

MONITORING SYSTEMS DESIGN: AIR QUALITY CONTROL TECHNOLOGY ANALYSIS

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BACKGROUND:

EMISSIONS MONITORING

THE FEDERAL CLEAN AIR ACT (CAA) REGULATES AND CONTROLS AIR POLLUTION TO PROTECT HUMAN HEALTH. ORIGINALLY DEVELOPED IN 1963 AS A RESEARCH PROGRAM, THE CAA WAS EXPANDED IN 1967 AND AMENDED IN 1970, 1977, AND, MOST RECENTLY, IN 1990. UNDER THE CAA, THE EPA SETS AIR EMISSION LIMITS BASED ON LOCATION AND SOURCE (E.G., CHEMICAL PLANTS, UTILITIES, AND REFINERIES) FOR CERTAIN POLLUTANTS THROUGHOUT THE UNITED STATES.

The CAA also requires the EPA to set and enforce National Ambient Air Quality Standards (NAAQS) in 40 CFR part 50. The NAAQS identify six criteria pollutants:

- Carbon Monoxide
- Lead
- Nitrogen Dioxide
- Ozone
- Particle Pollution (PM_{2.5} and PM₁₀)
- Sulfur Dioxide

To ensure that the emissions from certain sources are known, consistent, and below regulatory thresholds, the EPA requires emissions monitoring. With help from its federal and state partners, the EPA ensures these limits are met through the CAA compliance monitoring program. EPA compliance monitoring typically involves onsite inspections and records reviews, which lead to enforcement actions, including penalties and fines where necessary.

Most industrial sources are required to monitor air emissions in some form or another in order to demonstrate compliance. This may be to show that the facility is a de minimis source and does not require an air permit, or it may be to adhere to specific provisions outlined in the facility's operating permit. For instance, Title V facilities are required to submit a Compliance Assurance Monitoring (CAM) plan as a part of Title V permit application. In addition to operating permits, there are several other regulations that involve emissions monitoring.

BACKGROUND:

EMISSIONS MONITORING

FEDERAL MONITORING REQUIREMENTS

On the federal level, New Source Performance Standards (NSPS) establish emission limitations and compliance monitoring requirements for newly constructed, modified, or reconstructed sources within certain source categories. These sources must follow standards to control excess emissions of NO_x, SO₂, and particulate matter. Some NSPSs require sources to use continuous emission monitors and to monitor control device operating parameters to demonstrate continuous compliance.

New Source Review (NSR) and Prevention of Significant Deterioration (PSD) require certain facilities to install pollution controls when they build or make modifications to existing facilities, including petroleum refineries. Additionally, several source categories, including area sources, fall under National Emissions Standards for Hazardous Air Pollutants (NESHAPs). Each of the federal NESHAPs and the aforementioned federal programs have their own unique monitoring requirements. Monitoring is also required on the federal level for anything from Ozone Depleting Substances (ODS) if the facility contains equipment with more than fifty pounds of refrigerant to greenhouse gases for Greenhouse Gas Inventory reporting.

UNIQUE MONITORING REQUIREMENTS

Unique monitoring requirements also exist on the state level, such as Permit by Rule (PBRs) in Texas. Even cities can have unique monitoring requirements, such as the surface coating RACT in Kansas City, Missouri.

OUR SERVICES AND APPROACH:

ADHERING TO MONITORING REQUIREMENTS

Sometimes monitoring systems are put in place to help the client maintain compliance. Other times, systems are created based on restrictions imposed by enforcement actions from the EPA. Regardless of the situation, it is of paramount importance that federal, state, and local regulations regarding monitoring are adhered to.

As described above, there are literally thousands of scenarios that require facilities to have monitoring systems. Emissions monitoring can encompass an entire facility or be specific to a particular process unit within the facility. Sage has experience developing emissions monitoring systems for all types of facilities and regulations. These monitoring systems may take many forms, including daily paint usage logs for surface coating operations, which automatically populate the monthly VOC and HAP tracking spreadsheets for annual emission inventories, TankESP software to track petroleum emissions from aboveground storage tanks at refineries, or even continuous monitoring through intricate monitoring devices.

In many cases, monitoring spreadsheets serve multiple purposes. For instance, a single VOC/HAP monitoring spreadsheet may be used to track natural gas usage for greenhouse gas reporting, to identify emissions of a particular HAP to populate the

OUR SERVICES AND APPROACH:

ADHERING TO MONITORING REQUIREMENTS

releases for Toxic Release Inventory (TRI) Form Rs, and to simultaneously assist with the annual emissions report. Due to the wide-reaching effects of these monitoring systems, it is extremely important to ensure that the calculations are correctly prepared and the monitoring systems are properly implemented.

PREPARING MONITORING SYSTEMS

Most facilities need help preparing monitoring systems due to the quantity of work and expertise it often takes to create the spreadsheets and supporting documents.

Monitoring systems need to take into account the facility's situation and consider the individual(s) who will ultimately be responsible for filling out the monitoring spreadsheets. Sage's spreadsheets are designed with this in mind. In some cases, these spreadsheets include instructions regarding which logs, purchasing records, etc. the facility should draw information from to ensure consistency from year to year, even in the event of employee turnover at the facility. We also consider the nature of the process unit and identify applicable state and federal regulations. This typically involves a significant amount of cross-referencing to ensure that all applicable requirements outlined in the facility's permits and federal, state, and local regulations are met and properly documented.

Sage's spreadsheets are carefully designed with detailed assumptions and footnotes to clearly outline the rationale behind the monitoring approach, emission factors, analytical devices used, operational details of the data acquisition and measurement system, data requirements, and specific QA/QC procedures. This allows an EPA regulator to pick up the document and immediately see how the calculations are performed, where the emission factors are taken from, the units of the emissions, and answers to many other questions.

REPORTING

Sage also provides instructions on recordkeeping, reporting requirements, and next steps when a deviation occurs and a regulatory limit is exceeded. We assist with any monitoring reports, including compiling and analyzing data, drafting a cover letter, and providing the facility with a hard copy of the report to keep on file. We also train facility staff and simply provide annual oversight—serving as final QA/QC for the facility to ensure that all details are correctly represented.

PERMIT LIMITS

Sometimes, the monitoring records suggest that a permit limit has been exceeded. In these cases, we advise the client accordingly and work directly with the facility to file the necessary paperwork and help implement the required corrective actions. During this corrective action process, it is important to consider alternative control technologies, substitution of chemicals in a process, and other potential cost-effective solutions.

OUR SERVICES AND APPROACH:

ADHERING TO
MONITORING
REQUIREMENTS

TIMING

The timing of these projects is very dependent on the scope of the monitoring system, the size of the facility, and the complexity of the processes. Timing can also change based on the availability of data and other factors.

SUMMARY:

SAGE'S
MONITORING
SYSTEM
SERVICES

According to federal and state regulations, various industries must comply with emissions limitations. This compliance must be demonstrated through the facility's monitoring systems. Monitoring systems often require complex calculations to correctly determine and document a facility's emissions. Sage prepares customized monitoring systems, develops policies and procedures to comply with permits and regulations, and assists with monitoring and reporting of emissions.