Air Pollution Control

Developing an optimized air pollution control system requires the consideration of a wide range of engineering, environmental, economic, and regulatory factors. At O'Brien & Gere, we have assisted a wide variety of industrial, municipal, and military clients with the selection and design of effective air pollution control systems.

CONTROL GOALS

The United States Environmental Protection Agency (USEPA) has formed several control goals, expressed as:

- NESHAPs (National Emissions Standards for Hazardous Air Pollutants)
- NSPS (New Source Performance Standards)
- RACT (Reasonably Available Control Technology)
- BACT (Best Available Control Technology)
- MACT (Maximum Achievable Control Technology)
- LAER (Lowest Achievable Emission Rate)

Potential control systems must be carefully scrutinized in order to comply with federal, state, and local air pollution control regulations and to minimize capital and operating costs.

CHOOSING A CONTROL SYSTEM

An air pollution control system is specified by the degree of air cleaning required for a particular point source. The degree of removal, or overall control efficiency, is a product of the system's capture efficiency and control efficiency. Each system must be given design attention in order to develop a complete control system. The upgrade of an existing control system to meet new stringent limits can often be accomplished by increasing the system's capture efficiency instead of replacing the system.

Control systems vary widely, depending on type of air pollutant encountered, volume of air handled, degree of air cleaning required, and geographic location of the source.

Pollutant classes include particulates, inorganic compounds, and organic emissions.

Particulates: Particulates include inorganic or organic dust, ash, and fine mists which can be controlled through dry or wet control devices.

DRY CAPTURE DEVICES INCLUDE

- Baghouse filters
- Cyclone separators
- Settling chambers

WET CONTROL DEVICES INCLUDE

- Packed bed or plate scrubbers
- Impingement or venturi scrubbers
- Wet ionizers
- Wet electrostatic precipitators
- Electrostatic precipitators
- Cloth collectors
- High-efficiency air filters

CONTACT US

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INORGANIC CONTAMINANTS

Typical inorganic compounds, excluding particulate matter, include chlorides, sulfur oxides, nitrogen oxides, and some odorous compounds, such as hydrogen sulfide. Common control systems use both physical and chemical processes for emissions control, such as adsorption, absorption, and catalytic conversion. Integrated control systems with process operations include designs for liquid injection systems, catalytic oxidation processes, and chemical scrubbers.

These systems work well for most inorganics; however, the most effective method for nitrogen oxide emissions control usually includes process modifications to minimize NOx generation. Effective methods of reducing NOx emissions from combustion sources include strict control of excess air, multiple-stage combustion, flue-gas recirculation, and low-NOx burner designs.

ORGANIC CONTAMINANTS

The majority of organic air contaminants are classified as volatile organic compounds (VOCs). Control systems can recover VOCs for reuse, resale, or to blend into fuel. Otherwise, systems are designed to capture or destroy organics.

- Recovery systems include activated carbon adsorption with regeneration and condensation. Capture systems include aqueous or solvent scrubbers. Wastewater generation must be considered in the capture system's design.
- Destruction systems include flaring and thermal or catalytic incineration. Flaring has decreased in popularity due to the inability to monitor destruction efficiency as well as aesthetic concerns. With incineration, careful attention must be paid to the possibility of generating unwanted by-products of incomplete combustion, such as polynuclear aromatic hydrocarbons or dioxins/furans. Biological air filters offer destruction of organics through biological degradation.

RELATED CONSIDERATIONS

As with the design and construction of other environmental control systems, ancillary services such as air permit applications and support documentation, air dispersion modeling, and air emissions testing are often required by local authorities prior to or in conjunction with equipment installation.

EXPERIENCE

Selecting and implementing an air pollution control system involves sorting through a variety of issues relating to:

- Regulations and control limits
- Air stream characteristics
- Air toxics
- Corrosion problems
- Pollutant recovery/reuse potential
- Energy use or requirements
- Space limitation
- Cost

With these issues in mind, O'Brien & Gere provides complete services to clients involved with air pollution control installations:

- Air permitting assistance
- Air dispersion modeling evaluations
- Ambient air monitoring programs
- Best protocol development
- Emissions testing programs
- Interaction with regulatory agencies

O'Brien & Gere can help you sort through the alternatives to choose and execute the best solution for your situation.