SOURCE EMISSIONS MONITORING TEST GUIDELINES

Version 2.0

Connecticut Department of Energy &
Environmental Protection (DEEP)
Bureau of Air Management
Source Emissions Monitoring
79 Elm St., 5th Floor
Hartford, CT 06106-5127

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The DEEP SEM Unit has updated and revised the SEM Emissions Test Guidelines as part of its' LEAN Initiative to launch its new compliance emissions testing and Relative Accuracy Test Audit operational procedures.

Section 1. Introduction

Emission tests are performed in the State of Connecticut for the purposes of (1) determining what the actual emissions of a pollutant are, (2) determining compliance with air pollution permits and regulations, and (3) for conducting Continuous Emissions Monitoring (CEM) relative accuracy test audits (RATA). All emissions testing must be conducted in accordance with procedures prescribed by or acceptable to the Department of Energy and Environmental Protection (hereinafter referred to as the "DEEP"). These guidelines are designed to ensure standardization and uniformity of test requirements, ensure that Intent to Test (ITT) protocols identify the correct test requirements and test methods to ensure that the regulatory requirements of the test program will be met. Providing sufficient time for the DEEP to review and approve the test protocols reduces the likelihood that ITT protocol or test results will be rejected.

The source owner or operator should review all applicable permits, federal and state regulations and enforcement orders prior to completing the Intent to Test form and an emission test protocol. Reference test and analysis methods for stack testing and CEM relative accuracy testing are as specified in Title 40, Code of Federal Regulations (CFR) [1], Parts 51, 60, 61, 63 and 75. The test methods and equipment requirements must be strictly complied with, unless otherwise specified and agreed to by the DEEP.

ITT Forms and attachments (when applicable), test protocols for non-standard test protocols, emissions test reports, and completed Compliance Certification forms and any associated correspondence should be submitted to the Source Emissions Monitoring (SEM) to DEEP.SEM@ct.gov address. Section 3 of these Guidelines outline the ITT procedures.

Section 2. Clean Air Act National Stack Testing Guidance

The requirements contained in US EPA's Clean Air Act National Stack Testing Guidance are hereby incorporated by reference. They are available at the following web address:

http://www2.epa.gov/compliance/clean-air-act-national-stack-testing-guidance

Section 3. Selection of the Measurement Site

Selection of the measurement site must be in accordance with Method 1 of 40 CFR Part 60. Plan and elevation drawings of the duct and stack configuration must be submitted to the DEEP in accordance with the following:

A. Stack Testing

For existing and new or modified sources, drawings must be submitted with the test protocol described below showing the plan and elevation view of the ducting and stack arrangement. The drawings must include the position of all processes or operations venting to the stack or duct to be tested. It must also include the position of the sampling ports relative to the nearest upstream and downstream gas flow directional or duct dimensional change; and

[1] Code of Federal Regulations (eCFR)

B. *Relative Accuracy Testing*

For relative accuracy testing, the measurement site must be selected in accordance with the applicable relative accuracy test procedures contained in 40 CFR 60, 61, 63 and/or 40 CFR 75 (as may be applicable).

Section 4. ITT Forms (DEEP) & Performance Test Notifications (EPA)

The DEEP has three ITT Forms: "*ITT Form for Compliance Emissions Testing*", an abbreviated form "*ITT Form for Visible Emissions Testing*" and "*ITT Form for CEMS Relative Accuracy Test Audit."*

Regardless of which form is submitted, the DEEP has also implemented an additional subcategory for the ITT process: Standard versus Non-Standard test protocols.

A. *Standard and Non-Standard Test Protocols*

ITT Forms must be received by the SEM unit within the applicable timeframe specified below, unless a more stringent requirement is specified in an applicable regulation, permit or enforcement order.

ITT Forms must be sent electronically to DEEP.SEM@ct.gov. Hard copies of the ITT forms may also be submitted but must also be sent electronically.

1. Standard Test Protocols *(Due 45-days in advance of proposed test date)*

Standard Test Protocols may be submitted for the following test requirements:

a. For recurring testing (after an initial performance test);
b. Annual RATA – after a certification RATA is performed; and
c. For recurring testing of overall control efficiency (destruction/collection efficiency and capture efficiency) for VOC sources.

Standard Test Protocol Content

Standard Test Protocols require the submittal of the stack drawings with a completed ITT Form and are due 45-days in advance of proposed test dates. The DEEP will not issue formal approval letters for Standard test protocols.

2. Non-Standard Test Protocols *(Due 60-days in advance of proposed test date)*

Non-Standard test protocols require a completed ITT Form and additional attachments (a detailed test protocol that meets the requirements of this Section of these Guidelines). These must be submitted 60-days in advance and the DEEP will issue formal protocol approval or rejection letters.

Non-Standard test protocols require more time to review to ensure that program requirements will be met and are required for but not limited to the following test drivers:

a. Initial performance testing;
b. Testing that proposes use of a non EPA Test Method;
c. MWC sources performing testing pursuant to RCSA Section 22a-174-38;

d. Initial Certification RATA for new CEMS, changes to existing CEMS, or new equipment. [**Note: Initial CEMS RATA Certifications require that a CEMS Plan be submitted pursuant to the requirements in RCSA Section 22a-174-4 with the CEMS RATA ITT Form and test protocol];**
e. Any variance from the requirement to test at 90% of Maximum Rated Capacity (MRC) unless otherwise allowed pursuant to the Regulations of Connecticut State Agencies (RCSA) or a NSR permit; and
f. VOC sources with requirements to measure VOC in lb VOC/hour

Non-Standard Test Protocol Content

The Emission Test Protocol will be evaluated for its compliance with a NSR permit, RCSA, CGS, or Federal requirement and conformance to applicable test methods and process conditions. The protocol must include, at a minimum, a completed ITT Form and the following information:

1. A description of each test method to be used;
2. A schematic diagram of each sampling train, including construction materials;
3. The type or types of media to be used to determine each gas stream component;
4. Sample recovery, clean-up methods and solvents to be used (sample recovery procedures must be performed on-site);
5. A sample of all field data sheets to be used during the test;
6. Sampling area description:
    a. Stack configuration;
    b. Sampling port locations; and
    c. Sampling point locations for each port.
7. A description of process operations and monitoring to include, but not be limited to the following:
    a. Material usage and associated recordkeeping;
    b. Throughput rates and monitoring (e.g., feed, fuel flow and steam flow rates, VOC throughput in lb VOC/hr);
    c. MRC of equipment and parameters to be monitored to show MRC;
    d. Typical (and, if necessary, historical) operating levels; and
    e. Control equipment operation and monitoring (as applicable).
8. Quality assurance/quality control procedures; and
9. Equations and test methods used to calculate emissions in lb/hour, lb/MMBTU – be explicit and provide step-by-step calculations. Ensure Method 2 flowrate data is used where required for mass emissions rate calculations or as stipulated in a Test Method.

VOC Sources – Testing to Determine VOC on a Mass Basis (lb VOC/hr)

The DEEP does not accept the use of EPA Test Method 25A alone to determine VOC emissions on a *mass* basis (e.g. in lb VOC/hour).

"As part of EPA's recent enforcement initiative against agricultural sources, EPA has used various procedures to multiply measured VOC results to create a new, larger calculated emission

rate. EPA's stated basis for doing so was that the ***Agency's own promulgated test methods did not account for the "total mass" of VOCs being measured***" [2]

As a result of the shortcomings of established EPA methods for the measurement of VOCs on a mass basis in lb VOC/hour, the DEEP recommends one of the following:

1. ***Use Material Balances to Quantify VOC with Tested Destruction Efficiency/Capture Efficiency***
   One alternative to stack testing VOC in lb/hr is to utilize material balances. The quantity of VOC entering the process should be measured as well as the quantity leaving the process as waste and the quantity which is entrained in the product. The difference between the VOC input, and the waste plus the product entrainment is assumed to be equal to the VOC emissions to the air. NSR permits require monitoring and record keeping to document and quantify VOC consumption from production records and MSDS (PSDS) or product formulations so this data is readily available.

   Testing must still be performed to measure the VOC destruction efficiency of air pollution control equipment such as thermal and catalytic oxidizers but this also requires that a capture efficiency test be performed to determine the overall control efficiency (overall control efficiency = capture efficiency x destruction/collection efficiency). Method 25A is generally accepted for performing VOC destruction efficiency testing. With this approach, the inlet VOC loading can be calculated based on material balance.

2. ***Use Test Methods that Measure VOC Directly***
   Certain test methods can directly quantify individual VOC compounds including Method 18 and Method 320, and possibly Method 0030. However, the use of such methods can result in expensive test programs due to the extensive pretest analysis necessary to identify the VOC compounds and corresponding relative concentrations present in the emissions prior to a test program.

3. ***Use Method 25A with Method 18***
   Identify the predominant VOC components and percent by weight then use the heaviest molecular weight to determine VOC emissions in lb VOC/hour; or

4. ***Propose an Alternative Method(s)***

B. Performance Test Notifications - EPA Region 1

EPA	DEEP
Notification	ITT Form
Test Plan	Protocol

It's the responsibility of the source to ensure that compliance is met with both state and federal test requirements. Often state and federal test requirements may overlap particularly when a New Source Review permit cites a federal test requirement (such as the RICE Rule). EPA uses different terms and the performance test starts with a *test notification* but sometimes also requires submittal of a complete site

[2] ***Measuring and Reporting Emissions on a Mass VOC Basis***

specific test plan. Subsequently, EPA Region 1 must be notified of a pending test as well as the DEEP within the required deadline(s) specified in a given Federal Rule (40 CFR Part 60, Part 61, Part 62, Part 63, or Part 75). Such test notifications should be submitted to the EPA Region 1 Air Compliance Clerk below.

Although a test notification starts the clock with regards to a federal driven test requirement, EPA does not have a separate form. DEEP forms may serve as "test notifications" for EPA purposes. EPA requires that a copy of a completed ITT Form and test protocol be sent to the following address.

Air Compliance Clerk
US EPA Region I
Air Technical Unit OES04-2
5 Post Office Square, Suite 100
Boston, MA 02109-3912
E-mail: Schwartz.Sandra@epa.gov
Phone: (617) 918-1204 Fax: (617) 918-0204

Section 5. Performance Test Timeframes (Including Waivers and Extension)

Table 5 below lists the performance test timeframes for both Federal and State driven test requirements. Please be attentive to overlapping test requirements. For test requirements driven by Federal requirements, 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. For test requirement driven by a Federal Rule, an extension of the test deadline must be solicited directly from EPA well in advance of the proposed test deadline.

Table 5 - Performance Test Deadlines

Regulation	Performance Test	Timeframe
NSR Permit & 40 CFR 60 – New Source Performance Standards (NSPS)	Initial	Within 180 days after the initial startup date or within 60 days after reaching maximum production rate [40 CFR §60.8(a)] or at such other times specified by part 60 or any corresponding NSR Permit.
	Recurring	As specified in the corresponding NSR permit the NSPS subparts. It could range from 8760 hours of operation to up to 5 years from the previous stack test.
40 CFR 61 – National Emission Standards for Hazardous Air Pollutants (NESHAP)	Initial	a. Within 90 days after the effective date, for an existing source or a new source which has an initial startup date before the effective date.
		b. Within 90 days after initial startup, for a new source which has an initial startup date after the effective date [40 CFR §61.13(a)].

	Recurring	The DEEP may require to test emissions from the source at any other time when the action is authorized by section 114 of the Act [40 CFR §61.13(b)].
40 CFR 63 -NESHAP for Source Categories: Maximum Achievable Control Technology (MACT)	Initial	Within 180 days of the compliance date, or within 180 days after startup of the source, whichever comes later [40 CFR §63.7].
Nitrogen Oxides (NOx) RACT [RCSA §22a-174-22e]	Initial	No later than one year after the source becomes subject to RCSA §22a-174-22e. Phase 1 and Phase 2 have different deadlines.
	Recurring	Any owner or operator of a stationary source who has not installed and operated a continuous emissions monitor at such source shall conduct emission testing once every 63 months from the date of the previous test or 63 months from the date the previous test was due, whichever is earlier [RCSA §22a-174-22e(l)].
Municipal Waste Combustor (MWC) Regulation [RCSA §22a-174-38]	Initial	As specified in the corresponding NSR permit
	Recurring	Annual performance test for dioxin/furan, particulate matter, hydrogen chloride, cadmium, lead, mercury and fugitive ash at least once per calendar year. Such test shall be conducted no less than nine(9) Calendar months and no more than fifteen (15) calendar months following the previous performance test for such pollutant or the frequency as specified in RCSA §22a-174-38(i)(3) [RCSA §22a-174-38 (i)].
Sewage Sludge Incinerators [Connecticut General Statutes (CGS) §22a.191a(b)]	Initial	As specified in the corresponding NSR permit.
	Recurring	Annual Performance Test for the presence of mercury, metals and hydrocarbons for each incinerator at least once per calendar year.
Initial Relative Accuracy Test Audit	Initial	Timeframe is specified in the applicable permit or regulation.
Ongoing Annual Relative Accuracy Test Audit	Recurring	Every four calendar quarters for sources subject to 40 CFR Part 60 RATA; Every 2 or 4 QA operating quarters (calendar quarter in which there are at least 168 unit or stack operating hours) but no less than 8 calendar quarters plus a grace period for sources subject to Part 75 RATAs.

Section 6. Conducting the Stack Test

A. Process Operating Conditions

1. Stack Testing

Emission values obtained from any test program may be considered valid only for the process operating conditions existing during testing. During emissions testing the source must be operated at or above ninety percent (90%) of maximum rated capacity unless otherwise allowed pursuant to the RCSA or NSR permit.

For fuel burning sources, MRC is based on maximum gross heat input using the higher heating value of each fuel as specified in the NSR permit. For MWCs, MRC is based on steam load in pounds per hour. For VOC sources, MRC is based on material throughput i.e. lb/hour of VOCs. Refer to the NSR permit to determine worst case operational configuration for VOC sources that have multiple lines or products venting to a common incinerator/oxidizer.

Any variance from the requirement to test at 90% of MRC, unless otherwise allowed by the RCSA (e.g. RCSA Section 22a-174-22e), must be presented in the ITT form (Non-Standard Test Protocol) and must be approved by the DEEP in advance of the test

It is recognized, however, that there are specific processes that may warrant testing at less than 90% of maximum rated capacity (e.g., a process with a control or removal efficiency of a specified pollutant, in which lower inlet loading to a control device may result in worst case operating conditions). Therefore, on a case-by-case basis, the DEEP may approve emission tests conducted at less than 90% of maximum rated capacity, provided a sufficient justification for a different testing condition is submitted with the test protocol.

2. Relative Accuracy Testing

For relative accuracy testing, the process operating level must be as specified in 40 CFR 60, 61, 63 and/or 40 CFR 75 (as may be applicable).

B. Representative Conditions

Applicant must submit records showing operating conditions of the air pollution control equipment, such as the RTO operating temperature, ammonia feed rate for the SCR, etc., to justify that testing will be conducted at the representative conditions. The DEEP will not allow resetting of the control equipment operating parameters to achieve the desired test results during emissions testing. If control equipment parameters are altered during testing, then information gathered prior to the changes will be used for compliance determination purposes. Such changes would re-start the test clock and 3 runs would need to be performed.

If maintenance has been performed or parts replaced on equipment during the year leading up to a test that effect process emissions or the control of such emissions, then records should be provided to document the part replacements.

C. Test Stoppages, Postponements, and Interruptions

An owner or operator must never stop or postpone a performance test *solely* because the testing showed that the emissions unit being tested was exceeding or might exceed an emission standard, or might otherwise fail the test. Depending on the circumstances surrounding the stoppage, the facility may be found in violation of the requirement to conduct a stack test, the underlying regulatory requirement, or both.

1. Test Stoppage

If a performance test is stopped, the source must contact the DEEP SEM at DEEP.SEM@ct.gov not later than the end of the first business day after the occurrence. Testing may not be stopped solely due to failing or possibly failing results.

a. Non-Title V Source

Once a test is initiated but stopped due to failing results then at least 1 20-minute run must be completed and data submitted to the DEEP as soon as possible.

b. Major Source (Title V Source)

Once started, if a performance test is stopped (or postponed) because preliminary data indicated that the permit or regulatory limit was exceeded, the owner or operator must contact the DEEP SEM Supervisor as soon as possible, and in no case later than the end of the first business day after the occurrence. Once a test is initiated, at least 1 20-minute run must be completed and data submitted to the DEEP within 24 hours for all stopped compliance emissions testing.

If test data indicated that an emissions limit was exceeded, then the stopped test should be reported by the owner/operator to the DEEP CACU in a Title V deviation report. The owner or operator must take a failed test into consideration as part of its annual compliance certification and the DEEP will report the failed test in the national air data system. Moreover, DEEP may start enforcement action and assess penalties consistent with the HPV Policy and CAA Civil Penalty.

2. Postponements

When an owner or operator cannot conduct an emissions test on some or all of its emissions units because they are shut down, inoperable, unable to achieve the required load, or not on site, then the source must notify the DEEP as soon as possible before performance testing is due. The DEEP will evaluate the circumstances surrounding the proposed postponement to determine if this action would violate a permit condition or an applicable regulatory requirement.

3. Interrupted Testing

Test runs must be consecutive and may not be interrupted to service the equipment in any way. The equipment must be operated at normal operating conditions, and no changes or adaptions can be made to air pollution controls or other operating parameters. Each raw data set for each initiated test run must be submitted in the test report.

For situations outside of the source's control, for example if a test was interrupted because of insufficient fuel or an interrupted fuel supply, then the DEEP shall be notified and testing should be resumed as soon as practicable.

D. Test Observations

DEEP representatives may audit the field test procedures and process operation during testing. At a minimum, the following information will need to be supplied during each test program:

1. Prior to testing, calibration data as specified by the applicable test methods must be made available to the DEEP representative auditing the test. Frequency of calibration must be as specified by the appropriate test methods;
2. During testing, the DEEP's representative may collect copies of test data sheets and process documentation; and
3. Whenever an audit sample is required, the DEEP will review and approve audit samples proposed by lab vendors for use during a performance test effort. These results will remain confidential and will be used to analyze the test results. Failure to meet the audit criteria will result in rejection of the test results.

Section 7. Submittal of Test Reports

Unless a more stringent requirement is specified in an applicable regulation, permit or enforcement order, the following report submittal deadlines shall apply:

Table 7 - Test Report Submittal Deadlines

Regulation	*Report Submittal Deadline*
40 CFR 60 – New Source Performance Standards (NSPS)	60 days if not otherwise specified in the NSPS.
40 CFR 61 – National Emission Standards for Hazardous Air Pollutants (NESHAP)	Within 31 days after completion of the test [40 CFR §61.13(f)].
40 CFR 63 –Maximum Achievable Control Technology (MACT)	Within 60 days after the test is completed unless another time frame is specified in the applicable subpart [40 CFR §63.9(h)(2)(i)(G)].
Nitrogen Oxides (NOx) RACT [RCSA §22a-174-22e]	Within 60 days after emission tests are conducted [RCSA §22a-174-22e].
Municipal Waste Combustor (MWC) Regulations [RCSA §22a-174-38]	Within 60 days after tests are conducted.
Sewage Sludge Incinerators [Connecticut General Statutes §22a-191a(b)]	Within 60 days after tests are conducted.
New Source Review (NSR) permit	Within 60 days after tests are conducted.
Initial Performance Testing pursuant to NSR	Within 180 days after the initial startup date or within 60 days after reaching maximum production rate [40 CFR §60.8(a)] or at such other times specified by part 60.
Initial Relative Accuracy Test Audit	Deadlines are specified in applicable permit or regulation
Ongoing Relative Accuracy Test Audit	Within 30 days following the close of the calendar quarter in which the test is conducted

Section 8. Test Report Contents

Test reports should be submitted electronically to DEEP.SEM@CT.gov

The test report must include, at a minimum a completed Compliance Certification Form and the following information:

1. Compliance Certification Form for each unit tested and attached as a cover page for the test report;
2. Summary of the test program;
3. Key personnel involved in the test program;
4. Description of the process and operation (include schematic diagrams where applicable);
5. Description of the control equipment (include schematic diagrams where applicable);
6. Description of the flue gas sampling locations (with schematic diagrams where applicable);
7. Description of process sampling locations/ procedures (with schematic diagrams where applicable);
8. Test objectives and matrix;

9. Description of any test changes (i.e., deviations from the test protocol) and/ or problems encountered;
10. ***Step-by-step calculations*** demonstrating how and what data was utilized to calculate emissions;
11. Test results and emission limitations in tabular form including averages. The units of measurement must be consistent with units in the applicable permit, regulation or enforcement order;
12. A photocopy of all actual field data sheets used during the test. If any field data sheets are illegible, legible transcribed copies must also be included;
13. A breakdown of each formula use and calculations to arrive at emissions in each unit (ppmv, lb/hr, lb/MMBTU, micrograms/ACM, etc.)
14. Copies of all pre and post calibration data;
15. Quality assurance/ quality control documentation;
16. Fuel sampling results where applicable;
17. Process data (including percent of MRC) in tabular form averaged over each test period; and
18. Laboratory data sheets and laboratory QA/QC.

Section 9. Helpful Source Testing Web Links

1. SEM Web Address (CT-DEEP) ITT Form/Compliance Certification Form
2. Emission Measurement Center (EPA):
3. *Code of Federal Regulations (E-CFR):*
4. DEEP Source Monitoring Regulations for CEMS and COMS
5. DEEP Stack Testing Regulations
6. National Emission Test Guidelines
7. Stationary Source Audit Program
8. The NELAC Institute (TNI) Stationary Source Audit Program
9. EPA CAA Performance Audit Samples Effective April 15, 2014