Limited Summary of Test Frequency/Capacity Requirements for NOx major source New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP)

Notes: This document provides a limited summary of some of the non-CEM emission testing provisions and load conditions from Connecticut NOx major source applicable NSPS/NESHAP. This document is not intended to serve as a compliance guide or provide rule language but rather to show the variation in some of the requirements of the NSPS/NESHAP.

We recognize that some of the referenced MACTs do not include NOx emission limits, but some of you referenced those MACTs in your comments to us about testing.

NSPS

Subpart D Standards of Performance for Fossil-Fuel-Fired Steam Generators

Frequency	Load Conditions	Test Conditions	Other
As required by the EPA Administrator under section 114 of the Clean Air Act (CAA).	Per 40 CFR 60.8, based on representative performance of the affected facility.	Performance test = 3 runs per 40 CFR 60.8. Each run shall be at least 60 minutes – each run shall consist of four grab samples, with each sample taken at about 15-minute intervals.	Refers to 40 CFR 60.8 and Appendix A. The heat input rate of each fuel shall be determined by multiplying the gross calorific value of each fuel fired (determined by specified ASTM Methods) by the rate of each fuel burned (determined by "suitable methods", and confirmed by a material balance over the steam generating system).

Subpart Da Standards of Performance for Electric Utility Steam Generating Units

Frequency	Load Conditions	Test Conditions	Other
As required by the EPA Administrator under section 114 of the CAA.	Per 40 CFR 60.8, based on representative performance of the affected facility.	30 boiler operating day rolling average – hourly emission rates. Duct burners – average of 3 (nominal 1-hour) runs (tested separately). For PM concentration, the sampling time for each run shall be at least 120 minutes.	Refers to 40 CFR 60.8 (except for section 60.8(f) and Appendix A.

Subpart Db Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

Frequency	Load Conditions	Test Conditions	Other
If facility has a heat input capacity > 73 MW (250 MMBtu/hr), conduct performance test once per calendar year or every 400 hours of operation. If < 73 MW (250 MMBtu/hr) shall upon request determine compliance through the use of a 30 day performance test.	At maximum heat input capacity using specified test methods (if heat input capacity >73 MW (250 MMBtu/hr). Maximum heat input capacity of the steam generating unit shall be demonstrated by operating the facility at maximum capacity for 24 hours. If this demonstration indicates that the maximum heat input capacity of the affected facility is less than that stated by the manufacturer of the affected facility, the maximum heat input capacity determined during this demonstration shall be used to determine the capacity utilization rate for the affected facility. Otherwise, the maximum heat input capacity provided by the manufacturer is used.	Over a minimum of 3 consecutive steam generating unit operating hours (if heat input capacity >73 MW (250 MMBtu/hr). Duct burners – three-run average (nominal 1-hour runs) (separate NOx limit for duct burners). Compliance with the emission limits under this section is determined on a 24-hour average basis for the initial performance test and on a 3-hour average basis for subsequent performance tests for any affected facilities that: (1) Combust, alone or in combination, only natural gas, distillate oil, or residual oil with a nitrogen content of 0.30 weight percent or less; (2) Have a combined annual capacity factor of 10 percent or less for natural gas, distillate oil, and residual oil with a nitrogen content of 0.30 weight percent or less; and (3) Are subject to a federally enforceable requirement limiting operation of the affected facility to the firing of natural gas, distillate oil, and/or residual oil with a nitrogen content of 0.30 weight percent or less and limiting operation of the affected facility to a combined annual capacity factor of 10 percent or less for natural gas, distillate oil, and residual oil with a nitrogen content of 0.30 weight percent or less.	Any owner or operator of an affected facility petitioning for a facility-specific NOx emission limit shall demonstrate compliance with the emission limits for natural gas, distillate oil or residual oil by conducting a 30-day performance test.

Subpart Dc Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

Frequency	Load Conditions	Test Conditions	Other
40 CFR 60.8 (as requested by the Administrator).	The steam generating unit load does not have to be the maximum design heat input capacity, but must be representative of future operating conditions.	Initial performance test conducted over 30 consecutive operating days of the steam generating unit (SO2).	No NOx standards. The owner or operator of an affected facility seeking to demonstrate compliance with the SO_2 standards under §60.42c(c)(2) shall demonstrate the maximum design heat input capacity of the steam generating unit by operating the steam generating unit at this capacity for 24 hours. This demonstration shall be made during the initial performance test, and a subsequent demonstration may be requested at any other time. If the demonstrated 24-hour average firing rate for the affected facility is less than the maximum design heat input capacity stated by the manufacturer of the affected facility, the demonstrated 24-hour average firing rate shall be used to determine the annual capacity factor for the affected facility; otherwise, the maximum design heat input capacity provided by the manufacturer shall be used. Section 60.8(f) does not apply to this section.

Subpart E Standards of Performance for Incinerators

Frequency	Load Conditions	Test Conditions	Other
As required by the EPA Administrator under section 114 of the CAA.	Per 40 CFR 60.8, based on representative performance of the affected facility.	Performance test = 3 runs per 40 CFR 60.8. Sampling time for each run shall be at least 60 minutes (PM).	No NOx standards.

Subpart I Standards of Performance for Hot Mix Asphalt Facilities

Frequency	Load Conditions	Test Conditions	Other
As required by the EPA Administrator under section 114 of the CAA.	Per 40 CFR 60.8, based on representative performance of the affected facility.	Performance test = 3 runs per 40 CFR 60.8. Sampling time for each run shall be at least 60 minutes (PM).	No NOx standards.

Subpart GG Standards of Performance for Stationary Gas Turbines

Frequency	Load Conditions	Test Conditions	Other
As required by the EPA Administrator under section 114 of the CAA.	The 3-run performance test required by §60.8 must be performed within 5 percent at 30, 50, 75, and 90-to-100 percent of peak load or at four evenly-spaced load points in the normal operating range of the gas turbine, including the minimum point in the operating range and 90-to-100 percent of peak load, or at the highest achievable load point if 90-to-100 percent of peak load cannot be physically achieved in practice.	Performance test = 3 runs per 40 CFR 60.8.	

Subpart IIII Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

Frequency	Load Conditions	Test Conditions	Other
40 CFR 60.8 (as requested by the Administrator).	If displacement is > or equal to 30 liters/cylinder the test must be conducted within 10 percent of 100 percent peak (or the highest achievable) load.	If displacement is > or equal to 30 liters/cylinder refers to requirements in section 60.8 and under the specific conditions that this subpart specifies in table 7. You must conduct 3 separate test runs for each performance test as specified in section 60.8(f). Each test run must last at least 1 hour.	If displacement is <30 liters per cylinder use in-use testing procedures in 40 CFR part 1039 subpart F if displacement <10 liters per cylinder and 40 CFR part 1042 subpart F if displacement is greater than or equal to 10 liters/cylinder and less than 30 liters/cylinder.

Subpart JJJJ Standards of Performance for Stationary Spark Ignition Internal Combustion Engines

Frequency	Load Conditions	Test Conditions	Other
40 CFR 60.8 (as requested by the Administrator).	Each performance test must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and according to the requirements in section 60.8 and under the specific conditions specified in Table 2 to this subpart.	You must conduct 3 separate test runs for each performance test required as specified in section 60.8(f). Each test run must be conducted within 10 percent of 100 percent peak (or the highest achievable) load and last at least 1 hour.	

Subpart KKKK Standards of Performance for Stationary Combustion Turbines

Frequency	Load Conditions	Test Conditions	Other
Conduct tests on an annual basis, no more than 14 calendar months following the previous test.	Any load condition within plus or minus 25% of 100% of peak load. Peak load = 100% of the manufacturer's design capacity at ISO conditions. If 75% of the peak load cannot be achieved, you may test at the highest achievable load point.	Three separate test runs = one performance test. The minimum time per run is 20 minutes.	For systems with a duct burner, measure the total NOx after the duct burner. The duct burner must be in operation during the performance test.

NESHAP

Subpart YYYY Stationary Combustion Turbines

Frequency	Load Conditions	Test Conditions	Other
Annually.	Initial performance test - The test must be conducted at any load condition within plus or minus 10 percent of 100 percent load. Subsequent performance tests must be conducted at high load, defined as 100 percent plus or minus 10 percent.	Conduct three separate test runs for each performance test, and each test run must last at least 1 hour.	No NOx limitations.

Subpart ZZZZ Reciprocating Internal Combustion Engines (RICE) includes area sources

Frequency	Load Conditions	Test Conditions	Other
Annual for existing non emergency 4SLB and 4SRB stationary RICE (not remote) more than 500 HP at an area source operated more than 24 hours/calendar year. New or reconstructed 2SLB stationary RICE >500 HP located at major sources; new or reconstructed 4SLB stationary RICE ≥ 250 HP located at major sources; new or reconstructed CI stationary RICE >500 HP located at major sources; 4SRB stationary RICE ≥ 5000 HP located at major sources; stationary RICE >500 HP located at major sources and new or reconstructed 4SLB stationary RICE 250 ≤HP≤500 located at major sources – semiannually. After you have demonstrated compliance for two consecutive tests, you may reduce the frequency of subsequent performance tests to annually. If the results of any subsequent annual performance test indicate the stationary RICE is not in compliance, or you deviate from any of your operating limitations, you must resume semiannual performance tests. Existing non-emergency, non-black start CI stationary RICE >500 HP that are not limited use stationary RICE-Every 8760 hours or 3 years, whichever comes first. Existing non-emergency, non-black start CI stationary RICE >500 HP that are limited use stationary RICE-Every 8760 hours or 5 years, whichever comes first.	The engine percent load during a performance test must be determined by documenting the calculations, assumptions, and measurement devices used to measure or estimate the percent load in a specific application. A written report of the average percent load determination must be included in the notification of compliance status. The following information must be included in the written report: the engine model number, the engine manufacturer, the year of purchase, the manufacturer's site-rated brake horsepower, the ambient temperature, pressure, and humidity during the performance test, and all assumptions that were made to estimate or calculate percent load during the performance test must be clearly explained. If measurement devices such as flow meters, kilowatt meters, beta analyzers, stain gauges, etc. are used, the model number of the measurement device, and an estimate of its accurate in percentage of true value must be provided.	Conduct three separate test runs for each performance test. Each test run must last at least 1 hour, unless otherwise specified. Annual compliance demonstration for existing non emergency 4SLB and 4SRB stationary RICE (not remote) more than 500 HP at an area source operated more than 24 hours/calendar year must be at least one test run of 15 minute duration, except that each test using method in Appendix A to this subpart must consist of at least one measurements cycle and include at least 2 minutes of test data phase measurement.	Only CO and formaldehyde limitations. If you own or operate a non-operational stationary RICE that is subject to performance testing, you do not need to start up the engine solely to conduct the performance test. Owners and operators of a non-operational engine can conduct the performance test when the engine is started up again. The test must be conducted at any load condition within plus or minus 10 percent of 100 percent load for new emergency and non-emergency RICE at major HAP sources listed in paragraphs (b)(1) through (4) of section 63.6620.

Subpart DDDDD Industrial, Commercial and Institutional Boilers and Process Heaters – Major Sources

Frequency	Load Conditions	Test Conditions	Other
On an annual basis (no more than 13 months after the previous performance test), unless: (a) If performance tests for at least 2 consecutive years show that your emissions are at or below 75 percent of the emission limit (or, in limited instances, at or below the emission limit) for the pollutant, and if there are no changes in the operation of the individual boiler or process heater that could increase emissions, you may choose to conduct performance tests every 3rd year. Each test must be conducted no more than 37 months after the previous performance test. If you elect to demonstrate compliance using emission averaging under section 63.7522, you must continue to conduct performance tests annually. If a performance test shows emissions exceeded the emission limit or 75 percent of the emission limit, you must conduct annual performance tests for that pollutant until all performance tests over a consecutive 2-year period meet the required level (at or below 75 percent of the emission limit).	At representative operating load conditions (not defined) while burning the type of fuel or mixture of fuels that has the highest content of chlorine and Hg.	Three separate test runs = one performance test. The minimum time per run is 1 hour (or comply with minimum applicable volumes in Tables 1, 2 and 12).	No NOx limitations. From Table 4, maintain the operating load of each unit such that it does not exceed 110 percent of the average operating load recorded during the most recent performance test.

Subpart UUUUU Coal and Oil-Fired Electric Utility Steam Generating Units

Frequency	Load Conditions	Test Conditions	Other
For affected units meeting the LEE requirements of §63.10005(h), you must repeat the performance test once every 3 years (once every year for Hg) according to Table 5 and §63.10007. Should subsequent emissions testing results show the unit does not meet the LEE eligibility requirements, LEE status is lost. If this should occur: (1) For all pollutant emission limits except for Hg, you must conduct emissions testing quarterly, except as otherwise provided in §63.10021(d)(1). (2) For Hg, you must install, certify, maintain, and operate a Hg CEMS or a sorbent trap monitoring system in accordance with appendix A to this subpart, within 6 calendar months of losing LEE eligibility. Until the Hg CEMS or sorbent trap monitoring system is installed, certified, and operating, you must conduct Hg emissions testing quarterly, except as otherwise provided in §63.10021(d)(1). You must have 3 calendar years of testing and CEMS or sorbent trap monitoring system data that satisfy the LEE emissions criteria to reestablish LEE status. For solid oil-derived fuel- and coal-fired EGUs that do not use either an HCl CEMS to monitor compliance with the HCl limit or an SO2 CEMS to monitor compliance with the alternate equivalent SO2 emission limit, you must conduct all applicable periodic HCl emissions tests according to Table 5 to this subpart and §63.10007 at least quarterly, except as otherwise provided in §63.10021(d)(1). (e) Except where paragraph (b) of this section applies, for liquid oil-fired EGUs without HCl CEMS, HF CEMS, or HCl and HF CEMS, you must conduct all applicable emissions tests for HCl, HF, or HCl and HF emissions according to Table 5 to this subpart and §63.10007 at least quarterly, except as otherwise provided in §63.10021(d)(1), and conduct site-specific monitoring under a plan as provided for in §63.10000(c)(2)(iii). (f) Unless you follow the requirements listed in paragraphs (g) and (h) of this section, performance tests required at least every 3 calendar years must be completed within 35 to 37 calendar months after the previous performance test; performance tests required at least every year must be completed within 11 to 13 calendar months after the previous performance test; and performance tests required at least quarterly must be completed within 80 to 100 calendar days after the previous performance test, except as otherwise provided in §63.10021(d)(1).	If you conduct performance testing with test methods in lieu of continuous monitoring, operate the unit at maximum normal operating load conditions during each periodic (e.g., quarterly) performance test. Maximum normal operating load will be generally between 90 and 110 percent of design capacity but should be representative of site specific normal operations during each test run.	To demonstrate initial compliance with an applicable emissions limit in Table 1 or 2 to this subpart using stack testing, the initial performance test generally consists of three runs at specified process operating conditions using approved methods. For a qualifying low emitting EGU (LEE) for Hg emissions limits, you must conduct a 30-day performance test at least once every 36 calendar months to demonstrate continued LEE status.	No NOx limitations. If you choose to comply with an electrical output-based emission limit, you must collect hourly electrical load data during the test period. If you are required to establish operating limits (see paragraph (d) of this section and Table 4 to this subpart), you must collect all applicable parametric data during the performance test period. Also, if you choose to comply with an electrical output-based emission limit, you must collect hourly electrical load data during the test period.

Subpart JJJJJJ Industrial, Commercial and Institutional Boilers – Area Sources

Frequency	Load Conditions	Test Conditions	Other
40 CFR 60.8 (as requested by the Administrator).			No NOx limitations. EPA reconsidering PM emission testing provision allowing no further performance testing if initial performance test results show that PM emissions are equal to or less than half of the PM emission limit.

40 CFR 60.8 (Performance tests in General Provisions)

60.8(b)

Performance tests shall be conducted and data reduced in accordance with the test methods and procedures contained in each applicable subpart unless the Administrator (5) approves shorter sampling times and smaller sample volumes when necessitated by process variables or other factors.

60.8(c)

Performance tests shall be conducted under such conditions as the Administrator shall specify to the plant operator based on representative performance of the affected facility. The owner or operator shall make available to the Administrator such records as may be necessary to determine the conditions of the performance tests. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a performance test nor shall emissions in excess of the level of the applicable emission limit during periods of startup, shutdown, and malfunction be considered a violation of the applicable emission limit unless otherwise specified in the applicable standard.

60.8(f)

Unless otherwise specified in the applicable subpart, each performance test shall consist of three separate runs using the applicable test method. Each run shall be conducted for the time and under the conditions specified in the applicable standard. For the purpose of determining compliance with an applicable standard, the arithmetic means of results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances, beyond the owner or operator's control, compliance may, upon the Administrator's approval, be determined using the arithmetic mean of the results of the two other runs.

From Connecticut DEEP Source Emissions Monitoring Test Guidelines
http://www.ct.gov/deep/lib/deep/air/compliance_monitoring/emission_test/emission_test_guidelines.pdf
Reference test and analysis methods for stack testing and CEM relative accuracy testing are as specified in Title 40, Code of Federal Regulations, Parts 51, 60, 61, 63 and 75. The reference methods and equipment requirements must be strictly complied with, unless otherwise specified and agreed to by the Department.

Section 4 – Process Operating Conditions
Stack Testing
Emission values obtained from any test program may be considered valid only for the process operating conditions existing during testing. In general, the source must be operated at or above ninety percent (90%) of maximum capacity during emissions testing. Operation of equipment at rates differing from those existing during testing may place the equipment in violation.

It is recognized, however, that there are specific processes that may warrant testing at less than 90% of maximum 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 Department may approve emission tests conducted at less than 90% of maximum capacity, provided a sufficient justification for a different testing condition is submitted with the test protocol. See USEPA's Clean Air Act National Stack Testing Guidance for further discussion on representative testing conditions.

USEPA's Clean Air Act National Stack Testing Guidance:
IV SCOPE OF GUIDANCE

The guidance applies to tests conducted for the purposes of determining and demonstrating compliance with NSPS, NESHAP, and MACT programs. The guidance does not apply to tests in situations such as the following:

- tests requested by EPA to assist the Agency in the development of regulations or emissions factors;
- tests to establish monitoring protocols for tests conducted only to determine and demonstrate compliance with state Implementation Plan (SIP) requirements. (Tests conducted to simultaneously determine and demonstrate compliance with NSPS, NESHAP, and MACT programs are included within the scope of the guidance.)

The data from tests conducted in situations such as those listed above may be subject to Title V reporting requirements and need to be considered by the source when submitting reports and certifying compliance pursuant to the Title V program.

5. Representative Testing Conditions
Since the CAA requires continuous compliance with emissions limits except where explicitly excused, EPA interprets applicable regulations to require that any stack test that is conducted within the scope of this guidance must demonstrate that a facility is capable of complying with the applicable emissions

standards at all times. The NSPS and MACT programs require that performance tests be conducted under such conditions as the Administrator specifies based upon the representative performance of the affected facility. See 40 CFR §§ 60.8(c) and 63.7(e). The MACT program further defines representative performance as normal operating conditions. 43 CFR § 63.7(e). Operations during periods of startup, shutdown and malfunction do not constitute representative conditions for the purposes of a performance test. 40 CFR §§ 60.8(c) and 63.7(e). The Part 61 NESHAP program requires that emission tests be conducted "under such conditions as the Administrator shall specify "based on design and operational characteristics of the source." 40 CFR § 61.13(e). Individual standards may more specifically define operating conditions under which performance tests should be conducted. In the absence of such specifications, the question often arises as to what operating conditions should be used when conducting a stack test. If operating conditions are not indicated by the applicable requirements in individual standards, they should be developed as part of the site-specific test plan.

- EPA recommends that performance tests be performed under those representative (normal) conditions that:
  - represent the range of combined process and control measure conditions under which the facility expects to operate (regardless of the frequency of the conditions); and
  - are likely to most challenge the emissions control measures of the facility with regard to meeting the applicable emission standards, but without creating an unsafe condition.
- The following are factors that should be considered in developing the plan for a performance test that challenges to the fullest extent possible a facility's ability to meet emissions limits.
  - For a facility operating under an emission rate standard (e.g., lb/hr) or concentration standard (e.g., $\mu g/m^3$), normal process operating conditions producing the highest emissions or loading to a control device would generally constitute the most challenging conditions with regard to the emissions standard. If operating at maximum capacity would result in the highest levels of emissions, operating at this level would not create an unsafe condition, and the facility expects to operate at that level at least some of the time, EPA recommends that the facility should conduct a stack test at maximum capacity or the allowable/permitted capacity.
  - For a facility operating under a control or removal efficiency standard (e.g., 98 percent control or removal of a specified pollutant), lower emissions loading at the inlet of a control device within the range of expected process operating conditions may often be the most challenging emissions control scenario for purposes of achieving the applicable standard. For facilities required to achieve such control or removal efficiency standards:
    - EPA recommends that the performance test include operating the facility under such expected lower emissions loading conditions.
    - The test plan should generally include use of fuel, raw materials, and other process/control equipment that the facility expects to use during future operations that would present the greatest challenge in meeting applicable emissions standards. To demonstrate the facility's ability to meet concentration standards and emissions rate

standards, for example, the facility generally should use the fuel or raw materials that it expects to use and that have the highest emissions potential for the regulated pollutant(s) being tested. In instances where alternative processing materials are expected to be used by the facility and those materials are known to adversely impact emissions quality or the functioning of control measures, the facility generally should use the material that is likely to cause the greatest challenge in meeting applicable emissions standards.

- For concentration and emissions rates standards, the facility generally should process the material that it expects to use during future operations that is likely to cause the highest emissions.

- For control or removal efficiency standards, other factors may apply such as using fuels or raw materials that contain or produce pollutants that are more difficult to combust or otherwise remove.