

# **Procedures and Minimum Requirements for Stack Tests**

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### **Website Resources**

Air Emissions Monitoring for Stationary Sources website

[www.des.nh.gov/organization/divisions/air/cb/cmdps/tms/index.htm](http://www.des.nh.gov/organization/divisions/air/cb/cmdps/tms/index.htm)

Clean Air Act National Stack Testing Guidance

[www.epa.gov//compliance/resources/policies/monitoring/caa/stacktesting.pdf](http://www.epa.gov//compliance/resources/policies/monitoring/caa/stacktesting.pdf)

New Hampshire Code of Administrative Rules Chapter Env-A 800, *Testing and Monitoring Procedures*

[www.des.nh.gov/organization/commissioner/legal/rules/index.htm#air](http://www.des.nh.gov/organization/commissioner/legal/rules/index.htm#air)

## **1. Purpose of this document**

The Air Resources Division's Testing and Monitoring Section (ARD) is providing this guidance document to sources of air pollution, stack testing companies and consultants to inform them of the minimum requirements for performing stack testing in New Hampshire. In some cases, New Hampshire's requirements may be different from or more stringent than requirements in other states or what is required by EPA and federal testing requirements. Any source conducting stack testing in New Hampshire in order to comply with the testing requirements of its air permit, or with a state or federal regulation, should be familiar with this guidance document, as should any stack testing company retained by the source to conduct the testing.

New Hampshire Code of Administrative Rules Chapter Env-A 800, *Testing and Monitoring Procedures* contains the specific state regulations that must be complied with when testing in New Hampshire. Env-A 800 specifies both stack testing requirements and the requirements pertaining to the installation and operation of Continuous Emissions Monitoring (CEM) Systems. Env-A 800 is available on the DES website at <http://des.nh.gov/organization/commissioner/legal/rules/index.htm#air>.

EPA developed the Clean Air Act National Stack Testing Guidance to assist state and local air pollution agencies to implement its stack testing policies and to improve the uniformity of stack test emission data being collected across all the states. This guidance document, was initially issued in 2005, revised and reissued in April 2009. It is available at: <http://www.epa.gov/compliance/resources/policies/monitoring/caa/stacktesting.pdf>

The source and any testing contractor or consultant that has been retained to manage its test program, should review all applicable permits, regulations and enforcement orders prior to preparing and submitting the pre-test protocol to ARD. The test methods, performance specifications and requirements for testing are specified in many federal regulations, including Parts 51, 60, 61, 63 and 75 of Title 40 of the Code of Federal Regulations (CFR), and in Env-A 800. All test methods and equipment requirements must be strictly complied with, unless otherwise specified and agreed to by ARD.

All pre-test protocols, final reports and associated correspondence should be submitted to the Compliance Bureau's Testing and Monitoring Section at the address on the cover page of this document.

## **2. Authority for ARD to require testing**

Under RSA 125-C Air Pollution Control, the ARD has the authority to require a source of air pollution to stack test. Specifically, RSA 125-C:6 XI allows the commissioner of the DES to require "(c)onducting emission tests and requiring owners or operators of stationary sources to install, maintain, and use emission monitoring devices and to make periodic reports to the commissioner on the nature and amounts of emissions from such stationary sources. The commissioner shall have the authority to make such data available to the public and as correlated with any applicable emission standards."

In addition, EPA, through the promulgation of federal emissions standards and requirements, may require stack emissions testing and/or the installation and operation of a CEM system. These requirements are typically specified in the respective chapter of Title 40 of the CFR to which the source is subject: New Source Performance Standards (NSPS) in 40 CFR 60, Maximum Achievable Control Technology (MACT) standards in 40 CFR 63, and the emissions monitoring and reporting requirements of the federal Acid Rain program in 40 CFR 75. All these requirements are typically specified in the air permits issued by ARD to the source.

### 3. Time frame for conducting stack tests

In general, stationary sources that are required by a permit to conduct initial compliance testing of a new or modified device are required to complete the testing within 60 days of reaching maximum production or capacity of the device, not to exceed 180 days from the start-up of the device. These time periods are specified in order to allow the source to get used to operating the new or modified device and to resolve any unexpected problems with its operation prior to conducting the initial stack test. It is in a source's best interest to perform the compliance testing as soon as the device is operating in a stable manner. If during the compliance test, the source fails to comply with the emission limits, it can make corrections to its operation and conduct a subsequent test without penalty, as long as the subsequent test occurs within the 60/180-day timeframe. If the source waits to test until the end of the allowable period and subsequently exceeds an emissions limit, it is unlikely that the source will be able to make corrections to the device and conduct a subsequent test prior to the testing deadline, resulting in a violation of its permit.

In some cases, a source is issued a temporary permit to install a new device or modify a device, and once the device is started, the source is not able to operate it at maximum capacity or for a sustained period. If the source does not believe the device will be ready to be tested within the 60/180-day deadlines discussed above, the source can request from ARD in writing a **waiver** of the deadline in accordance with Env-A 205, *Waivers*. If ARD determines the waiver is justified, it will respond in writing to allow the waiver until such time the device is operating normally by specifying a new deadline in the waiver. Typically, ARD will require periodic updates on the status of the device until the time the device is tested.

Some rules and programs, notably the federal Acid Rain Program in 40 CFR 75, allow extensions and **grace periods**, depending on the circumstances, of deadlines for performing certification testing of CEM systems to allow for periods when the process being monitored is not operating. Similarly, ARD will allow extensions of deadlines for conducting testing if the device to be tested is not operating. If this situation occurs, the source must submit the request in writing to ARD as soon as possible in order for ARD to review the request and respond to the source.

There are no regulatory mechanisms to extend a deadline for stack testing required by the federal NSPS, NESHAP, and MACT programs, with the exception of testing delayed by a *force majeure* event. A *force majeure* event is defined in the federal subparts of those programs as "circumstances beyond the control of the affected facility, its contractors, or any entity controlled by the affected facility that prevents the owner or operator from complying with the regulatory requirement to conduct performance tests within the specified time frame despite the affected

facility's best efforts to fulfill the obligation. Examples of such events are acts of nature, acts of war or terrorism, or equipment failure or safety hazard beyond the control of the affected facility". However, ARD may use enforcement discretion in the case of the failure to meet a testing deadline caused by something other than a *force majeure* event, and where ARD determines it is appropriate to postpone the test. Such an example would be a source that is not able to operate at its maximum production rate.

Some compliance stack testing is required to be conducted on a periodic, more frequent basis. An example is the compliance testing for Nitrogen Oxides (NO<sub>x</sub>) emissions from a fuel burning device that is required by Env-A 803.03, *Periodic Compliance Stack Testing for NO<sub>x</sub>*. In this case, ARD specifies the frequency in calendar quarters from the previous compliance test. The frequency is nominally every 3 years, but the source is allowed to conduct the testing any time within the twelfth calendar quarter (or sooner) from the previous test.

Some sources with air pollution control equipment for the reduction of volatile organic compounds (VOCs) are required to test on a 5-year frequency for the efficiency of the control equipment. This testing, required by Env-A 804.13, *Periodic Compliance Stack Testing for VOCs* is required to be performed "within 5 years of the date of the initial stack test required by Env-A 804.12 and at least once every 5 years thereafter." Similarly to the NO<sub>x</sub> RACT periodic testing, where it is not prohibited by more stringent language in the permit, ARD has defined the 5 year period as 20 calendar quarters.

As this guidance document explains in more detail in Section 6, testing conducted on a more frequent basis may not require the submittal of a complete pre-test protocol or the need to conduct the pre-test meeting.

#### **4. ARD's oversight of stack testing programs**

ARD is tasked with assuring that emissions data measured at stationary sources for determining compliance are as accurate and representative as possible. This includes the oversight of stack emissions testing conducted to demonstrate compliance with permitted emission standards, and to certify CEM systems required to be installed and operated by state and/or federal air quality regulations.

Env-A 802, *Compliance Stack Testing for Stationary Sources* specifies the responsibilities of the source to notify ARD prior to the testing, submit the necessary reports, and to schedule the testing, as follows:

- a. The source shall notify ARD at least 30 days prior to the commencement of planned compliance stack testing. ARD policy is to be onsite for the duration of every compliance test and CEM system certification. ARD will attempt to work with the source to accommodate its desired schedule for testing. ARD will require the rescheduling of any compliance stack emissions test if the staff necessary to observe the test is not available. For this reason, it is in the source's best interest to schedule testing with ARD as far ahead of the test as possible.

- b. The source shall submit to ARD at least 30 days prior to the commencement of source testing a pre-test protocol. The contents of this document are discussed in more detail in Section 6 of this document.
- c. The source and the testing company that has been contracted to conduct the test shall at least 15 days prior to the test date meet with ARD to discuss and finalize the details of the test, which includes the testing schedule and the process conditions under which the data shall be collected. In addition, any modifications from any of the EPA test methods or from the permit requirements that the source intends to use should be discussed at this meeting. This meeting is typically held at the source so that ARD and the testing company can see the actual sampling locations to determine what modifications, if any, need to be made to accomplish the testing. ARD has occasionally allowed a pre-test meeting to be held via a conference call if the testing company's offices are at a location that would make travel to the source unnecessarily burdensome for a one to two hour meeting. However, ARD would only allow this if it believed the test methodology was relatively straightforward and the testing company had demonstrated its competence with a detailed pre-test protocol. In some cases, the pre-test meeting may be held less than 15 days prior to the test date so long as ARD is available for the meeting and implementation of any testing or operation changes resulting from the meeting can be carried out prior to the scheduled test date and the scheduled test integrity is not jeopardized.
- d. ARD will be onsite during the stack testing to verify conformance with all stack testing methods and to provide direction if any previously-agreed upon procedures must be deviated from to accomplish the goals of the test program.
- e. The source shall submit to ARD a final report of the results of the testing no more than 60 days after completion of a compliance stack test; or no more than 45 days after the completion of a CEM system certification or Relative Accuracy Test Audit (RATA),
- f. ARD will review the final report, request modifications, corrections or additional information if necessary, and, after all issues have been addressed, respond with a letter accepting the results of the stack test. The results may indicate compliance with or violation of an emissions limit.

**Note: for those sources subject to the federal Acid Rain program (40 CFR 75 Acid Rain) the requirements either co-exist with, or if they are more stringent take precedence over, Env-A 800 requirements.**

For those sources conducting compliance stack testing or the certification of a CEM system in order to comply with the requirements of a Temporary Permit issued by DES, Env-A 704, *Testing and Monitoring Fees for Temporary Permits* allows ARD to charge for the hours spent by its staff observing the testing and for its time reviewing the final report.

## 5. Sampling location and safety

Stack testing is typically conducted at considerable height, including on roof tops, scaffolding, elevated walkways and gratings, and on stack testing platforms. It is also frequently performed during inclement weather, including cold, rain, wind, ice and snow. As such, it can be a potentially dangerous, even life-threatening, activity. It is paramount that adequate safety procedures be followed. The source being tested and any testing company hired by the company should follow OSHA-approved safety standards at all times. If ARD finds that the conditions for testing are unsafe, due to the physical location, lack of adequate safety measures or adverse weather conditions, ARD may notify the source that it will not observe the testing until safe conditions exist, effectively ending the compliance test. This occurs very rarely.

In addition, the source must provide adequate access into the stack or duct for sampling that meets the specific criteria of the EPA test method. Most sampling locations will require electrical power for the testing company to operate its sampling equipment. This level of detail is generally discussed during the onsite pre-test meeting, but it is ultimately the responsibility of the source to make these accommodations for the testing company to conduct the test.

Paragraph (e) of 40 CFR 60.8 Performance Tests requires that the source provide:

- a. Sampling ports adequate for test methods applicable to such facility. This includes (i) constructing the air pollution control system such that volumetric flow rates and pollutant emission rates can be accurately determined by applicable test methods and procedures and (ii) providing a stack or duct free of cyclonic flow during performance tests, as demonstrated by applicable test methods and procedures;
- b. Safe sampling platform(s);
- c. Safe access to sampling platform(s); and
- d. Utilities for sampling and testing equipment.

EPA Test Method 1 of 40 CFR 60 Appendix A specifies the requirements for sampling locations, including the minimum upstream and downstream distance from flow disturbances. If a proposed sampling location does not meet Method 1 requirements, ARD strongly recommends discussing this issue before submitting the pre-test protocol. In some cases, modifications may have to be made to stacks or ducts in order for the emissions from them to be sampled. In general, sampling ports should be four-inch (minimum) inner diameter threaded pipe connections with a cap. This diameter will allow a particulate sampling probe assembly (i.e. probe, nozzle, pitot tube, and thermocouple) to fit easily through the port. Where only gaseous emissions are being sampled, a smaller port opening may be acceptable. The inside edge of the port should not extend past the inside surface of the stack or duct.

## 6. Pre-test protocol (and pre-test meeting)

The source must submit to ARD a pre-test protocol at least 30 days prior to the scheduled date of the stack test. The protocol should include and **describe in detail** the procedures that the testing contractor intends to use during the test, including, but not limited to, the specific test methods, sampling train and equipment specifications, sampling locations, process operations, calibration standards, sample data collection sheets and calculations. In addition, the protocol must specify

any modifications to the established test methods that the test contractor believes are necessary for the specific testing program. Env-A 802.04, *Pre-test Protocol* lists the items that are required to be included, at a minimum, in the pre-test protocol. ARD will review and approve the pre-test protocol, either prior to or after discussing any issues with the source and testing contractor at the pre-test meeting. Any significant changes to the protocol must be documented and resubmitted to ARD in a revised pre-test protocol. The pre-test protocol **MUST** be approved by ARD prior to the beginning of any compliance testing.

To expedite ARD's review and approval of the protocol, the testing contractor should include in the submittal drawings of the test location that show the stack configuration and dimensions, sampling port locations, and traverse point locations when sampling is done at multiple points across the stack or duct. The drawings should also include the position of the sampling ports relative to the nearest upstream and downstream flow disturbances. Where there are multiple processes or operations venting to the stack or duct, or if there are any bypasses installed, those should also be indicated.

In addition, the protocol should include samples of the data collection sheets and all calculations that will be used to determine the results, including all equations, constants and conversion factors. There should be a description of the operating conditions that the source will use for the test and a description of how these conditions will be verified. Sample process data sheets, the monitored parameters and the data collection frequency should all be noted. If the source has air pollution control equipment that will be operating, process parameters and data collection for the controls shall similarly be specified in the protocol.

The protocol must include a complete description of the quality assurance and quality control measures that the testing contractor intends to use. It should contain a description of the calibration procedures and frequency of calibration of its test equipment. Any unusual pre-test preparation procedures, such as extensive glassware and sampling equipment cleaning, preliminary test data upon which test instrument ranges or calibration standards are chosen, or the inclusion of any test blanks should be explained thoroughly

The protocol should contain a proposed test schedule. ARD realizes that this is frequently subject to change depending on the operation and production schedule of the source, and any unexpected process or testing issues that occur the day(s) of the test. However, a proposed schedule will assist ARD in scheduling its staff availability to ensure its coverage of the test program.

If the source is planning to conduct testing at any operating condition other than between 90 and 100 percent of maximum load or capacity, or at less than 50 percent of load for a CEM system certification, this must be explained in the pre-test protocol. See Section 7 on operating conditions during stack testing.

The exception for having to submit a pre-test protocol is explained in Env-A 802.06, *Repeating a Compliance Stack Test*. For stack tests that are repetitive (such as 3-year NOx RACT testing or annual CEM system certifications) and meet all of the following criteria, a source shall not be required to submit the pre-test protocol or schedule the pre-test meeting:

- a. ARD approved the previous pre-test protocol.
- b. The testing uses the same test methods, is on the same device, and the device is operating at the same conditions.
- c. The same stack testing contractor has been retained to conduct the testing.
- d. The source or its testing contractor shall submit a letter to ARD referencing the previously-approved protocol and pre-test meeting and identifying in detail any **minor** modifications, if any, from the previously accepted protocol.

Although the source is not required to submit the pre-test protocol until at least 30 days prior to the scheduled test date or to hold the pre-test meeting until at least 15 days prior to the test date, it is to the source's advantage to do these as early as possible. This is especially the case if the source has not conducted stack testing at its facility previously or the testing is on a new device. If, as a result of reviewing the protocol and attending the pre-test meeting, ARD requests that the source or the testing contractor make extensive changes to the testing or sampling location(s) or to the test methods chosen for the test, failure to test within the deadlines specified in the permit may result in enforcement action.

## **7. Process operating conditions for the test**

In general, a source is expected to operate during compliance emissions testing between 90 and 100 percent of its full load or maximum capacity specified in the permit. Env-A 802.10, states that the source shall operate within this range, or "at a production rate at which maximum emissions occur; or at such operating conditions agreed upon during a pre-test meeting..." ARD realizes that maximum emissions may not necessarily occur at maximum load, depending on the device and how it is designed to be operated. In the case of air pollution control equipment, specifically thermal oxidizers for volatile organic compounds where the emissions limit is specified as a minimum destruction rate, the worst case may occur at low-load conditions. For these reasons, ARD may require that testing be done at a load other than 90 to 100 percent of capacity, or even at multiple loads. In addition, the protocol should address any non-steady state part of the operation, including start-ups, shut-downs, cyclic or batch operations, load shifts, or soot blowing, etc.

For sources conducting a RATA in order to certify or recertify a CEM system, the process operating level must be as specified in 40 CFR 60, 61, 63 and/or 40 CFR 75 (as may be applicable). If no minimum condition is otherwise specified, the device being monitored by the CEM system should operate at a minimum of 50 percent of full-load.

Unless ARD agrees otherwise during the pre-test meeting, any pollution control equipment that is operating during the stack test should be operated in its normal mode of operation. Any reagent injection rates or parameters of operation (e.g. ammonia, urea or sulfuric acid injection; scrubber water flow rate; recycle rate; temperatures, etc.) should not be changed for the test. Likewise, any part of the process that is normally operated in an automatic mode should remain in automatic for the test.

If any process parameter is operated in a mode other than its normal mode of operation, or if any parameter is operated below the minimum or above the maximum required by the permit, ARD may require that the permit be modified to reflect the operating conditions during the test.

Similarly, if the device is operated at less than 90 to 100 percent of maximum load or capacity or at a condition that generates less than normal, representative emissions, ARD may modify the permit to limit the maximum capacity of the device. As noted earlier, these items should be discussed during the pre-test meeting. The conditions under which the source will operate for the stack test, including any load changes or intermittent modes of operation that might result in large changes or swings in operation, or any condition(s) that might be considered other than normal or steady-state should be discussed with ARD during the pre-test meeting. Any changes in operation made during the test without the prior agreement of the ARD engineer may cause the test run(s) to be invalidated.

## **8. Conducting the stack test**

It is an ARD policy for one the engineering staff to be onsite for every stack test that takes place in New Hampshire. During the test program, the ARD engineer compares the testing procedures being used by the testing company against the requirements of the specific test method(s) in the federal test methods and/or state regulation. ARD engineer brings any discrepancies to the attention of the testing company and the source such that corrections or modifications to the implementation of the test method can be made at the time of the test. ARD accommodates most requests from the source and/or the testing company to conduct preliminary data collection or pre-test quality assurance steps on the day of test equipment setup (usually the day preceding the test) or very early on the test day. In some cases, ARD may allow some of these procedures to begin prior to its arrival onsite. No testing or data collection should be initiated prior to the ARD engineer being onsite without the engineer having given his/her prior approval. Doing so risks having to repeat these parts of the test when ARD arrives at the facility.

It is not uncommon that on the day of the test that the testing must deviate from the protocol because of some unforeseen physical or operational constraint. Instead of the source having to decide between stopping the test, or proceeding and hoping that ultimately ARD accepts the change and does not require a repeat of the testing, the ARD engineer onsite can make the determination. Usually, these deviations from the agreed-upon protocol are minor and are quickly resolved. In only a few cases, and often times when the test is being required by EPA and is a federal requirement, a decision may take longer and can temporarily suspend the test program. In some instances, ARD may contact EPA Region 1 or EPA headquarters for clarification and to determine if the modification from the test method will be acceptable to the EPA and will not prevent the collection of acceptable data.

### **On the day(s) of the test these items must be completed (as required):**

- a. **For each stack test that includes a gas concentration measurement**, ARD requires the source to perform a concentration stratification check at each measurement location following the methods specified in 40 CFR 60, Appendix A, Method 7E, section 8.1.2 for Part 60-subject sources and 40 CFR 75, Appendix A, Section 6.5.6.1 for Part 75-subject sources.
- b. **For each stack test that includes measurement of the stack volumetric flow rate**, ARD requires the source to perform a verification of the absence of cyclonic flow

- following the method and acceptance criteria specified in 40 CFR 60, Appendix A, Method 1.
- c. As noted above, ARD may require the testing contractor to repeat any preliminary stack testing procedures, such as the gas concentration stratification check or cyclonics flow check, if the procedure was conducted prior to the onsite arrival of the ARD engineer and without ARD's prior approval.
  - d. The testing contractor shall provide the ARD engineer with the certification sheets for all calibration gases and all test equipment that is planned to be used that requires calibration in accordance with the respective EPA test method.
  - e. If the stack test includes the measurement of gas concentrations by instrumental reference methods, the test contractor shall provide the ARD engineer with all calibration data.
  - f. If the testing contractor uses the instrumental method 7E to measure NO<sub>x</sub> concentrations, an efficiency test of the NO<sub>2</sub>-NO converter must be done during the testing as specified in EPA Method 7E, Section 8.2.4. The method states that it must be done before or after the field test. However, it also states that any failed conversion efficiency test invalidates all tests since the last passed test. For this reason, ARD **strongly** recommends that this be done both **before** and **after** each field test.
  - g. Similarly, ARD recommends the testing contractor conduct leak checks of its sampling trains on a frequent basis. This includes pre-run checks and intermediate run checks if the sample train is moved significantly during a test run. If a leak check is failed, all test data collected with that equipment since the last satisfactory leak check may be invalidated. In some cases, the ARD engineer may request a leak check to be done after the sampling train has been moved to confirm its integrity before resuming the test.
  - h. In general, stack test runs are 60 minutes long. In a few cases, where the device is being tested to meet a state-only requirement, the device is tested regularly (e.g. 3-year NO<sub>x</sub> RACT testing) and the operation of the device and its emissions are very stable (e.g. internal combustion engines running at constant load), ARD may allow 30 minute runs instead of 60 minute runs.
  - i. Any corrections to hand-written data collection sheets must be done by lining out the incorrect entry, annotating the correct data as close as legibly possible to the lined-out entry, and initialing and dating the change. Data sheets that are not legible or that have corrections not following this procedure may be rejected.
  - j. If a source is part way through a compliance stack test and the emissions data show that the source is exceeding an emission limit, with few exceptions, the test run must be completed to document the failure. Once the test run has been completed, indicating a failed stack test, corrective actions can be made and the test can be restarted.

- k. If a source is part way through a CEM system RATA and the comparison with the reference method shows that the plant CEM system will not meet the criteria for relative accuracy, the RATA can be aborted only with the agreement between the source and ARD. If this occurs, from the time of stopping the test until the time a successful RATA is completed, the CEM system is operating out of control and the collected emissions data is invalid.
- l. If during a compliance stack test or a CEM system RATA, the reference method test equipment experiences a failure that causes a test run to be aborted or a test program to be stopped, this alone can not be used to show compliance or the lack thereof. The exception to this is if the reference failure occurred within the third compliance test run and the data from the first two runs are valid and quality-assured according to the requirements of the test method. In this case, the results of the two runs can be averaged to determine the measured emissions rate.
- m. If there are process problems that occur during the test that indicate that emissions are not representative of normal operation, the ARD engineer onsite must be notified promptly so that a decision can be made whether or not to stop the test run. This does not necessarily invalidate the test or any of the test data collected. For a short-term, easily-corrected upset, the testing can resume once stable operation has been regained. The stoppage of the test, including beginning and end times, and all corrective actions taken by the source must be documented in the final test report that results from the subsequent completed stack test. If stable operation cannot be regained, then it is likely that the entire test will have to be repeated at a later date;
- n. If a stack test is being performed where the results of the test will not be known for some time after the conclusion of the test, typically because laboratory analysis of collected samples is required, ARD recommends that the source collect as much process operating data during the test to document its correct operation. If the sample analyses indicate that the source failed to comply with an emission limit, the source may be able to indicate using the process data that a process upset occurred which could invalidate the test results.
- o. Testing for certification of a CEM system or for compliance “looks forward.” That is, compliance or failure of a test is from that time going forward. It does not necessarily indicate compliance or failure going back. Exceptions to this are:
  - i. A source has had to install a new CEM system component and initially performed a system audit to provisionally certify the component. It can use the results of a successful, subsequent RATA, with the previous concurrence of ARD, to certify the new component and validate the data it has measured from the time of its installation.
  - ii. Failing a compliance stack test does not necessarily indicate that the source was in violation of the emissions limit prior to the test. Typically the violation begins with the failed test and continues until a subsequent test shows compliance. However, if there is credible evidence, by some process parameter or some other measured emission that indicates that the conditions that caused the emissions

violation existed prior to the stack test, then ARD may consider the violation to have begun before the stack test failure.

- p. During or at the conclusion of the stack test, the ARD engineer may request copies of the field data sheets or process data sheets.
- q. Any changes to the test program made on the day of the test that were originally agreed to in the pre-test protocol must be documented in the stack test report.

## **9. Final compliance test report**

ARD has no required format for the final test report. However, all of the information required by Env-A 802.11, *Report Submission Requirements* shall be included in the report. The report must include sufficient description and data to explain any process problems, test equipment problems, and any aborted or partial runs that occurred during the testing, in accordance with Env-A 802.11(c) (6) and (7). All the information that was described in the pre-test protocol and any additional information requested by the ARD engineer at the time of the testing must be included in the final test report.

### **The final test report must include the following:**

- a. All the information required to be in the pre-test protocol as described in Env-A 802.04 and in Section 6 of this document
- b. The key personnel involved in the test program.
- c. All test data, including all hand-written data sheets and (when being used for the test) the output from the reference method CEM system and the facility's CEM system.
- d. All calibration data (pre-, post- and during the day of the test).
- e. Any process data that ARD and the source agreed, both during the pre-test meeting and on the day of the test, would be collected.
- f. All equations and calculations used in the test report, including any intermediate calculations, all constants, and assumed values.
- g. If the testing included any post-test sample analyses, then all the laboratory data sheets and any laboratory QA/QC information.
- h. All final results and the limits against which they are being compared for compliance.
- i. A description of any changes from the information described in the pre-test protocol, and any discrepancies or problems that occurred during the testing, or after the test, including sample analyses.

- j. An explanation of how discrepancies or problems were treated and the effect, if any, on the final results, especially if the source is requesting to discard any test run data or for ARD to accept less than the full run time.
- k. If applicable, the results and associated run data and field data sheets for any failed stack tests or individual runs.

The final test report must contain all the information necessary to support the final results of the test. In its review, ARD will perform its own calculation of the final results using all the basic data from the reference method instrumental analyzer output and hand-written data sheets. ARD will also verify the initial, intermediate and final calibration calculations. The final report must contain all the data for ARD to perform these calculations and for it to understand the basis for all the submitted data.

The test contractor shall calculate the final results of the test by using sufficient significant figures in all intermediate calculations to retain the accuracy of the initial or raw data through to the final calculated result. According to the section titled “Rounding of Significant Figures” on page 19 of the EPA’s Clean Air Act National Stack Testing Guidance located at [www.epa.gov/compliance/resources/policies/monitoring/caa/stacktesting.pdf](http://www.epa.gov/compliance/resources/policies/monitoring/caa/stacktesting.pdf), a minimum of 5 significant figures should be kept for intermediate calculations. All final results must be presented in units of the emission standard and contain at least one significant figure beyond that of the emission limit.

The final report should be signed by the responsible party at the source. If the testing was conducted at a Title V facility, the report MUST include the certification of accuracy statement and be signed by a responsible official. Unless otherwise indicated by a more stringent federal reporting deadline, the source or the testing contractor must submit the final test report to ARD:

- a. No more than 60 days after completion of a compliance stack test; or
- b. No more than 45 days after the completion of a CEM system certification or Relative Accuracy Test Audit (RATA).

ARD may grant an extension of the report submittal deadline if it is requested by the source or stack test company. ARD typically grants an extension where the stack test methods include significant laboratory analyses of samples that were collected during the test. Shipping the samples to the laboratory, waiting on their analyses, and then waiting for the laboratory to submit the results back to the testing company can use up a significant amount of the 60-day total to get the results to ARD.

Once ARD has received the final report, it will review it for technical accuracy and completeness. ARD will contact the source, or the test company at the source’s request, to request modifications, corrections or additional information if necessary. At the conclusion of its review, and after it is satisfied that the test was carried out following all the requirements of the particular methods and the conditions of source operation met the test objectives, ARD will respond to the source with a letter accepting the results of the stack test and indicating whether the results demonstrated compliance with or violation of an emissions limit.

## 10. Additional requirements for RATAs and CEM certifications

Env-A 808, *Continuous Emissions Monitoring* specifies the requirements that a source has to follow for the approval of, installation, certification and operation of a CEM system. For a source that is required by a permit to install a new CEM system, the source should meet with ARD to discuss the CEM system design to ensure that it will meet the criteria in Env-A 808.03, *Minimum Specifications For CEM Systems* and that it will meet the needs of the source and satisfy the requirements of the permit for data measurement, handling and reporting.

The source is required by Env-A 808.04, *CEM Monitoring Plan* to submit a CEM Monitoring Plan to ARD at least 90 days prior to the CEM system installation. ARD is required to respond to the source with a letter of approval, or non-approval, within 30 days. If the plan is not approved, the CEM system design will have to be modified. Ideally, the source will meet with ARD prior to submitting the plan. It is in the best interest of the source to begin discussions with ARD as soon as possible after it learns that it has to install a CEM system so that all parties can agree on what parameters the system will have to meet in order to be approved by ARD.

In addition to the typical annual RATA or recertification of a source's CEM system, sometimes a source may have to perform an unexpected RATA. This might be the case if a source had to replace a CEM system component or make a significant modification to the monitoring system. Env-A 808.04(g) and Env-A 808.05(e), (f) and (g) specify the conditions under which a RATA might have to be performed outside the normal annual schedule. Any such repair or correction to the CEM system should be reported to ARD, so that the agency can help the source take the necessary actions to recertify the system, and to ensure that ARD does not have to later invalidate CEM data because a necessary RATA was not conducted. In some cases, ARD allows the source to provisionally certify the CEM system after a repair by performing a cylinder gas audit, and then retroactively certify the system during an upcoming RATA.

A number of sources in NH have been required to install NO<sub>x</sub> control equipment (e.g. Selective Catalytic Reduction, Selective Non-Catalytic Reduction, Regenerative Selective Catalytic Reduction, etc.) that utilizes ammonia or urea as a reactant. A small amount of ammonia, or slip, is emitted as a result. Several of these sources have been required to install ammonia CEM systems to demonstrate ongoing compliance with the slip limit. There is no federal Performance Specification for ammonia CEM systems; however there is a preliminary specification (PPS-001 Preliminary Performance Specifications for Ammonia Continuous Emission Monitors) which ARD has adapted for the ammonia monitors in NH.

Where the ammonia slip concentration is measured by the differential NO<sub>x</sub> monitor method, ARD requires that the facility calibrate the monitors daily with high and low NO<sub>x</sub> concentration calibration gases, and once a month with an ammonia calibration gas standard. The annual RATA acceptance criterion is 20 percent of the emissions standard.

**Note: for those sources subject to the federal Acid Rain program (40 CFR 75 Acid Rain) the requirements either co-exist with, or if they are more stringent take precedence over, Env-A 800 requirements.**

## **11. Assessment of fees for observing and reviewing stack tests**

Env-A 704, *Testing and Monitoring Fees for Temporary Permits* allows ARD to charge a source for the time spent by its staff observing testing and reviewing the final report. Env-A 704.02(a) states “for any testing and monitoring which department personnel undertake or audit as a condition of a temporary permit proposed to be issued or issued to a source, the department shall assess an individual personnel testing and monitoring fee to the applicant or permittee.” Note that this is only for testing required by a Temporary Permit, not for testing required by a State Permit to Operate or a Title V Permit. This applies to both ARD’s involvement with a compliance stack test, as well as the initial certification of a CEM system required by a temporary permit.

For those sources conducting testing required by a temporary permit, ARD will include in its acceptance letter of the test a statement that an invoice for the time spent observing the testing and reviewing the report will be forthcoming.

## **12. Approval of alternate methods**

One of the purposes of the pre-test protocol and pre-test meeting is to allow the source, the testing contractor, and ARD to discuss the methods to be used during the stack test and to modify them when necessary to meet the measurement goals of the test. In some cases, the modifications may be to use entirely different types of test methods and a different test program. Usually, the permit specifies the test methods or at least the general methodology to be followed. The source should follow Env-A 809.01, *Request for Approval of Alternate Methods or Requirements* when it or its contractor wants to use a very different method to demonstrate its compliance. This situation occurs rarely. If it does, then Env-A 809.02, *Request Processing and Decision* stipulates how ARD must respond to the request.

If the source is conducting testing required by a federal requirement, even if ARD is observing the test and reviewing the pre-test protocol, and requests a significant modification of a test method, it must comply with Env-A 809.03, *Alternate Methods for Federal Standards*. In this case, the request for alternate method should be submitted to EPA for approval.

## **13. Visible emissions testing**

An exception to normal stack testing and what is required from the source and testing contractor prior to the testing is visible emissions (VE) testing for rock crushing operations. These sources operate under a General State Permit for non-metallic mineral processing. In general, unless the facility has been subject to some type of enforcement action or there is some other cause for ARD’s heightened interest in the facility, ARD does not require the submittal of a pre-test protocol, there is no requirement for a pre-test meeting, and ARD is not onsite during the testing. ARD does not review the results unless an agency representative happens to be onsite at some date after the testing has occurred, for example, for a compliance inspection or if responding to a complaint.