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# Procedures and Minimum Requirements for Stack Tests

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December 2019

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## 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 the 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.

NH 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 New Hampshire Department of Environmental Services (NHDES) website.

The 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, also useful to sources and stack test companies conducting stack tests in New Hampshire, was initially issued in 2005, revised and reissued in April 2009.

The source and any testing contractor or consultant that the source has 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, 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 Air Resources Division has the authority to require a source of air pollution to stack test. Specifically, RSA 125-C:6 XI allows the commissioner of NHDES 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, the EPA, through the promulgation of federal emissions standards and requirements, may require stack emissions testing or the installation and operation of a CEM system. These requirements

are typically specified in the respective chapter of Title 40 of the Code of Federal Regulations (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 the 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 to demonstrate compliance within the 60/180-day deadline. If the source waits to test until the end of the allowable period and exceeds an emissions limit, it is likely that the source will not be able to make corrections to the device and demonstrate compliance until after 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, but 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 in writing from ARD a **waiver** of the deadline in accordance with *Env-A 205 Waivers*. ARD must receive the request from the source prior to the deadline, and the source should make the request of ARD as early as possible prior to the deadline in order for ARD to review the request and respond to the source. If ARD determines the waiver is justified, it will allow a waiver until such time the device is operating at a load suitable for testing by specifying a new deadline in the waiver. Typically, ARD will require as a condition of the waiver periodic updates on the status of the device until the time the device is tested.

Some compliance stack testing is required to be conducted on a periodic basis. An example is the compliance testing for 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, 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 regular basis may not require the submittal of a complete pre-test protocol or the need to conduct the pre-test meeting prior to every test event.

In addition to the compliance testing required by a Temporary Permit above, if compliance testing required by a State Permit to Operate or Title V permit cannot be accomplished by the deadline to conduct testing in the permit, the source may request in writing from ARD a waiver of the deadline until the device is able to operate under the conditions necessary for testing. As above, ARD must receive the request from the source prior to the deadline, and the source should make the request of ARD as early as possible prior to the deadline. ARD will review the request and if the reasons given justify the need for the waiver and comply with the criteria of Env-A 205, ARD will approve the waiver.

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.

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

ARD is tasked with assuring that emissions data measured at stationary sources for the purpose of determining compliance is 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 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. However, ARD will require the rescheduling of any compliance stack emissions test if the staff necessary to observe the test are 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. Note that if the test is required by a federal rule or standard, it may require the pre-test protocol to be submitted at least 45 days or 60 days prior to the scheduled testing date depending on the federal rule. The contents of the pre-test protocol are discussed in more detail in Section 5 of this document.
- c. At least 15 days prior to the test date, the source and the testing company that has been contracted to conduct the test shall meet with ARD to discuss and finalize the details of the test, 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. In general, the meeting is held at the facility 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 facility 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.

Part 75 Acid Rain requirements either co-exist with, or if that is not possible, 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 NHDES, *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 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).
- 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)**

As noted in Section 3. of this document, the source must submit to ARD a pre-test protocol at least 30 days, and as many as 60 days for some federal-required testing, 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.

Sources that are required to conduct compliance testing or a RATA by a federal program may be also be required to submit a source sampling test plan to EPA prior to conducting the test using EPA's Electronic

Reporting Tool (ERT), a Windows-based software reporting application, and submitting the zipped file that is created using the web-based Compliance and Emissions Data Reporting Interface (CEDRI), which is located on EPA's Central Data Exchange (CDX). Sources that are required to follow this electronic method of test plan submission will also be required by NHDES to submit a hardcopy pre-test protocol required by Env-A 802.04.

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% of load for a CEM system certification, this must be explained in the pre-test protocol. See Section 7. below for further discussion 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 or RATA*. For those stack tests that are repetitive (such as 3-year NOx RACT testing or annual CEM system certifications) and meet 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 data 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 between 90 and 100 percent of its full load or maximum capacity specified in the permit during compliance emissions testing. Env-A 802.10 *Operating Conditions During a Stack Emissions Test* further 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. 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.

Compliance testing of air pollution control equipment installed to reduce the emissions of volatile organic compounds (VOCs) is an example of when testing at multiple loads is likely to be necessary to demonstrate the device's ability to control emissions at all operating conditions. In the case of thermal and catalytic destruction of VOCs, high load (90 to 100%) operation is often not the worst case scenario to challenge the device's ability to control VOCs. At a lower VOC loading to the oxidizer, even though the VOC concentration and mass emission rate at the control device outlet may be lower than they would be at higher load, the percent destruction efficiency of the oxidizer may be lower than it would be at a higher VOC loading to the oxidizer. In addition, most permits require a minimum combustion zone temperature which is based on the temperature that is recorded during compliance testing. If testing is conducted at a high VOC loading, the temperature may be higher than that temperature is when operating at normal or low VOC loading conditions. In order to maintain the temperature to that which was recorded during the high load testing, the source may be required to burn more supplemental fuel while it is operating at low load.

In order to address these concerns for VOC control equipment, ARD requires that for an initial test of a new device, the source must conduct **six** test runs, three at a high loading and three at a low loading. For subsequent tests (every 5 years), the source must conduct **four** test runs, three at "normal" operations and one at a low VOC loading. Normal load would be based on records of operation of the device since the last compliance test. Testing over a range of conditions will demonstrate the device's ability to meet required destruction efficiencies and allow for ARD to specify a lower minimum operating temperature in the permit, thus saving the source some supplemental fuel costs.

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 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, et.) 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% 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.

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

As noted in Section 4. of this document, it is ARD policy for one of its 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 or state regulation. The 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.

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 quickly resolved. Rarely, but in some cases, and more likely to occur if the test is being required by the 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:**

- 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. 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 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 test runs since the last passed converter 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.
- h. In general, stack test runs are 60 minutes long, although some can be several hours long depending on the pollutant being tested and test method used. 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 legibly and as close as 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. Prior to conducting a CEM system RATA, the source may conduct trial RATA runs including calibration adjustments. However, if for any trial RATA run the relative accuracy exceeds the

acceptable relative accuracy criteria, then the RATA is considered to be aborted and will be treated as a failed RATA attempt. The CEM system will be considered to be operating out of control and the collected emissions data will be invalid from the time of the failed trial run until the time a successful RATA is completed. In addition, the results of the trial runs must be included with the completed RATA in the final report. This is consistent with 40 CFR 75 Appendix B, section 2.3.2 Data Validation and is ARD policy even for RATAs done for Part 60 CEM systems.

- l. 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.
- m. 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.
- n. 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.
- o. During or at the conclusion of the stack test, the ARD engineer may request copies of the field data sheets or process data sheets.
- p. 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

Sources that are required to conduct compliance testing or a RATA by a federal program may be also be required to report the results by inputting the test data into EPA's Electronic Reporting Tool (ERT), a Windows-based software reporting application, and submitting the zipped file that is created to EPA using the web-based Compliance and Emissions Data Reporting Interface (CEDRI), which is located on EPA's Central Data Exchange (CDX). Sources that are required to follow this electronic method of test data submission may also be required by NHDES to submit a hardcopy test report which complies with Env-A 802.11 *Report Submission Requirements*. ARD has no required format for the final test report, but it 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, including (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. 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.

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](#), 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 when requested by the stack test company, because it is waiting to receive the results of 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. However, 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 New Hampshire have been required to install NO<sub>x</sub> control equipment (e.g. SCR, SNCR, RSCR, 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. 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. Annual RATA acceptance criteria is 20% of the emissions standard.

**Note: for those sources subject to the federal Acid Rain program that 40 CFR 75 Acid Rain 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 a bill for its time 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 for 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. However, in some cases, the modifications may be to use entirely different types of test methods and a very 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 facilities 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.