VP)). A calendar quarter that does not qualify as a QA operating quarter must be excluded in determining the deadline for the next RATA. No more than eight successive calendar quarters must elapse after the quarter in which a RATA was last performed without a subsequent RATA having been conducted. If a RATA has not been completed by the end of the eighth calendar quarter since the quarter of the last RATA, then the RATA must be completed within a 720 unit (or stack) operating hour grace period (as provided in Section 2.3.3 of this Exhibit) following the end of the eighth successive elapsed calendar quarter, or data from the CEMS will become invalid.

b) The relative accuracy test audit frequency of a CEMS may be reduced, as specified in Section 2.3.1.2 of this Exhibit, for primary or redundant backup monitoring systems which qualify for less frequent testing. Perform all required RATAs in accordance with the applicable procedures and provisions in Sections 6.5 through 6.5.2.2 of Exhibit A to Appendix B and Sections 2.3.1.3 and 2.3.1.4 of this Exhibit.

2.3.1.2 Reduced RATA Frequencies

Relative accuracy test audits of primary and redundant backup CO2 or O2 diluent monitors used to determine heat input, moisture monitoring systems, flow monitors may be performed annually (i.e., once every four successive QA operating quarters, rather than once every two successive QA operating quarters) if any of the following conditions are met for the specific monitoring system involved:

a) The relative accuracy during the audit of a CO2 or O2 diluent monitor used to determine heat input is ≤ 7.5 percent;

b) The relative accuracy during the audit of a flow monitor is ≤ 7.5 percent at each operating level tested;

c) For low flow (≤ 10.0 fps), as measured by the reference method during the RATA stacks/ducts, when the flow monitor fails to achieve a relative accuracy ≤ 7.5 percent during the audit, but the monitor mean value, calculated using Equation A-7 in Exhibit A to Appendix B and converted back to an equivalent velocity in standard feet per second (fps), is within ± 1.5 fps of the reference method mean value, converted to an equivalent velocity in fps;

d) For a CO2 or O2 monitor, when the mean difference between the reference method values from the RATA and the corresponding monitor values is within ± 0.7 percent CO2 or O2; and

e) When the relative accuracy of a continuous moisture monitoring system is ≤ 7.5 percent or when the mean difference between the reference method values from the RATA and the corresponding monitoring system values is within ± 1.0 percent H2O.

2.3.1.3 RATA Load Levels and Additional RATA Requirements

a) For CO2 or O2 diluent monitors used to determine heat input, mercury concentration monitoring systems, sorbent trap monitoring systems, moisture monitoring systems, the required semiannual or annual RATA tests must be done at the load level designated as normal under Section 6.5.2.1(d) of Exhibit A to Appendix B. If two load levels are designated as normal, the required RATAs may be done at either load level.

b) For flow monitors installed and bypass stacks, all required semiannual or annual relative accuracy test audits must be single-load audits at the normal load, as defined in Section 6.5.2.1(d) of Exhibit A to Appendix B.

c) For all other flow monitors, the RATAs must be performed as follows:

1) An annual 2-load flow RATA must be done at the two most frequently used load levels, as determined under Section 6.5.2.1(d) of Exhibit A to Appendix B. Alternatively, a 3-load flow RATA at the low, mid, and high load levels, as defined under Section 6.5.2.1(b) of Exhibit A to Appendix B, may be performed in lieu of the 2-load annual RATA.

2) If the flow monitor is on a semiannual RATA frequency, 2-load flow RATAs and single-load flow RATAs at the normal load level may be performed alternately.

3) A single-load annual flow RATA may be performed in lieu of the 2-load RATA if the results of an historical load data analysis show that, in the time period extending from the ending date of the last annual flow RATA to a date that is no more than 21 days prior to the date of the current annual flow RATA, the unit (or combination of units, for a common stack) has operated at a single load level (low, mid, or high), for ≥ 85.0 percent of the time. Alternatively, a flow monitor may qualify for a single-load RATA if the 85.0 percent criterion is met in the time period extending from the beginning of the quarter in which the last annual flow RATA was performed through the end of the calendar quarter preceding the quarter of current annual flow RATA.

4) A 3-load RATA, at the low-, mid-, and high-load levels, as determined under Section 6.5.2.1 of Exhibit A to Appendix B, must be performed at least once every 20 consecutive calendar quarters, except for flow monitors that are exempted from 3-load RATA testing under Section 6.5.2(b) of Exhibit A to Appendix B.

5) A 3-load RATA is required whenever a flow monitor is re-characterized, i.e., when its polynomial coefficients or K-factors are changed, except for flow monitors that are exempted from 3-load RATA testing under Section 6.5.2(b) of Exhibit A to Appendix B. For monitors so exempted under Section 6.5.2(b), a single-load flow RATA is required.

6) For all multi-level flow audits, the audit points at adjacent load levels or at adjacent operating levels (e.g., mid and high) must be separated by no less than 25.0 percent of the "range of operation," as defined in Section 6.5.2.1 of Exhibit A to Appendix B.

d) A RATA of a moisture monitoring system must be performed whenever the coefficient, K-factor or mathematical algorithm determined under Section 6.5.6 of Exhibit A to Appendix B is changed.

2.3.1.4 Number of RATA Attempts

The owner or operator may perform as many RATA attempts as are necessary to achieve the desired relative accuracy test audit frequencies. However, the data validation procedures in Section 2.3.2 of this Exhibit must be followed.

2.3.2 Data Validation

a) A RATA must not commence if the monitoring system is operating out-of-control with respect to any of the daily and quarterly quality assurance assessments required by Sections 2.1 and 2.2 of this Exhibit or with respect to the additional calibration error test requirements in Section 2.1.3 of this Exhibit.

b) Each required RATA must be done according to subsection (b)(1), (b)(2) or (b)(3) of this Section:

1) The RATA may be done "cold", i.e., with no corrective maintenance, repair, calibration adjustments, re-linearization or reprogramming of the monitoring system prior to the test.

2) The RATA may be done after performing only the routine or non-routine calibration adjustments described in Section 2.1.3 of this Exhibit at the zero and/or upscale calibration gas levels, but no other corrective maintenance, repair, re-linearization or reprogramming of the monitoring system. Trial RATA runs may be performed after the calibration adjustments and additional adjustments within the allowable limits in Section 2.1.3 of this Exhibit may be made prior to the RATA, as necessary, to optimize the performance of the CEMS. The trial RATA runs need not be reported, provided that they meet the specification for trial RATA runs in [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(G)(v) of Appendix B. However, if, for any trial run, the specification in [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) (b)(3)(G)(v) of Appendix B is not met, the trial run must be counted as an aborted RATA attempt.

3) The RATA may be done after repair, corrective maintenance, re-linearization or reprogramming of the monitoring system. In this case, the monitoring system will be considered out-of-control from the hour in which the repair, corrective maintenance, re-linearization or reprogramming is commenced until the RATA has been passed. Alternatively, the data validation procedures and associated timelines in [Sections](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(B) through [(I)](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP&ReferencePositionType=T&ReferencePosition=SP_a15b0000291b0) of Appendix B may be followed upon completion of the necessary repair, corrective maintenance, re-linearization or reprogramming. If the procedures in [Section 1.4](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP)(b)(3) of Appendix B are used, the words "quality assurance" apply instead of the word "recertification".

c) Once a RATA is commenced, the test must be done hands-off. No adjustment of the monitor's calibration is permitted during the RATA test period, other than the routine calibration adjustments following daily calibration error tests, as described in Section 2.1.3 of this Exhibit. If a routine daily calibration error test is performed and passed just prior to a RATA (or during a RATA test period) and a mathematical correction factor is automatically applied by the DAHS, the correction factor must be applied to all subsequent data recorded by the monitor, including the RATA test data. For 2-level and 3-level flow monitor audits, no linearization or reprogramming of the monitor is permitted in between load levels.

d) For single-load RATAs, if a daily calibration error test is failed during a RATA test period, prior to completing the test, the RATA must be repeated. Data from the monitor are invalidated prospectively from the hour of the failed calibration error test until the hour of completion of a subsequent successful calibration error test. The subsequent RATA must not be commenced until the monitor has successfully passed a calibration error test in accordance with Section 2.1.3 of this Exhibit. Notwithstanding these requirements, when ASTM D6784-02 (incorporated by reference under Section 225.140) or Method 29 in appendix A-8 to 40 CFR 60, incorporated by reference in Section 225.140, is used as the reference method for the RATA of a mercury CEMS, if a calibration error test of the CEMS is failed during a RATA test period, any test runs completed prior to the failed calibration error test need not be repeated; however, the RATA may not continue until a subsequent calibration error test of the mercury CEMS has been passed. For multiple-load flow RATAs, each load level is treated as a separate RATA (i.e., when a calibration error test is failed prior to completing the RATA at a particular load level, only the RATA at that load level must be repeated; the results of any previously-passed RATAs at the other load levels are unaffected, unless re-characterization of the monitor is required to correct the problem that caused the calibration failure, in which case a subsequent 3-load RATA is required), except as otherwise provided in Section 2.3.1.3(c)(5) of this Exhibit.

e) For a RATA performed using the option in subsection (b)(1) or (b)(2) of this Section, if the RATA is failed (that is, if the relative accuracy exceeds the applicable specification in [Section 3.3 of Exhibit A to Appendix](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS3.3&FindType=VP) B) or if the RATA is aborted prior to completion due to a problem with the CEMS, then the CEMS is out-of-control and all emission data from the CEMS are invalidated prospectively from the hour in which the RATA is failed or aborted. Data from the CEMS remain invalid until the hour of completion of a subsequent RATA that meets the applicable specification in [Section 3.3 of Exhibit A to Appendix](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS3.3&FindType=VP) B. If the option in subsection (b)(3) of this Section to use the data validation procedures and associated timelines in [Sections](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(B) through (b)(3)(I) of Appendix B has been selected, the beginning and end of the out-of-control period must be determined in accordance with [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(G)(i) and (ii) of Appendix B. Note that when a RATA is aborted for a reason other than monitoring system malfunction (see subsection (g) of this Section), this does not trigger an out-of-control period for the monitoring system.

f) For a 2-load or 3-load flow RATA, if, at any load level, a RATA is failed or aborted due to a problem with the flow monitor, the RATA at that load level must be repeated. The flow monitor is considered out-of-control and data from the monitor are invalidated from the hour in which the test is failed or aborted and remain invalid until the passing of a RATA at the failed load level, unless the option in subsection (b)(3) of this Section to use the data validation procedures and associated timelines in [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(B) through (b)(3)(I) of Appendix B has been selected, in which case the beginning and end of the out-of-control period must be determined in accordance with [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(G)(i) and (ii) of Appendix B. Flow RATAs that were previously passed at the other load levels do not have to be repeated unless the flow monitor must be re-characterized following the failed or aborted test. If the flow monitor is re-characterized, a subsequent 3-load RATA is required, except as otherwise provided in Section 2.3.1.3(c)(5) of this Exhibit.

g) For each monitoring system, report the results of all completed and partial RATAs that affect data validation (i.e., all completed, passed RATAs; all completed, failed RATAs; and all RATAs aborted due to a problem with the CEMS, including trial RATA runs counted as failed test attempts under subsection (b)(2) of this Section or under [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3)(G)(vi)) in the quarterly report required under [40 CFR 75.64](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.64&FindType=VP), incorporated by reference in Section 225.140. Note that RATA attempts that are aborted or invalidated due to problems with the reference method or due to operational problems with the affected units need not be reported. Such runs do not affect the validation status of emission data recorded by the CEMS. However, a record of all RATAs, trial RATA runs and RATA attempts (whether reported or not) must be kept on-site as part of the official test log for each monitoring system.

2.3.3 RATA Grace Period

a) The owner or operator has a grace period of 720 consecutive unit operating hours, as defined in [40 CFR 72.2](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS72.2&FindType=VP), incorporated by reference in Section 225.140 (or, for CEMS installed on common stacks or bypass stacks, 720 consecutive stack operating hours, as defined in [40 CFR 72.2](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS72.2&FindType=VP)), in which to complete the required RATA for a particular CEMS whenever:

1) A required RATA has not been performed by the end of the QA operating quarter in which it is due; or

2) A required 3-load flow RATA has not been performed by the end of the calendar quarter in which it is due.

b) The grace period will begin with the first unit (or stack) operating hour following the calendar quarter in which the required RATA was due. Data validation during a RATA grace period must be done in accordance with the applicable provisions in Section 2.3.2 of this Exhibit.

c) If, at the end of the 720 unit (or stack) operating hour grace period, the RATA has not been completed, data from the monitoring system will be invalid, beginning with the first unit operating hour following the expiration of the grace period. Data from the CEMS remain invalid until the hour of completion of a subsequent hands-off RATA. The deadline for the next test will be either two QA operating quarters (if a semiannual RATA frequency is obtained) or four QA operating quarters (if an annual RATA frequency is obtained) after the quarter in which the RATA is completed, not to exceed eight calendar quarters.

d) When a RATA is done during a grace period in order to satisfy a RATA requirement from a previous quarter, the deadline for the next RATA must be determined as follows:

1) If the grace period RATA qualifies for a reduced, (i.e., annual), RATA frequency the deadline for the next RATA will be set at three QA operating quarters after the quarter in which the grace period test is completed.

2) If the grace period RATA qualifies for the standard, (i.e., semiannual), RATA frequency the deadline for the next RATA will be set at two QA operating quarters after the quarter in which the grace period test is completed.

3) Notwithstanding these requirements, no more than eight successive calendar quarters must elapse after the quarter in which the grace period test is completed, without a subsequent RATA having been conducted.

2.4 Recertification, Quality Assurance, and RATA Frequency (Special Considerations)

a) When a significant change is made to a monitoring system such that recertification of the monitoring system is required in accordance with [Section 1.4(b)](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP&ReferencePositionType=T&ReferencePosition=SP_a83b000018c76) of Appendix B, a recertification test (or tests) must be performed to ensure that the CEMS continues to generate valid data. In all recertifications, a RATA will be one of the required tests; for some recertifications, other tests will also be required. A recertification test may be used to satisfy the quality assurance test requirement of this Exhibit. For example, if, for a particular change made to a CEMS, one of the required recertification tests is a linearity check and the linearity check is successful, then, unless another recertification event occurs in that same QA operating quarter, it would not be necessary to perform an additional linearity test of the CEMS in that quarter to meet the quality assurance requirement of Section 2.2.1 of this Exhibit. For this reason, EPA recommends that owners or operators coordinate component replacements, system upgrades, and other events that may require recertification, to the extent practicable, with the periodic quality assurance testing required by this Exhibit. When a quality assurance test is done for the dual purpose of recertification and routine quality assurance, the applicable data validation procedures in [Section](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS75.20&FindType=VP) 1.4(b)(3) must be followed.

b) Except for Hg monitoring systems (which always have an annual RATA frequency), whenever a passing RATA of a gas monitor is performed, or a passing 2-load RATA or a passing 3-load RATA of a flow monitor is performed (irrespective of whether the RATA is done to satisfy a recertification requirement or to meet the quality assurance requirements of this Exhibit, or both), the RATA frequency (semi-annual or annual) must be established based upon the date and time of completion of the RATA and the relative accuracy percentage obtained. For 2-load and 3-load flow RATAs, use the highest percentage relative accuracy at any of the loads to determine the RATA frequency. The results of a single-load flow RATA may be used to establish the RATA frequency when the single-load flow RATA is specifically required under Section 2.3.1.3(b) of this Exhibit or when the single-load RATA is allowed under Section 2.3.1.3(c) of this Exhibit for a unit that has operated at one load level for ≥ 85.0 percent of the time since the last annual flow RATA. No other single-load flow RATA may be used to establish an annual RATA frequency; however, a 2-load or 3-load flow RATA may be performed at any time, or in place of any required single-load RATA, in order to establish an annual RATA frequency.

2.5 Other Audits

Affected units may be subject to relative accuracy test audits at any time. If a monitor or continuous emission monitoring system fails the relative accuracy test during the audit, the monitor or continuous emission monitoring system will be considered to be out-of-control beginning with the date and time of completion of the audit, and continuing until a successful audit test is completed following corrective action. Alternatively, the conditional data validation procedures and associated timelines in Sections 1.4(b)(3)(B) through (I) of Appendix B may be used following the corrective actions.

2.6 System Integrity Checks for Mercury Monitors

For each mercury concentration monitoring system (except for a mercury monitor that does not have a converter), perform a single-point system integrity check weekly, i.e., at least once every 168 unit or stack operating hours, using a NIST-traceable source of oxidized mercury. Perform this check using a mid- or high-level gas concentration, as defined in Section 5.2 of Exhibit A to Appendix B. The performance specifications in [subsection (3) of Section 3.2](http://www.westlaw.com/TOC/Default.wl?rs=dfa1.0&vr=2.0&DB=1000547&DocName=40CFRS3.2&FindType=VP) of Exhibit A to Appendix B must be met, otherwise the monitoring system is considered out-of-control, from the hour of the failed check until a subsequent system integrity check is passed. If a required system integrity check is not performed and passed within 168 unit or stack operating hours of last successful check, the monitoring system will also be considered out of control, beginning with the 169th unit or stack operating hour after the last successful check, and continuing until a subsequent system integrity check is passed. This weekly check is not required if the daily calibration assessments in Section 2.1.1 of this Exhibit are performed using a NIST-traceable source of oxidized mercury.

[Note: The following TABLE/FORM is too wide to be displayed on one screen. You must print it for a meaningful review of its contents. The table has been divided into multiple pieces with each piece containing information to help you assemble a printout of the table. The information for each piece includes: (1) a three line message preceding the tabular data showing by line # and character # the position of the upper left-hand corner of the piece and the position of the piece within the entire table; and (2) a numeric scale following the tabular data displaying the character positions.]

Figure 1 for Exhibit B of Appendix B − Quality Assurance Test Requirements

|  |  |  |
| --- | --- | --- |
| Test |  | Basic QA test frequency requirements [FN\*] |
|  | Daily[FN\*] | Weekly | Quarterly[FN\*] | Semiannual[FN\*] | Annual |
| Calibration Error Test (2 pt.) | / |  |  |  |  |
| Interference Check (flow) | / |  |  |  |  |
| Flow-to-Load Ratio |  |  | / |  |  |
| Leak Check (DP flow monitors) |  |  | / |  |  |
| Linearity Check or System Integrity Check [FN\*\*] (3 pt.) |  |  | / |  |  |
| Single-point System Integrity Check [FN\*\*] |  | / |  |  |  |
| RATA (SO2, NOx, CO2, O2, H2O) [FN1] |  |  |  | / |  |
| RATA (All Hg monitoring systems) |  |  |  |  | / |
| RATA (flow) [FN1] [FN2] |  |  |  | / |  |

[FN\*] "Daily" means operating days, only. "Weekly" means once every 168 unit or stack operating hours. "Quarterly" means once every QA operating quarter. "Semiannual" means once every two QA operating quarters. "Annual" means once every four QA operating quarters. [FN\*\*] The system integrity check applies only to Hg monitors with converters. The single-point weekly system integrity check is not required if daily calibrations are performed using a NIST-traceable source of oxidized Hg. The 3-point quarterly system integrity check is not required if a linearity check is performed.

[FN1] Conduct RATA annually (i.e., once every four QA operating quarters), if monitor meets accuracy requirements to qualify for less frequent testing. [FN2] For flow monitors installed on peaking units, bypass stacks conduct all RATAs at a single, normal load (or operating level). For other flow monitors, conduct annual RATAs at two load levels (or operating levels). Alternating single-load and 2-load (or single-level and 2-level) RATAs may be done if a monitor is on a semiannual frequency. A single-load (or single-level) RATA may be done in lieu of a 2-load (or 2-level) RATA if, since the last annual flow RATA, the unit has operated at one load level (or operating level) for ≥ 85.0 percent of the time. A 3-level RATA is required at least once every five calendar years and whenever a flow monitor is re-linearized, except for flow monitors exempted from 3-level RATA testing under Section 6.5.2(b) of Exhibit A to Appendix B.

Figure 2 for Exhibit B of Appendix B − Relative Accuracy Test Frequency Incentive System

|  |
| --- |
| ---------------------------------------------------------------------------------------------------------------- |
| RATA | Semiannual [FNW] (percent) | Annual [FNW] |
| ---------------------------------------------------------------------------------------------------------------- |
| SO2 or NOX [FNY] | 7.5% < RA ≤ 10.0% or ± 15.0 ppm [FNX] | RA ≤ 7.5% or ± 12.0 ppm [FNX] |
| SO2-diluent | 7.5% < RA ≤ 10.0% or ± 0.030 lb/mmBtu [FNX] | RA ≤ 7.5% or ± 0.025 lb/mmBtu =G5X |
| NOX-diluent | 7.5% < RA ≤ 10.0% or ± 0.020 lb/mmBtu [FNX] | RA ≤ 7.5% or ± 0. 015 lb/mmBtu [FNX] |
| Flow | 7.5% < RA ≤ 10.0% or ± 2.0 fps [FNX] | RA ≤ 7.5% or ± 1.5 fps [FNX] |
| CO2 or O2 | 7.5% < RA ≤ 10.0% or ± 1.0 CO2/O2 [FNX] | RA ≤ 7.5% or ± 0.7% CO2/O2 [FNX] |
| Hg [FNX] µg/scm | N/A | RA < 20.0% or ± 1.0 [FNX] |
| Moisture | 7.5% < RA ≤ 10.0% or ± 1.5% H2O [FNX] | RA ≤ 7.5% or ± 1.0% H2O [FNX] |

[FNW] The deadline for the next RATA is the end of the second (if semiannual) or fourth (if annual) successive QA operating quarter following the quarter in which the CEMS was last tested. Exclude calendar quarters with fewer than 168 unit operating hours (or, for common stacks and bypass stacks, exclude quarters with fewer than 168 stack operating hours) in determining the RATA deadline. For SO2 monitors, QA operating quarters in which only very low sulfur fuel as defined in 40 CFR 72.2, incorporated by reference in Section 225.140, is combusted may also be excluded. However, the exclusion of calendar quarters is limited as follows: the deadline for the next RATA will be no more than 8 calendar quarters after the quarter in which a RATA was last performed.

[FNX] The difference between monitor and reference method mean values applies to moisture monitors, CO2 and O2 monitors, low emitters of SO2, NOX, or Hg, or and low flow, only. The specifications for Hg monitors also apply to sorbent trap monitoring systems.

[FNY] A NOX concentration monitoring system used to determine NOX mass emissions under 40 CFR 75.71, incorporated by reference in Section 225.140.

(Source: Added at 33 Ill. Reg. 10427, effective June 26, 2009)