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**KEY ELEMENTS TO BOILER MACT COMPLIANCE**

01 PLANNING

02 PERFORMANCE TESTING

03 CEMS PROGRAM

04 FUEL ANALYSIS

05 REPORTING/ CERTIFICATION
Boiler MACT Compliance – Leveraging Lessons Learned From New Sources

By DEANNA DURAM, PE, CM, Managing Consultant — Atlanta, GA and CHRIS POOL, EIT, Senior Consultant — Atlanta, GA

For existing sources, the compliance deadline for the National Emission Standards for Hazardous Air Pollutants (NESHAP) for industrial, commercial, and institutional boilers and process heaters at major sources (40 CFR 63, Subpart DDDDD; the “Boiler MACT”) of January 31, 2016 is still months away, while new sources impacted by the rule must comply upon startup. For existing sources, most of the focus thus far has been on determining how to meet the emission limitations via capital improvements and scheduling necessary upgrade work and testing for compliance purposes. These facilities should consider important lessons learned from new sources that have met the testing, monitoring, reporting and recordkeeping requirements already. Specifically, it is important to anticipate the level of effort, detail, and challenges associated with the initial performance testing and subsequent notice of compliance status (NOCS) submittals.

The Boiler MACT requires sources to complete both initial and continuous (ongoing) compliance demonstrations. Most solid and liquid fuel boilers as well as some gas fired boilers are subject to specific emission limits under the rule which require performance stack testing, fuel analysis and/or a continuous monitoring system (CMS) for compliance.

Initial Performance Testing – How Bad Could it Be?

Most sources will choose to demonstrate compliance with Boiler MACT using performance testing for at least one pollutant. For a single fuel boiler, initial performance testing (IPT) under Boiler MACT is complex; for multi-fuel boilers, it may seem next to impossible to determine the necessary performance testing requirements while also allowing for optimization of factors such as operating capacity, fuel types, and power or raw material usages for control devices.

The Boiler MACT requires boilers that demonstrate compliance via performance testing to do the following:

> Conduct IPT according to specified requirements
> Conduct fuel analyses (with some exceptions)
> Establish operating limits
> Conduct CMS performance evaluations

One benefit of a single fuel boiler is that fuel analyses are not required if conducting an IPT; however, they could be used for a source that decides to comply via fuel analysis rather than through performance testing. Excluding fuel analyses, an owner/operator must only complete performance testing related to the following pollutants and compliance options:
Filterable particulate matter (PM) or Total Selected Metals (TSM)¹
Hydrogen Chloride (HCl)
Mercury (Hg)
Carbon Monoxide (CO)

Depending on your compliance strategy, initial performance testing may simply involve traditional reference test methods, establishment of operating limits, and evaluation of any CMS. As an example, Table 1 summarizes the number of tests required and run times for a single fuel fluidized bed biomass boiler choosing stack testing for all pollutant demonstrations. Note the complexity (and expense) involved even for a single fuel boiler to demonstrate initial compliance. For each pollutant relying on performance testing for compliance, a source must establish an operating load limit based on the operating load during the performance test in addition to parametric monitoring ranges applicable to the control devices operated. For boilers complying with the CO emission limit using performance testing, an oxygen analyzer or continuous oxygen trim system must be operated at or above the oxygen level established during your performance test.

Now, consider the challenges multiplied with a multi-fuel boiler. Boiler MACT requires that performance tests be conducted while combusting the type of fuel or mixture of fuels that has the highest content of chlorine and mercury (and TSM for sources opting to comply with TSM alternative). So, one must first establish what that scenario may be – and the complexity involved grows exponentially the more fuels the boiler is capable of combusting. This evaluation can be further complicated by ensuring the unit is operating at maximum capacity during the performance tests.

### Table 1. Boiler MACT Test Method Metrics

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Reference Test Method</th>
<th>Sample Volume</th>
<th>Run Time (hrs/run)</th>
<th>Number of Runs</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM</td>
<td>Method 5/5D or 17</td>
<td>3 dscm/run</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>HCl</td>
<td>Method 26/26A</td>
<td>120 L/run (M26) or 1 dscm/run (M26A)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Hg</td>
<td>Method 29, Method 30A/B, ASTM D6784</td>
<td>4 (M29/ASTM D6784) or as specified in method (M30A/B)</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>CO</td>
<td>Method 10</td>
<td>N/A</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

For multi-fuel boilers, even if performance testing indicates compliance, fuel analyses and development of a site-specific fuel analysis plan are typically still required. In addition to establishing operating limits and parametric monitoring conditions during the performance test, after the IPT multi-fuel boilers face the challenge of ensuring that the fuel input of chlorine, mercury, and TSM does not exceed the maximum input value calculated from the IPT. **Thus, the design of the performance test directly impacts the flexibility in fuels that may be fired in the boiler.** To maximize this flexibility, one must carefully design the performance tests and consider conducting multiple performance tests for each pollutant. It is possible to have a situation for a multi-fuel boiler where the fuel with the highest mercury, chlorine, or TSM content cannot or would not normally be fired in a manner that allows the boiler to operate at its highest operating load condition. In this case, one must carefully balance achieving both highest operating load and highest maximum pollutant input during the performance test.

### Fuel Analyses – An Option Worth Considering?

One possible way to avoid the difficulties related to performance testing is to demonstrate compliance with HCl, mercury, and/or TSM emissions limits using fuel analyses. Under this compliance

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¹TSM is defined in the Boiler MACT to be the sum of arsenic, beryllium, cadmium, chromium, lead, manganese, nickel, and selenium.
option, an owner/operator demonstrates that the pre-control emission rate of the boiler is less than the Boiler MACT emission limit. If the potential emission rate of the fuel or fuel mixture exceeds the applicable Boiler MACT emission limit, then this is not an option. For some sources, this may provide a less expensive compliance option than stack testing for each pollutant.

Under this option, a site-specific fuel analysis plan is required. On a monthly basis, three composite samples of each fuel type fired are needed. The maximum pollutant input level for the pollutant of concern is then calculated while considering the fraction of the total heat input from each fuel type. One must maintain the 12-month rolling average pollutant input at or below the applicable emission limit. For an individual fuel type, the sampling frequency may be reduced to quarterly if results are less than 75% of the applicable limit for 12 consecutive months.

How About a CEMS?

Another option to avoid the complexities of performance testing and/or fuel analysis is a continuous emissions monitoring system (CEMS). Boiler MACT allows the use of CO, mercury, and HCl CEMS as a compliance alternative, however this can be an expensive solution. It is important to note that the CO limit applicable to the source differs depending on whether demonstrating compliance using performance testing or a CEMS.

Reporting – The Worst is Over….Isn’t It?

Having survived the performance testing, one might hope that the reporting should be relatively simple. Unfortunately, this may not be the case. Most importantly, do not procrastinate as waiting until the day before the deadline to start working on report submittals may cause missed deadlines.

First, performance testing and CEMS performance evaluation reports should be submitted to the state agency and electronically via EPA’s Central Data Exchange (CDX) – Compliance and Emissions Data Reporting Interface (CEDRI). CDX – CEDRI requires a substantial amount of manual data entry, so it is important to request that stack testing vendors include data entry as part of their services. While CDX-CEDRI does allow the user to save PDF versions of the test reports, when viewed in the system the reports may look incomplete or appear to have inaccurate data in some instances. Note that not all state agencies are accepting the submittals via CDX – CEDRI, so hard copy submittals may be necessary.

Troubled Online Compliance Reporting

Initial users of the CDX-CEDRI system identified some areas of difficulty with the system. Initially, CDX-CEDRI was set up to require separate compliance reports for: (1) boilers subject to a tune-up requirement, (2) boilers demonstrating compliance using performance testing, (3) boilers demonstrating compliance using fuel analysis, and (4) boilers demonstrating compliance using a CMS. The system lacked the ability to account for a single boiler that could actually be required to conduct a tune-up, conduct compliance demonstrations using performance testing and fuel analysis, and operate a CMS. This resulted in the need to submit multiple Boiler MACT compliance reports for a single boiler in the CDX-CEDRI system.

Additionally, Boiler MACT requires reporting of the type and quantity of fuel combusted for boilers subject to emission limits and operating requirements under the rule. At one point, only coal or fuel oil were available selections in the CDX-CEDRI fuel reporting menu. So, time was needed to contact EPA and coordinate with their contractors to add more fuel choices. Boiler MACT requires the submittal of compliance information related to each CMS used to demonstrate compliance under the rule; however, the CDX-CEDRI system does not presently allow submittal of information on several types of CMS specifically identified as compliance options in the rule itself. EPA is working to revise the system to allow for more realistic reporting, but more trouble shooting will likely be necessary.

Next, the notification of compliance status (NOCS) must include the following:

- General boiler specifications
- Relevant emission limits
- Methods used to demonstrate compliance
- Testing/compliance demonstration results
- Established operating limits
- Certification of compliance status with emission limits, operating limits, and work practices
For both boilers that are subject to emission limits and boilers that are only required to conduct a tune-up, compliance reports must be submitted in CDX-CEDRI. Again, significant data entry is required, and a paper compliance report with this information is often required by the state agency as well. Boilers that must conduct a tune-up, but which are not subject to emission limits or operating requirements, must submit a compliance report after each compliance period during which a tune-up was conducted. Boilers that are subject to emission limits must submit semiannual compliance reports in CDX-CEDRI.

Nearing the home stretch, it is important to have the responsible official approved to certify within CDX-CEDRI well in advance of the deadline for report submittal. It is a multi-step and complex process to receive that approval, and one that may require some guidance to your certifying official to streamline the process.

If You Can’t Avoid It…Plan Accordingly

The complexity of the Boiler MACT and its compliance requirements calls for significant planning and allowing sufficient time in your compliance schedule to accommodate the challenges associated with the initial performance testing and subsequent reporting. Identify early on the following key elements:

- A plan to demonstrate initial and continuous compliance for each pollutant
- When the stack test should be conducted
- What monitoring systems at the facility are CMS that will be used to demonstrate compliance with Boiler MACT
- Who will complete the electronic reports (possibly ask stack testing company to include as part of their testing scope)
- How to track ongoing compliance with limits
- Who will electronically certify and submit compliance report (responsible official must be approved in CDX-CEDRI early)

Planning early will save you sleepless nights in the effort to meet the applicable compliance timeframes. For assistance in developing a compliance calendar and strategies for handling the myriad of details associated with Boiler MACT, or for other related questions, please call your local Trinity office or (800) 229-6655.

### Important Boiler MACT Compliance Dates for Existing Units

<table>
<thead>
<tr>
<th>Activity</th>
<th>Due Date for EXISTING Units at Major Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance Date (includes monitoring equipment installation, energy assessment and initial tune-ups, if required)</td>
<td>January 31, 2016</td>
</tr>
<tr>
<td>Notification of Intent to Conduct Performance Test</td>
<td>60 days prior to stack tests</td>
</tr>
<tr>
<td>Notification of Performance, Evaluation / Develop Site-Specific Test Plan</td>
<td>60 days prior to CMS evaluation</td>
</tr>
<tr>
<td>CMS Performance Evaluation Results</td>
<td>60 days after completion of CEMS performance evaluation</td>
</tr>
<tr>
<td>Notification of Compliance Status</td>
<td>60 days after performance tests and/or other initial compliance demonstrations</td>
</tr>
<tr>
<td>Initial Compliance Demonstration (including performance tests, fuel analyses, and CMS performance evaluation, if applicable)</td>
<td>July 29, 2016</td>
</tr>
</tbody>
</table>

### Upcoming Training Courses to Help You Prepare for Boiler MACT Compliance

**Introduction to ISO 50001**
- Sep 18 - Houston, TX
- Oct 9 - Chicago, IL

**Boiler MACT Energy Assessment**
- Sep 19 - Houston, TX
- Oct 10 - Chicago, IL

Learn more and register at trinityconsultants.com/training or call (800) 613-4473.
Changes to GHG PSD and Title V Rules May Help Oil and Natural Gas Facilities Seeking to Expand

By GEORGETTE REEVES, Gulf Region Business Development Manager — Austin, TX

On June 23, 2014 the U.S. Supreme Court ruled that EPA lacks authority to require air quality permits from facilities based solely on their greenhouse gas (GHG) emissions. The court upheld EPA’s authority to establish a PSD de minimis increase trigger for sources otherwise subject to PSD regulations. In other words, the Supreme Court ruling declared that EPA can regulate GHG emissions from sources already subject to PSD and Title V permitting requirements due to their emissions of conventional criteria pollutants, including requiring the installation of Best Available Control Technology (BACT) for all pollutants, including GHG.

As a next procedural step, the DC Circuit Court must implement the Supreme Court’s decision, effectively requiring EPA to rescind or withdraw the vacated portion of the rule. EPA has released one guidance memo (as of the printing of this article) to the permitting agencies on how to proceed in the interim: http://www.epa.gov/region6/6pd/air/pd-r/ghg/memo-jmccabe-andgiles2regions-on-CAA-permitting-post-uarg-case.pdf. The path forward for facilities with permits in the approval pipeline will depend primarily on whether they are an “anyway” source (i.e., already subject to PSD or Title V due to conventional criteria pollutants). Any sources not considered to be “anyway” sources (i.e., triggering PSD for non-GHG pollutants) could see drastic reductions in their permitting requirements resulting from this ruling.

Impact on Oil and Natural Gas Operators

Many traditional industrial facilities do not trigger permitting for GHGs alone, so this decision may not be particularly impactful; but the oil and natural gas operators...
industry is different. Many oil and gas facilities are sources of methane – a GHG pollutant with 25 times more global warming potential than carbon dioxide. Furthermore, there are very few options to limit GHG emissions from combustion sources (such as those commonly used in the industry including heaters, reboilers, engines, etc.). Consequently, the oil and gas industry (particularly the midstream industry) was finding that planned expansions and new processing or boosting facilities were triggering the significant permitting requirements under PSD. Many companies took production restrictions or committed to more costly electric motor driven compressors to keep from triggering PSD or Title V permitting for GHG.

The consequences of the recent Supreme Court decision on industry members are quite positive.

**Following additional procedural steps, sources will no longer be required to seek PSD or Title V permits if they trigger these programs on GHG alone.** This is clear moving forward, however there are additional procedural steps that EPA must take to finalize this change. As a practical matter, EPA has released a statement indicating that they “… will no longer apply or enforce federal regulatory provisions or the EPA approved PSD State Implementation Plan (SIP) provisions that require a stationary source to obtain a PSD permit if GHG are the only pollutant that 1) the source emits or has the potential to emit above PSD major source thresholds, and 2) for which there is a significant emissions increase and a significant net emissions increase from a modification.”

**Sources that currently have pending PSD and/or Title V applications will need to reach out to their state agency for next steps.** EPA “does not intend to continue processing PSD or Title V permit applications for ‘Step 2’ sources or require new applications for such permits in cases where EPA is the permitting authority.” However, each state is likely still working through the administrative requirements and may not have yet made a clear decision on a path forward relating to current pending applications. Reach out to your local regulatory authority to ensure you receive updates or notices regarding any developments in this regard.

**Sources that have been issued PSD and Title V permits that triggered these permitting requirements based on emissions other than GHG must still apply Best Available Control Technology (BACT).** While the scope of the GHG permitting rule is limited, it is important to remember that the Supreme Court decision did not remove EPA’s authority to regulate GHGs altogether. Sources triggering permitting under PSD and Title V for non-GHGs will likely still face some kind of requirements relating to the reduction of GHGs through BACT.

**Sources operating under PSD and Title V permits that were issued based on GHG emissions alone must reach out to their local regulatory authority to determine a course of action.** When rules were modified to accommodate GHG emissions under PSD and Title V (also known as the GHG Tailoring Rule), states adopted the rules differently. Exactly how each state opted to adopt the GHG Tailoring Rule may impact whether or not the future vacature of the requirement to seek PSD and Title V permits for GHG alone will result in automatic permit and/or condition cancellation. Some states may have incorporated the rule by reference to the Code of Federal Regulations (CFR) – if and when the rules are removed, the provisions of those permits may no longer apply. However, some states may have adopted the Tailoring Rule into their SIP by simply pasting the federal rule into their own regulation – in order to remove requirements under those programs, additional steps by local permitting authorities may be required.

**Conclusion**

Oil and natural gas facilities in rapidly expanding areas may have been considering significant capital expenditure or throughput limits in order to avoid PSD and/or Title V permitting and ensure the fastest permit path possible. Seeking a PSD permit is an extremely lengthy process – one that can easily take 18 months to over 2 years. With this action by the Supreme Court, an oil and gas facility may be able to achieve expansion without requiring significant limitations or other expenses that otherwise would have kept the facility “minor” for purposes of PSD. Oil and gas companies may have also taken production limitations or committed to more costly electric motor driven compressors. This ruling may provide companies an opportunity to request modifications to existing permits to allow higher production or the use of natural gas fired engines to drive compressors.

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1 Memorandum, from Janet G. McCabe (US EPA, Acting Assistant Administrator, Office of Air and Radiation) to Regional Administrators, Regions 1-10; July 24, 2014
2 Memorandum, from Janet G. McCabe (US EPA, Acting Assistant Administrator, Office of Air and Radiation) to Regional Administrators, Regions 1-10; July 24, 2014
By SCOTT ADAMSON, Senior Consultant, MSI — Salt Lake City, UT

On January 22, 2013, the D.C. Court of Appeals vacated the \( \text{PM}_{2.5} \) Significant Monitoring Concentrations (SMCs) citing the SMCs were inconsistent with the requirements of Section 165(e)(2) of the Clean Air Act. As a result, all Prevention of Significant Deterioration (PSD) permit applications must now include ambient air monitoring data for the preceding 12-month period for the permit application to be considered complete. If existing data are not determined to be representative by the permitting authority, the applicant must conduct its own monitoring program. A thorough understanding of quality assurance requirements under PSD and a familiarity with proper sampling equipment are key components to designing a successful monitoring program to meet PSD permitting requirements.

EPA Designated Sampling Methods

Monitoring for a PSD permit application must be conducted using a reference, equivalent, or EPA-approved method. EPA has developed design and performance based criteria defining three levels of method designations for ambient monitoring samplers: Federal Reference Method (FRM), Federal Equivalent Method (FEM), or an approved method accepted by the permitting authority.

FRM monitors are defined as the principal standard for collecting particulate samples. Samplers designated as FRM have met a combination of design and performance based criteria as defined in Title 40, Part 53 of the Code of Federal Regulations (40 CFR Part 53) and 40 CFR Part 50 Appendix L for \( \text{PM}_{2.5} \). FRM samplers collect particulates using a filter-based system by pumping ambient air through a 46.2 mm diameter polytetrafluoroethylene filter for 24-hours at a low volume (1 m³/hr). Samples are typically collected on a predefined three or six day schedule (updated annually by EPA) and are processed at a laboratory using gravimetric analysis to determine the 24-hour \( \text{PM}_{2.5} \) concentrations. EPA maintains a list on the Ambient Monitoring Technology Information Center (AMTIC) webpage of samplers that have been designated reference and equivalent methods in accordance with 40 CFR Part 53. Currently there are 17 models designated as reference methods for sampling \( \text{PM}_{2.5} \).

Federal Equivalent Method samplers meet performance criteria defined in 40 CFR Part 53 and are separated into three classifications (Class I, Class II, and Class III). Class I FEM samplers have minor design modifications from an FRM, but do not meet all the requirements to be designated an FRM. Many Class I FEMs (BGI PQ200-VSCC or PQ200A-VSCC, Thermo Scientific/Rupprecht & Patachnick Partisol Model 2000, Thermo Electron RAAS2.5 (100, 200, or 300), and Thermo Scientific Partisol 2025 Sequential Sampler) have a dual reference and equivalent method designation. Minor modifications to the sampler or quality assurance policies may change the actual designation for these samplers. Like FRMs and Class I samplers, FEM Class II samplers collect by filtration, require filter conditioning and gravimetric analysis, but have substantial design differences from FRMs. An example of a Class II equivalent sampler would be the Thermo Scientific Partisol-D 2000 and Partisol 2025-D dichotomous samplers which measure \( \text{PM}_{2.5}, \text{PM}_{10}, \text{and PM}_{10-2.5} \).

On October 17, 2006, EPA published test criteria (FR 71, 61236) for continuous \( \text{PM}_{2.5} \) monitors to qualify as a Class III FEM. The time resolution of Class III FEMs are on the order of minutes to an hour providing \( \text{PM}_{2.5} \) data in real-time or near real-time on a daily basis. FEM Class III Beta attenuation monitors such as Met One
BAM 1020 and 1022, Teledyne 602 Beta, and Environmental S.A. MP101M, collect samples onto a filter tape each hour and analyze the amount of particulate through beta ray attenuation. Other methods for continuous monitoring include light scattering detection (Grimm EDM 180) and mass gain using a tapered element oscillating microbalance (TEOM) coupled with a Filter Dynamics Measurement System (FDMS) to account for semi-volatile materials. Automated continuous monitors do not require filter collection, conditioning, and gravimetric analysis at a laboratory.

Background Determination

Background values used in cumulative impact analyses are typically obtained from representative 24-hour and annual PM$_{2.5}$ concentrations. Depending on the type of monitor and sampling schedule selected, background concentrations can be skewed. High concentrations may be missed when daily 24-hour concentrations are not available and statistics may be affected by the number of samples collected.

The annual PM$_{2.5}$ design value is the three-year average of the annual average PM$_{2.5}$ and the three-year average of the annual 98th-percentile 24-hour average concentrations. Filter-based systems (FRM and FEM) sample on an EPA defined 3-day or 6-day schedule resulting in approximately 122 or 61 samples in a 12-month period, respectively. The design value for the 24-hour samples would be the third highest concentration for a 3-day sampling schedule and the second highest concentration on a 6-day schedule.

Recently, EPA allowed continuous FEM monitors to be assigned as the primary sampler at a monitoring site. The result of this decision allows 24-hour concentration data for each day to count toward data completeness. Using daily 24-hour concentrations would allow for background determination to be based on the eighth highest concentration in a year.

EPA’s PM$_{2.5}$ modeling guidance allows for the use of seasonal background concentrations using the maximum value for each season after the design value has been determined. Additional analysis of the continuous monitor may be helpful in determining where particulate originated when paired with meteorological data, it can be used to determine if emissions from an existing nearby source are being measured or “double-counted.”
Quality Control Monitoring

The PSD and SLAMS monitoring quality assurance programs require the reporting of precision, bias, and accuracy. To meet these criteria, a collocated monitor must be installed at the site per 40 CFR Part 58, Appendix A. Each pair of samplers must have a designated primary and audit sampler. Concentrations from the primary sampler will be reported as the PM$_{2.5}$ concentrations measured at the site while concentrations from the audit sampler will be used in determining precision, accuracy, and bias. Although both PSD and SLAMS monitoring projects allow sampling with a primary monitor that is FRM or FEM designed, under Appendix A, the first collocated monitor in a network must have an FRM designation.

Agreement between measurements of collocated samplers may be relatively poor for low concentrations. According to Appendix A, PM$_{2.5}$ data quality assessment calculations for precision and bias should be made for sample pairs where both the primary and secondary analyzer measure 24-hour concentrations greater than 3 µg/m$^3$. Appendix A also recommends that approximately 25 of these acceptable sample pairs be collected in a year which can be challenging particularly on a 6-day sampling schedule where only 60 samples are taken annually. Sampling at a higher frequency with a continuous monitor (daily 24-hour concentrations) or on a 3-day sample schedule increases the likelihood of meeting the recommended number of sample pairs.

Comparability of Collocated Continuous FEM and FRM Samplers

Using two different sampling methods can introduce challenges for data analysis. Differences in operation and data collection can lead to concentration discrepancies resulting in precision and bias criteria not being met. Continuous monitors provide near-real-time concentrations on an hourly basis while filter-based samples are analyzed gravimetrically in a laboratory days after the sample was taken.

In 2011, EPA’s office of Air Quality Planning and Standards (OAQPS) conducted an assessment of continuous PM$_{2.5}$ FEMs with collocated FRMs throughout the country. The study comprised of 61 Met One beta attenuation monitors (BAM 1020) and 17 Thermo Scientific 8500 filter dynamic measurement system (FDMS) each monitor reported to EPA’s Air Quality System (AQS). Valid 24-hour concentrations were compared to data quality objectives (DQOs) that are defined in 40 CFR Part 53 for FEM designation. Figure 1 presents the slope and intercept comparison for each monitor type (61 BAM units and 17 FDMS units). The orange box identifies the acceptable slope and intercept criteria defined in 40 CFR Part 53, and the red arrow points to the average.

The study found that a majority of collocated FEMs produced data meeting DQOs while a third of the monitors had unacceptable slopes and/or intercepts. The study also found that most stations that were reporting within DQOs also had a positive bias leading to higher overall concentrations being measured by the continuous monitor. EPA recommended that state agencies running continuous PM$_{2.5}$ FEMs that did not meet DQOs use the FRM as the primary sampler for reporting concentrations while working toward improving the FEM data. While SLAMS networks include monitors that are run indefinitely, PSD projects are for a finite term and any data loss due to poor sampler performance can delay the submission of the permit application and/or granting of a permit.

Figure 1: DQO Comparison of Continuous FEMs to FRMs
Source: “Assessment of PM2.5 FEMs Compared to Collocated FRMs”, April 2011, EPA – OAQPS
In conclusion, for PSD projects where pre-construction monitoring is required, several factors are key when choosing the appropriate method for the monitoring program. High resolution data from continuous FEM monitors provide a more complete annual dataset that can be analyzed for particulate origination. However, 40 CFR 53 requires the use of an FRM designated sampler for the first collocated sampler in a network. Comparability between FEM and FRM sampler data can be difficult and presents a challenge for meeting the established quality assurance criteria. A study conducted by EPA-OAQPS comparing continuous FEM monitors to FRM samplers found that a good portion of sites reporting to the AQS system lacked acceptable performance data questioning the use of continuous FEMs. Meteorological Solutions Inc., a Trinity Consultants company, has a thorough understanding of the quality assurance requirements of the PSD monitoring program and can design, build and implement a quality/robust monitoring program that will meet sources monitoring goals. Defensibility of the data is key and using a high resolution, well performing method is essential for PSD monitoring.

References:
“Purpose and Goals of PM Continuous Program and FEM Status”, Tim Hanley, EPA OAQPS – AAMG, November 6, 2006
“Finally, a Continuous FEM for PM2.5”, Gobeli, Meyer, Schloesser, Pottberg, AWMA EM February 2009
EPA Memo to PM NAAQS Review Docket, “Assessment of PM2.5 FEMs Compared to Collocated FRMs”, (EPA-HQ-OAR-2007-0492), dated April 7, 2011
National Ambient Air Quality Standards for Particulate Matter. Final Rule, Federal Register 2006, 71, 61236
AMTIC – Sampling Schedule Calendar http://www.epa.gov/ttn/amtic/calendar.html

Schreiber Yonley & Associates
Joins the Trinity Family

Trinity is pleased to announce its recent acquisition of Schreiber Yonley & Associates (SYA), an environmental consulting company located in St. Louis, Missouri, that is well known for its service to the cement industry and other industrial sectors in the Midwest and beyond. SYA was founded in 1985 and provides environmental permitting and compliance support across multiple environmental media. The SYA team specializes in complex air pollutant strategies, alternative fuel (hazardous and non-hazardous applications), and field services and monitoring for clients in cement and other industries. The entire SYA team will integrate with Trinity’s St. Louis office under the administrative leadership of Managing Consultant Mike Liebert.

John Iwanski, Trinity’s Northern Region Managing Director, reflected on Trinity’s interest in joining with SYA. “Schreiber Yonley & Associates is a well-respected provider of environmental services in areas that complement Trinity’s capabilities. Their services to the cement industry in particular have been well known to Trinity and we are pleased to combine forces in a manner that benefits both companies as well as our current and future clients. In addition to the synergy among our two groups’ technical capabilities and client sectors, perhaps most important is our cultures, both of which value client service first, followed by career development for our consultants, and long term company growth.”

Bob Schreiber and Carrie Yonley, President and Vice President of SYA, commented, “We are extremely pleased to complete this transaction to join with Trinity. Trinity’s expertise and focus on air quality issues, reputation for excellent work, and strong management team make it a great match for SYA.”
New Cooling Water Intake Structures Rule Seeks to Minimize Adverse Impact

By JOSE ORSINI, Managing Consultant — Orlando, FL

On May 19, 2014, the U.S. Environmental Protection Agency (EPA) released a final rule regulating cooling water intake structures at existing facilities under Section 316(b) of the Clean Water Act (CWA). As noted in the sidebar, the release of the final rule brings an end to a long history of legal proceedings and EPA setbacks which date back to 2004.

There are three main components to the final rule:

1. Existing facilities that withdraw at least 25 percent of their water from an adjacent waterbody exclusively for cooling purposes and have a design intake flow of greater than 2 million gallons per day (MGD) are required to reduce fish impingement

2. Existing facilities that withdraw at least 125 million gallons per day are required to conduct studies to help their permitting authority determine whether and what site-specific controls, if any, would be required to reduce the number of aquatic organisms entrained by cooling water systems

3. New units that add electrical generation capacity at an existing facility are required to add technology that achieves one of two alternatives under the national Best Technology Available (BTA) standards for entrainment for new units at existing facilities

The Rule regulates existing facilities and new units at existing facilities that withdraw cooling water from “waters of the United States” and have, or require, a National Pollutant Discharge Elimination System (NPDES) permit, issued under section 402 of the CWA.

CWIS Rule Requirements

Section 316(b) of the CWA requires that the location, design, construction, and capacity of CWIS reflect the best technology available (BTA) for minimizing adverse environmental impacts. Under the regulation, the term “cooling water intake structure” means the total physical structure and any associated waterways used to withdraw cooling water from “waters of the United States.”

For purposes of the final Rule, adverse environmental impacts include, but are not limited to, impingement and entrainment at CWIS, including adverse effects to federally-listed species (species listed as threatened or endangered under the ESA), designated critical habitats, and changes in flow regime, caused by the withdrawal of water.
Impingement is defined as the entrapment of any life stages of fish and shellfish on the outer part of an intake structure or against a screening device during periods of intake water withdrawal. Entrapment is defined as the condition where impingeable fish and shellfish lack the means to escape the cooling water intake. Entrainment is defined as any life stages of fish and shellfish in the intake water flow entering and passing through a cooling water intake structure and into a cooling water system, including the condenser or heat exchanger.

BTA Standards for Impingement Mortality

Pursuant to 40 CFR 125.94(c), EPA requires owners or operators to comply with one of following BTA Standards for Impingement Mortality:

1. Closed-cycle recirculating system and daily monitoring of actual intake flows
2. Demonstrated ≤ 0.5 ft/sec through-screen design velocity
3. Demonstrated ≤ 0.5 ft/sec through-screen actual velocity and daily monitoring of velocity
4. Existing offshore velocity cap and daily monitoring of intake flow
5. Modified traveling screens, optimized to minimize impingement mortality
6. BTA++ systems of technology, management practices, and operational measures
7. 12-month impingement mortality performance standard and monthly monitoring (# fish killed/# fish impinged < 24 percent)

BTA Standards for Entrainment

The CWIS Rule requires the permitting authority to establish requirements that reflect the BTA standards for entrainment for each CWIS on a site-specific basis that must reflect the maximum reduction in entrainment warranted by section 125.98 of the Rule. The owner or operator of an existing facility must comply with BTA standards for entrainment, as determined by the permitting authority.

The owner or operator of a new unit at an existing facility must achieve the impingement mortality and entrainment standards by the following:

1. Reducing design intake flow for the new unit, at a minimum, to a level commensurate with that which can be attained by the use of a closed-cycle recirculating system for the same level of cooling for the new unit
2. Demonstrating to the permitting authority that they will operate and maintain technologies for the intake flow serving the new unit that demonstrate entrainment reductions equivalent to at least 90 percent of the reduction that could be achieved through compliance with intake flow commensurate with a closed-cycle system (i.e., 125.92(c)(1)).

Exceptions are described in the Rule, and the permitting authority may establish alternative requirements or additional BTA standards for entrainment on a site-specific basis.

**Monitoring**

EPA has established monitoring requirements for some of the BTA Standards for Impingement Mortality. The owner or operator complying with the 12-month impingement mortality performance standard may request the permitting authority to reduce monitoring requirements after the first full permit term in which these monitoring requirements are implemented, if the facility’s CWIS does not directly or indirectly affect federally-listed species or designated critical habitat. To do so, the results of the monitoring to date must demonstrate that the owner or operator of the facility has consistently operated the intake as designed and is meeting the impingement mortality standard. In addition, the permitting authority will determine entrainment monitoring requirements on a site-specific basis, as appropriate, to achieve the maximum reduction in entrainment warranted.

The permitting authority may require additional monitoring for a variety of reasons as specified in section 125.96 of the Rule, including additional monitoring for federally-listed species. Where the permitting authority requires additional monitoring for federally-listed species or critical habitat, the owner/operator must implement such monitoring.

**Reporting**

Reporting requirements include Monitoring Reports (Discharge Monitoring Reports or equivalent state reports) and results of all monitoring, demonstrations, and other information required by the permit sufficient to determine compliance with the permit conditions and requirements established under section 125.94(g), such as:

- Status reports required by the permitting authority
- Signed annual certification statement and report (indicating substantial modifications, if any)
- Additional supplemental permit reporting, as determined by the permitting authority

In addition, the permitting authority may require supplemental recordkeeping, such as compliance and other monitoring or supplemental data collection required in the permit.

**Incidental Take of Listed Species**

The Rule does not authorize “take” of endangered or threatened species. EPA defines impingement as entrapment, and entrainment as entering or passing through a CWIS and into the cooling water system. The USFWS and the NMFS have interpreted these as examples of “trap,” “capture,” and “harass,” and have determined that any impingement or entrainment of federally-listed species constitutes take.

As cited in the Rule, incidental take of endangered species (and threatened species, as applicable, under 16 U.S.C. 1533(d)) is prohibited under the ESA, unless it is permitted or exempted by the USFWS or the NMFS. Absent such exemption or permit, any facility operating under the authority of the CWIS Rule must not take federally threatened or endangered species.

**Permit Application**

The content requirements for the CWIS permit application have been outlined by EPA under 40 CFR 122.21(r). Table 1 summarizes the requirements.

The permit issued by the permitting authority may include requirements for the protection of federally-listed species and designated critical habitat, including additional control measures, monitoring requirements, and reporting requirements that are designed to minimize incidental take, reduce or remove more than minor detrimental effects to federally-listed species and designated critical habitat, or avoid jeopardizing federally-listed species or destroying or adversely modifying designated critical habitat.

EPA requires the permitting authority to include the following language as a permit condition: “Nothing in this permit authorizes take for the purposes of a facility’s compliance with the Endangered Species Act.”
Conclusions

As with every other newly promulgated rule, the CWIS presents new challenges for affected facilities that will require careful planning and selection of the optimum demonstration methods and technologies.

It will be interesting to see how public participation related to entrainment studies for site-specific controls is considered during permitting actions. It will also be interesting to monitor developments and interpretations on the reach of cooling water intake structures, instances of incidental take and resulting compliance costs.

Affected facilities may undertake the following actions to assure compliance with the rule requirements:

- Evaluate and determine regulatory requirements based on type of system and intake volume
- Select techniques and methods to comply with the applicable impingement and entrainment standards
- Assess potential impacts on critical habitats or endangered/threatened species and plan accordingly
- Evaluate impact of the rule on future expansion projects and plan for early compliance

For assistance with evaluating CWIS applicability and preparing for compliance, please contact Jose Orsini at (407) 982-2891 or jorsini@trinityconsultants.com.
Environmental Product Declarations in the Building Construction Materials Sector

By RICH PANDULLO, Managing Director – Sustainability & Environmental Management Services — Raleigh, NC and WENDY SHI, Consultant— Sustainability & Environmental Management Services — Raleigh, NC

Introduction

In response to a growing demand by consumers for understanding the true impact of a product on the environment, Environmental Product Declarations (EPDs) have become a standardized way for companies to quantify the embodied environmental impacts of a product and to communicate this information to interested parties. The EPD analysis addresses environmental impacts at each stage of a product’s life cycle - from raw material extraction, production and packaging, to distribution, end use and disposal. The disclosure information provided in an EPD typically includes such data as energy consumption (MJ), global warming potential (kg CO2e), ozone depletion (kg CFC-11 eq), photochemical oxidant creation (kg O3 eq or kg NOx eq), acidification of land/water (kg SO2 eq), and eutrophication (kg nitrogen or kg phosphate). An EPD can also include disclosure concerning other key parameters of interest – such as water consumption and composition of chemical constituents related to
the product. In essence, EPDs are analogous to a nutrition label except that the information conveyed is related to environmental impacts.

Recent revisions to scoring methodologies for the widely recognized Leadership in Energy & Environmental Design (LEED) certification process have created a distinct driver for companies in the Building Construction Materials (BCM) sector to develop EPDs for their respective products. Basically, additional LEED points are awarded to architectural and design project teams that have considered the life cycle impacts of materials they select. Project teams demonstrate that they have evaluated life cycle impacts by selecting a minimum number of materials for which life cycle disclosure is available in an EPD.

Due to this emerging LEED driver, along with having to face steadily increasing customer requests for life cycle information, the BCM sector has a newly formed interest in EPD development.

**EPDs in Sustainable Construction and Building**

As discussed in Trinity’s Winter 2014 issue of *Environmental Quarterly*, EPDs provide a standardized way for a company to collect data, assess impacts, communicate information, and review the environmental performance related to its products. An EPD can be developed only after a Product Category Rule (PCR) has been created and approved for a certain industry or process type. The PCR essentially establishes the ground rules for conducting an EPD for the designated industry/process type. As noted below in this article, the Building Construction Materials Sector has been very active during the past few years with respect to both PCR and EPD development.

According to PE International1, the application of EPDs in the Building Construction Materials sector can encourage environmental sustainability benefits in several ways. The process of preparing an EPD clarifies for manufacturers the environmental impacts associated with their products’ life cycles, as well as enables the manufacturers to communicate transparently to architects, designers, and end users. Thus, EPDs enable consumers to make consistent and robust comparisons between products used in a building materials. Furthermore, under a new LEED Pilot Program established to increase transparency and performance among the Architecture and Design community, firms are having their EPDs 3rd party certified as a means to demonstrate a strong commitment to high level environmental performance.

**EPDs Leaders in Building Construction Materials Sector**

The Building Construction Materials Sector has published more PCRs and EPDs than any other sector to date. These PCRs and EPDs apply to flooring, floor coverings, ceiling panels and building insulation, and other types of construction materials. Some examples of this activity are highlighted below.

- Flooring has the largest number of developed EPDs, mostly certified by UL Environment. These EPDs are also mostly based on NSF’s PCR for Flooring: Carpet, Resilient, Laminate, Ceramic and Wood. Participant manufacturers include Mannington Mills, Dal-Tile Corporation, Beaulieu Commercial, Mohawk Group, Shaw Industry Groups, Resilient Floor Covering Institute, Tandus Flooring, and Tarkett.2

- Manufacturers that have developed EPDs in the floor covering field include Bentley Mills, FLOR and Interface.3 Their EPDs are certified by UL Environment based on the PCR for floorcoverings and the Harmonized Rules for Textile, Laminate and Resilient Floor Coverings.

- CertainTeed Ceilings was the first manufacturer in the ceiling products industry to issue EPDs (initial publication was in 2012). Their series of EPDs covers more than 27 ceiling product families, and all are certified by the program operator UL Environment.4 Since then, Armstrong World Industries also issued 9 EPDs for ceiling panels.

- Manufacturing organizations that have developed EPDs in the building insulation field include Certain Teed, Dow Corning, Kingspan, Knauf Insultation, North American Insulation Manufacturers Association (NAIMA), Owens Corning, and Spray Polyurethane Foam Alliance.5 Their EPDs are certified by UL Environment based on the PCR for Building Envelope Thermal Insulation.

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In the Cement Sector, ASTM and the Portland Cement Association are the program operators that are in the process of developing a PCR for cement - specifically slag cement, Portland cement, and blended hydraulic cement. ASTM and the Carbon Leadership Forum also have developed PCRs for concrete.

There are several published EPDs in various other segments of the construction industry. The program operator National Ready Mix Concrete Association (NRMCA) has certified EPDs for three companies - Central Concrete, Ceratech, and CEMEX, in the concrete field. Their EPDs cover almost 1,500 concrete products. In addition, Titan Concrete issued 10 EPDs certified by the National Science Foundation (NSF) in December 2013. NSF also certified three EPDs for concrete products produced by Argos Ready Mix in May 2014, as well as four EPDs for concrete products produced by Cadman Inc. in May 2014.

**EPD Example**

Below is an example of an EPD in the BCM sector. The declaration owner is CeraTech USA and the program operator is NRMCA. This EPD covers ekkomaxx™ concrete for industry-average mixes produced in the United States. The essential data is highlighted below.

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### Proceeding with EPD Development

Many companies in the BCM sector have been tracking the creation of PCRs relevant to their operations and have initiated EPD planning as the PCR is at or near completion. Some helpful hints in planning for the development of your EPD include the following:

- **Find the correct PCR or create your own** – It is important to identify the PCR that is most relevant to your product. If a relevant PCR does not exist, you should consider working with a Program Operator to develop a new PCR that is representative of your product.

- **Make sure you follow the methodology outlined in the PCR** – Once you have identified the relevant PCR, it is essential that you follow the approved methodology set forth in the document.

- **Clearly document EPD assumptions** – Particularly if you plan to have your EPD certified, you must document how you followed the PCR methodology and clarify any underlying assumptions you made in determining the EPD results.
Seriously consider having the EPD certified by a recognized 3rd party – A general rule for disclosure of any sustainability data is that 3rd party certification increases credibility of the analysis and reliability of the data.

Trinity can assist you with developing an EPD and/or evaluating any existing LCA data your company may have to ensure that it aligns with a relevant PCR. We have conducted LCAs for many different sectors and have good insight into the PCR process (note that Trinity staff have served on the Review Panel for the PCR for Portland cement). Furthermore, Trinity has established strong relationships with several organizations qualified to certify EPDs.

For more information, please contact Rich Pandullo, Director of Sustainability & Environmental Management at rpandullo@trinityconsultants.com.


Upcoming Trade Shows
— Hope to See You There

Shale Gas Insight 2014
Sep 24-25 Philadelphia, PA
Booth Number: 828
http://shalegasinsight.com/

Nebraska Safety Council Conference & Trade Show 2014
Oct 7-8 Lincoln, NE
https://www.nesafetycouncil.org/index.php/training-courses-and-conferences/conferences

Carolinas Air Pollution Control Association (CAPCA) Conference and Exposition
Fall 2014
Oct 15-17 Myrtle Beach, SC
http://capca-carolinas.org/

LA - A&WMA Environmental Focus 2014
Oct 28-29 Baton Rouge, LA
Booth Number: 13
http://la-awma.org/conference

Mary Kay O’Connor Process Safety Center International Symposium
Oct 28-30 College Station, TX
http://psc.tamu.edu/symposia/2014-sym

Federation of Environmental Technologists (FET) Environment, Health, & Safety 2014
Oct 28-30 Pewaukee, WI
Booth Number: 17G

Environmental Federation of Oklahoma’s Annual Conference and Tradeshow 2014
Oct 29-31 Tulsa, OK
Training for Excellence
EH&S Courses July 2014 - June 2015

Introductory EH&S
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Feb 24-25 Oklahoma City, OK

Introduction to Environmental Recordkeeping and Reporting Requirements (2 days) $749
Feb 26-27 Oklahoma City, OK

Air Permitting for Municipal Solid Waste (MSW) Landfills $499
Feb 25 Atlanta, GA

Compliance Management for Fugitive Emissions and LDAR for Oil & Natural Gas Industry $499
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