ANNUAL FALL JOINT CONFERENCE
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Prepping for a $PM_{2.5}$ (or any) Stack Test

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ChaseYoung Environmental Testing

CYET?

- Chase Young Environmental Testing Inc (CYET) is a privately-owned professional environmental consulting and testing firm specializing in providing air quality-related compliance and testing services to a variety of industrial, commercial, and institutional facilities.
- CYET's mission is to provide these services in a high-quality and cost-effective manner while fostering the professional and personal development of CYET's associates.
- Our work includes testing at a large variety of manufacturing and industrial facilities including cement kilns, industrial boilers, engines, turbines, fiberglass manufacturing, coating facilities and food processing.
- We test using USEPA Reference Test Methods, some NIOSH and conditional test methods and have designed test programs at hard to test facilities.
- We are proud to have a dedicated team of professionals with extensive expertise in the field – we have more than 70 years of combined testing experience.

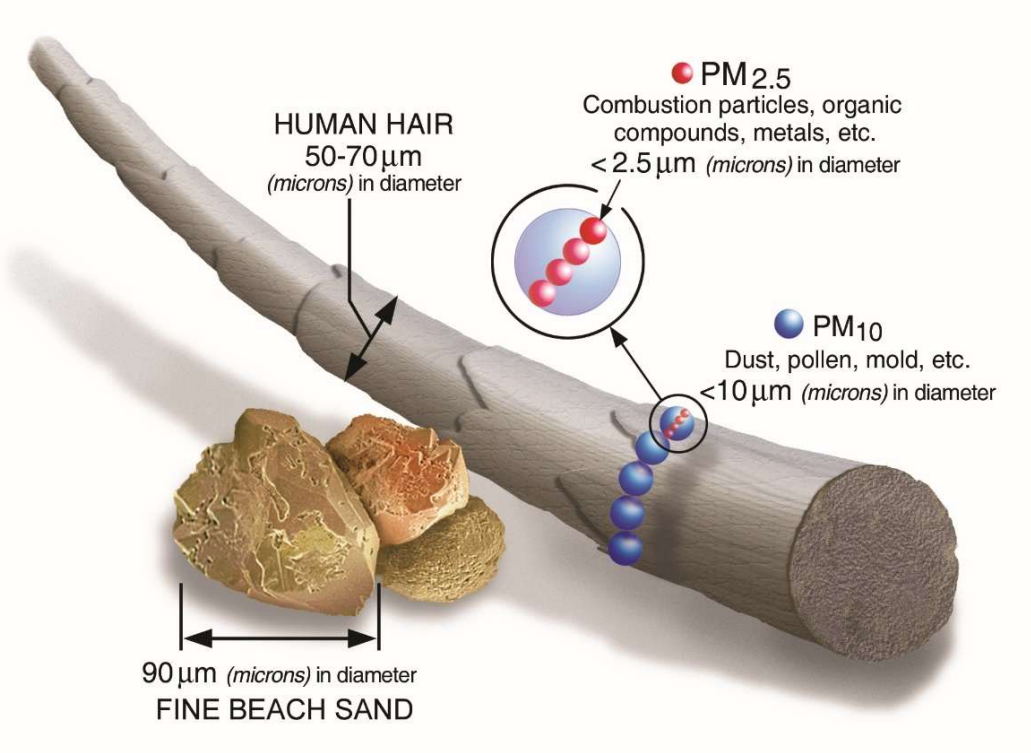
CYET ChaseYoung Environmental Testing

Overview

- Before the test – maybe even when you do the permitting
- Sending out an RFP – and selecting a contractor
- Preparing the Protocol
- Test Considerations
- Onsite
- Submitting the Report

What is $PM_{2.5}$?

- Particulate matter or PM is a mixture of solid particles and liquid droplets found in the air.
- $PM_{2.5}$ consists of fine inhalable particles with a diameter of 2.5 micrometers or smaller
- Sources of $PM_{2.5}$: smokestacks, automobiles, wildfires, etc.



What is condensable PM (CPM) ?

- Condensible $PM_{2.5}$ or PM_{10} is not a specific chemical compound – its the matter in the gas phase, which condenses to sub-micron particles after cooling.

USEPA Reference Method 202

(a) If the gas filtration temperature exceeds 30 °C (85 °F) and you must measure both the filterable and condensable (material that condenses after passing through a filter) components of total primary (direct) PM emissions to the atmosphere, then you must combine the procedures in this method with the procedures in Method 201A of appendix M to this part for measuring filterable PM. However, if the gas filtration temperature never exceeds 30 °C (85 °F), then use of this method is not required to measure total primary PM.

21. The volatile organic compound emission rate from each gas heater shall not exceed 0.0028 pound per million Btus heat input and 0.056 pound per hour.

How am I going to demonstrate compliance?

- This is an awfully small number – too small for stack testing in this case.
- Source was seasonal – and few opportunities to test.
- After we discussed the problems with the applicant, they used the information to remove the limit from the PTI.
- Sometimes its better to use manufacturers information (this was a small source but in a PSD permit).
- 1 ppm = one inch in 16 miles
- 1 ppb = one inch in 16,000 miles

Sending out an RFP

- We know you need three quotes – but try not to waste a lot of contractor time if you know you will not use them.
- Include a copy (or link to) the permit.
- Explain when testing is required and any pitfalls of source operation
- Be specific about testing needed – and methods to be used
- Offer to let the test company see the stack and testing area – it could affect the price of the project (and eliminate change orders, drilling new ports, etc.)
- When comparing contractors – look at standby rates, equipment costs, etc.
- What happens if you need another day?
- Schedule of deliverables – test plans, reports, draft results (especially if you fail)
- Consider a pre-test on new equipment

Preparing a Protocol

- Stack test drawings, process description needed.
- Nail down and describe process operation – production rates (you may need to stage material).
- Explain what process data will be collected and then provided to test company for including in report.
- Can you operate at maximum routine operation? What does that mean? It needs to be clear in protocol.
- Who is going to submit this? It must be submitted in MiEnviro.
- It can be approved with additional test conditions.

Interference? Method 8 Example

Interferences

Possible interferents are free ammonia, dimethyl aniline and fluorides. If free ammonia is present, alternate procedures must be used (see Special Situations Section).

(_) 1. **Alternative Procedures for Method 8 when Ammonia is Present**:

Sampling Procedures

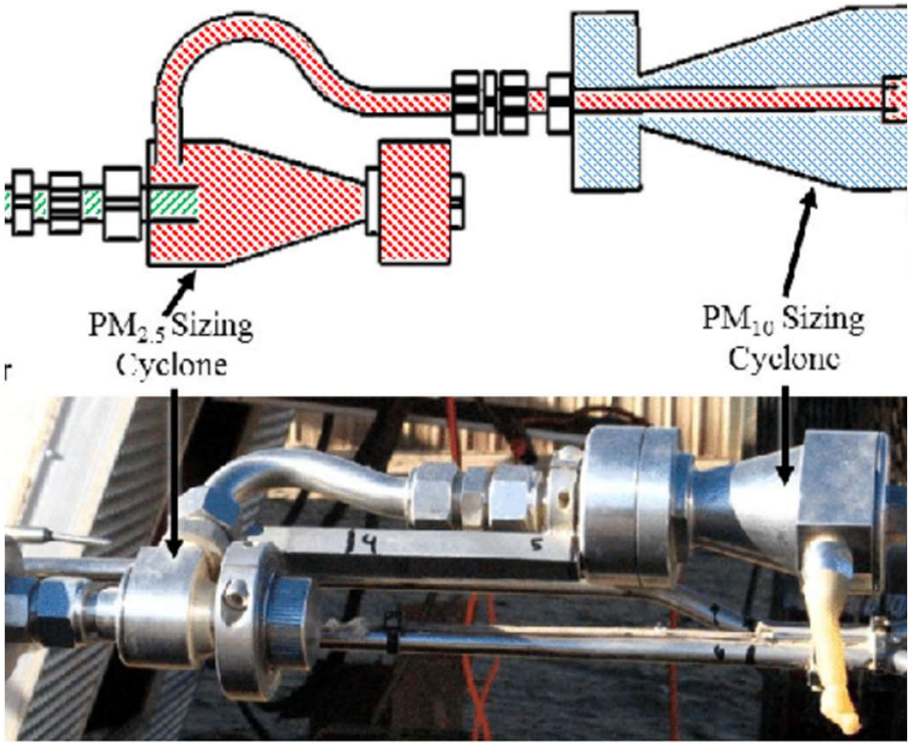
SOx must be determined using Method 8, utilizing the sampling procedures specified in Section 16.3.1 of Method 6, which are as follows:

The probe will be maintained at 275°C (527°F) and equipped with a high-efficiency in-stack filter (glass fiber) to remove particulate matter. The filter material will be unreactive to SO_2. Whatman 934AH (formerly Reeve Angel 934AH) filters treated as described in Reference 10 in Section 17.0 of Method 5 is an example of a filter that has been shown to work. Where alkaline particulate matter and condensed moisture are present in the gas stream, the filter will be heated above the moisture dew point but below 225°C (437°F)."

- A thorough understanding of the process is needed to ensure the correct test methods are used and that the results will be accurate.

Stack Requirements (or Limitations)

- Cannot use Method 201A in a stack with a diameter less than 12 inches
- Port sizes at least 6” in diameter are preferred



0 and PM2.5 sizing cyclones and in-stack filter holder schematic (CFR, 2010) and 10 to 2.5 µm, > 10 µm).

Hazards when speciating small particles…

- Combustion produces mostly small particles (< PM_{10})
- Its often safe to use USEPA Method 5 to collect filterable particles and assume they are PM_{10}/$PM_{2.5}$
- This is often true of simple-cycle combustion turbines.
- PLUS, their exhaust temperature is very hot – sometimes hot enough to damage testing equipment (which does not improve test results).
- Consider that you are collecting milligrams of sample (and may want to consider extending test times).
- Testing contractors and their clients should be cognizant of these issues.

Protocol problems...

- Not including a stack diagram with the port locations, stack diameter, the distances from disturbances, and the number and location of traverse points.
- Proposing an inappropriate method.
- Not including an adequate description of the sampling train, including materials of construction and reagents used.
- Not including an adequate description of sample train operation, including leak checks, required temperatures, sample rates/volumes, sample times, and other method-specific requirements.

More protocol problems…

- Not specifying the source and control device operation during testing and / or the monitoring to verify the operation during testing. (Permits require operation at worst-case with respect to meeting the emission limits without creating an unsafe condition.)
- Not specifying sample location acceptability verification procedures (ie: cyclonic flow check and stratification check, as applicable).
- Not specifying what will be included in the test report, including required certifications, and/or specifying a report submittal date that is contrary to the Permit requirements.
- Not filling out all required fields when using the Electronic Reporting Tool (ERT) to prepare the protocol.
- Not using the MiEnviro portal.

Measure twice, cut once

- In most cases, failing a stack test will result in some type of fine as well as a need to do more frequent stack tests.

12. Within thirty (30) days after the effective date of this Consent Order, [redacted] pay to the General Fund of the State of Michigan, in the form of a check made payable to the "State of Michigan" and mailed to the Michigan Department of Environmental Quality, Accounting Services Division, Cashier's Office, P.O. Box 30657, Lansing, Michigan 48909-8157, a settlement amount of $35,000.00, which includes AQD costs for investigation and enforcement. This total settlement amount shall be paid within thirty (30) days of the effective date of this Consent Order. To ensure proper credit, all payments made pursuant to this Consent Order shall include the "Payment Identification Number

Not calculating in-stack detection limits and/or proposing sample train operation that will not provide an adequate detection limit to demonstrate compliance can lead to allegations of noncompliance when your emissions are really just less than the detection limit!

Safety is Job One!

- Stack sampling and source evaluation exposes EGLE staff, contractors and employees to potential safety hazards in the field. Ensuring the safety of all field personnel at facilities is an issue that CYET takes very seriously.
- To ensure the safety of all field personnel, stack sampling platforms, both permanent and temporary, and access ways leading to and from the platforms or testing locations, must be designed and erected in such a manner as to conform to published safety laws and regulations.
- A facility contact should be available for the duration of the test project. Keep in mind EGLE is often in attendance and may have questions about the facility, operating conditions. They may even do an inspection.
- Setting up the day before the test is highly recommended.

What could go wrong?

- Pre-test site survey errors (or failure to conduct a pre-test visit).
- Weather
- Unacceptable sample location, equipment/electrical needs, clearances, safety issues, etc.
- Sample recovery and handling errors.
- Recovery location is not clean, improper reagents/equipment, improper procedures, etc.
- Equipment errors – operating ranges/calibrations, materials of construction, incorrect equipment, etc.
- Procedural errors with – cyclonic flow, leak checks, traverse points, isokinetics, temperatures, etc.
- The test date is not the date to start tuning!

What can go wrong?

- Errors caused by inexperienced testers
- You need - backup equipment and glassware, additional calibration gases for unexpected concentrations, sufficient ice, etc.
- Person(s) performing the test need to have read the protocol, including correspondences.
- Coordination between Testers and Facility
- Proper source operation, collection of process data, etc.
- Though testing is a field activity and unexpected circumstances arise and should be discussed with the test company and EGLE.

Before testing …

- **Verify Sampling Point Accessibility**
- **Stack Port Verification**
- **Equipment Calibration/Tuning Performed**
- **Ensure that Maintenance is completed before Testing**

Onsite…

- Testing must be conducted at worst-case permitted operating conditions with regard to meeting the applicable emission standards, but without creating an unsafe condition.
- Report must include operating data to document this and :
  - Reflect regulations and permit requirements.
  - Raw material information.
  - Control equipment parameters.
  - Fuel usage rates (if applicable).
  - Production input/output (if applicable).
  - Other pertinent information.
- Designate a contact onsite who will collect process data, communicate with test company and discuss test problems.

Preliminary Data

- During set up, process should be running, company contact should be onsite
- Who will review preliminary data, ensure the process is running correctly
- What is an anomaly that would require notification to EHS staff?
- Deviations from the protocol and/or methods needs EGLE approval.

Testing

- Don’t start up the equipment FOR the test (be running under steady-state conditions).
- If you encounter problems, consider delaying the test.
- Be observant – a welder in the area of testing, a generator engine, cleaning processes, will not improve test results.
- Make sure everyone knows about the test and can provide feedback if the process or equipment is not running normally.
- Be ready to test – don’t tune the day of the test or because you are failing.

Deliverables

- Agree on test dates, when draft report will be available, where lab results should be sent (if at all), when final is due, who will submit the report through ERT, CEDRI or Mi Enviro
- What if the results show failure? Onsite? After lab results are received?

THANK YOU

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