United States Environmental Protection Agency	Air Pollution Training Institute MD-17 Research Triangle Park, NC 27711
Air	

APTI
Course 444

Air Pollution Field Enforcement

STUDENT MANUAL

Jerry W. Crowder
Crowder Environmental Associates, Inc.
2905 Province Place
Plano, Texas 75075

Joe G. Moore, Jr.
BCM Engineers, Inc.
14651 Dallas Parkway, Suite 102
Dallas, Texas 75240

Louis DeRose
Attorney at Law
1318 S. Finley Rd. Suite 2A
Lombard, Illinois 60148

William J. Franek
Franek and Associates, Inc.
3711 W. 83rd Street
Chicago, Illinois 60652

September 1999

United States Environmental Protection Agency, Manpower and Technical Information Branch, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711

Notice

Although the information is this document has been funded wholly or in part by the United States Environmental Protection Agency to the University of Texas at Arlington, it may not necessarily reflect the views of the Agency and no official endorsement should be inferred.

Note from the Authors

This document is current as of September 1999. The policies and rules stated in this document represent the views of the authors and are not necessarily the view of the United States Environmental Agency. Policies and rules are likely to change in the future. Readers are advised to contact either their state agency or the USEPA regional office for official policies and rules and their interpretation.

Table of Contents

Chapter 6: Federal Clean Air Act

Chapter 13: Baseline Source Inspection Techniques

Chapter 14: Inspection Safety

Chapter 1

Overview of Air Pollution Control

Goal

The purpose of this lesson is to present the broad objectives and means of attainment of the air pollution control effort in the United States.

Objectives

At the end of this lesson, the student should be able to:

1. Recite the ultimate goal of the air pollution control agency and how progress toward the goal is measured.
2. Define ambient air quality.
3. Explain the fundamental relationships which create ambient air quality.
4. Name the criteria pollutants.
5. Differentiate between primary and secondary National Ambient Air Quality Standards and between primary and secondary pollutants.
6. Explain background pollution levels.
7. List the hazardous pollutants covered by NESHAPS.
8. Identify three meteorological factors important in air pollution control.
9. Identify the basic concept of air quality control in the U.S.
10. Define atmospheric reaction products.
11. State the source of regulations enforced by the state and local inspections.

Introduction

An understanding of the principles of air quality management will provide a better understanding of the role of the air pollution inspector. APTI self-instructional Course SI:422, "Air Pollution Control Orientation Course", is highly recommended as preparation for study in the field of air pollution enforcement. The following overview will briefly highlight the fundamentals of air quality management.

Air Quality Management

The goal of air quality management is to achieve a clearly defined set of ambient air quality standards, which will protect the public against adverse effects on health and welfare and prevent significant deterioration of air quality in regions where the air is considered clean.

Health is considered to be a state of complete physical, mental and social well-being and not merely the absence of disease. The Clean Air Act, Sec. 302(h), states that all language referring to effects on welfare includes, but is not limited to, effects on soils, water, crops, vegetation, anthropogenic materials, animals, wild-life, weather, visibility, climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well-being.

Following the establishment of a set of air quality standards or goals the air quality management strategy will encompass the regulation of the amount, location, and time of inventoried pollutant emissions in order to attain the prescribed standards. Additionally, monitoring the progress toward achieving the set standards must also be performed by measuring the ambient air quality and meteorology.

National Ambient Air Quality Standards

National Ambient Air Quality Standards designed to provide an acceptable level of air quality were promulgated by EPA in 1970. Six contaminants, termed "criteria pollutants", were originally named: CO, SO2, NOx, non-methane hydrocarbons, photochemical oxidants, and total suspended particulates (TSP). Since that time, lead has been added, non-methane hydrocarbons have been removed, photochemical oxidants have been replaced by ozone and TSP has been replaced by PM-10 and additionally PM 2.5.

To further define air quality goals, NAAQS are divided into primary and secondary levels. The primary standards are designed to protect human health with an “adequate margin of safety". The secondary standards are set to prevent other adverse effects from air pollution, including damage to flora and fauna and materials of economic value.

The terms primary and secondary are also used in reference to the pollutants themselves. The primary criteria pollutants are those, which are directly emitted into the atmosphere and include CO, SO2, PM-10, lead and NO. Secondary pollutants are those formed primarily by atmospheric reaction and include Ozone and NO2.

An Ambient Air Quality Model

As part of the air quality management practice a conceptual or predictive model may be developed to represent the major factors(i.e. emissions that contribute to the air quality of a region. The model separates emitters from receptors and demonstrates that air quality results from the transport, diffusion or accumulation of contaminants from sources, atmospheric reaction products, background influx, and deposition and re-entrainment from surfaces. The model, illustrated in Figure 1-1, is written as:

$$AAQ = \frac{E + A + B + C}{F}$$

where AAQ = ambient air quality in $\mu g/m^3$

E = the sum of emissions from within the region, including both stationary and moving sources and fugitive emissions from storage piles, material handling, construction and demolition, building openings, etc. These are identified as the point and area sources within the air quality control region. The units are µg/sec.

A = the effect of atmospheric reaction. This term may be either positive or negative, depending on whether the contaminant is generated or consumed by the reaction. This parameter is also affected by the frequency and intensity of solar radiation. The units are µg/sec.

B = background pollutants flowing into the region from outside its boundaries. Rainfall, snow cover and humidity influence this parameter. The significance of background influx can be considerable in determining the required reduction of E necessary to meet the air quality standard. Obviously, if B exceeds the standard, no amount of reduction in E will achieve attainment. The units are µg/sec.

C = the effect of deposition and re-entrainment from surfaces. This term may also be either positive or negative, depending on whether the contaminant is deposited on or released from the surface. If both are occurring simultaneously, the sign is determined by the process that dominates and the value is given by the difference in rates. This parameter is also influenced by rainfall, snow cover and humidity. The units are µg/sec.

F = the effective dilution flow of atmospheric air through the region. This parameter is affected by horizontal wind speed and atmospheric stability or turbulence in units of m^3/sec.

The model is applied to each pollutant separately, because air quality is defined on a single contaminant basis. In so doing, one or more of the terms may reduce to zero.

For SO_2

$$AAQ = \frac{E - A + B - C}{F}$$

since SO_2 is depleted by atmospheric reaction and tends to deposit onto surfaces at a rate greater than it is released.

For PM-10,

$$AAQ = \frac{E + A + B + C}{F}$$

since small particles are produced by atmospheric reaction and tend to be released from surfaces at a rate greater than they deposit.

For O_3

$$AAQ = \frac{0 + A + B - C}{F}$$

since O_3 is formed by atmospheric reaction, is not significantly emitted from point and area sources and tends to deposit on surfaces at a rate greater than it is released.

Air Quality Index

A number and descriptive term that is used to characterize air quality for a given location and time period is referred to as an air quality index. The index developed and proscribed by EPA for all cities with populations over 200,000 people is called the Pollutant Standard Index (PSI). The index provides EPA with a uniform system of reporting pollution levels for the major air pollutants regulated under the Clean Air Act..

The Pollutant Standard Index is determined by dividing the concentrations of each of the five major air pollutants--nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone and particulate matter--for a given time period by the corresponding National Ambient Air Quality Standard (NAAQS) to obtain a number between 0 and 500. The reported index is based on the pollutant having the highest PSI value. Accompanying each index range is a description of the general health effects and the precautions to take. The index ranges and corresponding descriptions are as follows:

0-50	--	good
51-100	--	moderate
101-200	--	unhealthful
201-300	--	very unhealthful
301-500	--	hazardous

The intervals on the PSI scale relate to the potential health effects of daily concentration of each of these five pollutants. Each value has built into it a margin of safety that, on current knowledge, protects highly susceptible member of the public.

Hazardous Pollutants

The Clean Air Act, Sec. 112(a)(1), defines hazardous pollutants as those "which may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness." Prior to the 1990 Clean Air Act Amendments (CAA), National Emission Standards for Hazardous Air Pollutants, NESHAPS, were established for only eight pollutants: asbestos, beryllium, mercury, vinyl chloride, benzene, radio nuclides, inorganic arsenic and coke oven emissions. These were established as health-based standards. After the 1990 CAA Congress completely revised the program with a list of 189 designated hazardous air pollutants or HAP's. Control of NESHAP's are now established on a technology-based standards based on "maximum achievable control technology(MACT).

Other Pollutants

Most state and local jurisdictions are vitally concerned with many contaminants not included in the national program. These other contaminants cause a variety of effects in local areas, such as vegetation and materials damage, injury to livestock and discomfort to individuals. Regulations dealing with these pollutants are enacted and enforced by the state and local agencies.

During the last few years, regulations have emerged, primarily at the state and local level, for the control of air toxics. Air toxics refer to those air pollutants that may pose a potential health risk when emitted into the air, but for which EPA has not established an NAAQS. Approximately 800 pollutants are currently regulated by various state and local air toxics programs, ranging from common elements such as iron and nickel or simple organics such as benzene, to complex chemical such as polynuclear aromatic hydrocarbons.

Air Quality Control in the U.S.

Air quality control in the U.S. is a two level program, with the efforts of the states and their political subdivisions dictated by their own legislative actions to meet their particular needs, and the Federal program based on Federal laws and regulations created by the Clean Air Act. Since 1970, the Federal program has strongly influenced state and local programs through the promulgation of national requirements imposed on states and local governments.

Enforcement Responsibilities

The major component of an enforcement program that determines the role of the inspector comes from the control strategy embodied in the applicable state implementation plan. Federal inspectors find their enforcement role spelled out in the Clean Air Act and resulting Federal regulations. Both levels of enforcement action target the same major sources, leading to cooperative or duplicate or unilateral actions that are often confusing to the regulated sources and the public.

References

Gruber, C.W., and P.M. Giblin, "Air Pollution Field Enforcement: Student Manual", EPA 450/2-80-075, March 1980.

U.S. EPA Office of Air Quality Planning and Standards, Measuring Air Quality "The Pollutant Standard Index" EPA 451/K-94-001

U.S. EPA Office of Air Quality Planning and Standards, Guideline For Reporting of Daily Air Quality - Air Quality Index(AQI) , EPA 454/R-99-010 July 1999

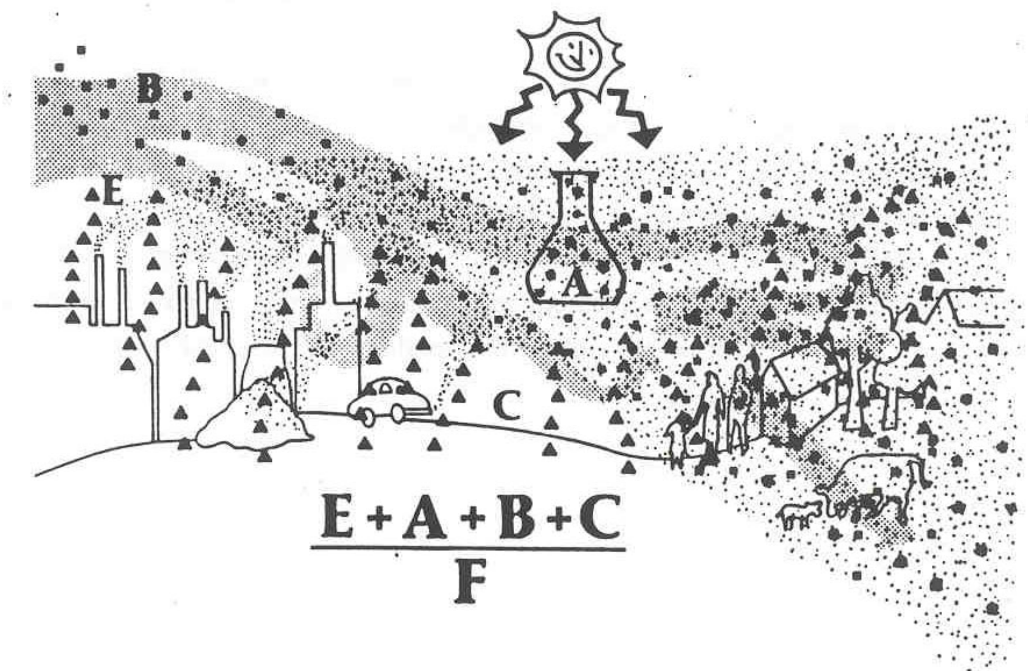


Figure 1-1: Ambient Air Quality Model

Chapter 2
Role of the Inspector

Goal

The purposes of this lesson it to describe the job characteristics and necessary personal qualities of the agency inspector.

Objectives

At the end of this lesson, the student should be able to:

1. State the role of the field inspector.
2. State three job-related requirements a newly hired inspector must learn.
3. State what determines the scope of the field operations program.
4. State at least five field enforcement activities.
5. Identify at least five specific characteristics of the inspector's job.
6. State at least three methods of continuing self-education by day to day working experience.
7. List at least four personal qualities or skills needed by the agency inspector.
8. Identify three nonverbal influences in communications.

Introduction

This chapter describes the job of the inspector and the personal qualities necessary to satisfactorily perform these duties.

Role of the Inspector

Inspectors form the primary field operation of the control agency. Tasks assigned may include field surveillance; complaint investigation; facility inspections; writing reports, composing orders, recommending or serving notices of violation; assisting in developing compliance plans; serving as a witness before a hearing board or a court; or assisting in other operations, such as source testing or sample collection. The specific duties of an inspector will be determined by the scope of the agency's field operations, and that is influenced markedly by the level of the agency.

Field enforcement responsibilities at the local level (city, county or regional agency or district office of a state agency) generally involve the supervision of a wide variety and large number of sources. The inspector is physically close to the pollution sources and to the citizens, who generally expect prompt response to complaints. In cases of litigation, the inspector usually has little advance consultation with legal counsel. Every inspection must be conducted as if it will go to court and be heavily contested. An agency’s entire case often hinges upon the expertise and professionalism of the inspector as the witness of fact.

Enforcement officers at a centralized state agency are farther removed from sources, requiring greater travel and less frequent inspections. Enforcement tends to emphasize larger sources than in areas served by local agencies and usually relies on in-house legal counsel.

At the federal level, enforcement emphasis is placed on major stationary sources of pollutants and is usually structured on a case-by-case basis with legal consultation from within the agency. Actions are usually in cooperation with the state but may preempt the state under certain conditions.

Within an agency, the scope of field operations will be influenced by both internal and external determinants. The major external determinants are the number and types of stationary sources that require surveillance and the status of their compliance with regulations, compliance plans, consent orders, etc. The major internal determinants are the complexity of the rules and regulations; the support required for source registration and permit inspections; the frequency of required re-inspections; and the administrative and enforcement policies of the agency.

The inspector's job is both people and situation oriented. Field personnel must deal with the motivations, needs and problems of individuals and with other environmental, economic, legal and social considerations that may be encountered in the field. The inspector is constantly meeting and dealing with people face to face; obtaining information, conducting investigations, seeking provable, factual evidence; answering questions and solving problems; forming judgments and taking enforcement actions; preparing and preserving the record in written reports; and giving persuasive testimony. The inspector represents the agency in the field and, in the eyes of the general public, often *is* the agency. The ultimate success or failure of the enforcement program depends heavily upon how well inspectors do their job. An agent of the government must constantly strive to maintain the highest standards of thoroughness, ethical conduct and quality assurance.

Personal Qualities and Skills

The inspector should possess a mature personality and be capable of dealing with the public in an efficient and businesslike manner, often under strained conditions. At times, the inspector must listen to caustic comment and criticism with self-control to avoid argument or debate. Under such circumstances, maintaining a courteous demeanor can be difficult.

The ability to communicate is essential for an inspector. Effective communications may well be the lubricant that can prevent friction between violator and enforcer. However, the inspector should be aware that communicating is more than a matter of people talking to each other. Be sure the other party understands the full meaning and import of what you say and what you may want them to do. Avoid ordering or commanding: "Do this!", "Do that!", "Because I say so", or "Because the law says so". Remember, the right words communicate, while the wrong words irritate.

The spoken words are by no means the sum total of communications. The nonverbal influences can be just as important. How the inspector acts and dresses and the level of calmness and self-assurance are all part of effective communications. Don't make it tough on yourself by going into an interview with a chip on your shoulder.

The inspector's dress and appearance must be neat and well groomed. This may be difficult to achieve, since alternating situations of office and plant, clean and dirty, heat and cold must often be accommodated. If the inspection visit is to involve entry into a manufacturing or operating area, remember that ties, loose coats and street shoes have no place in this environment.

The inspector must develop investigative skills in gathering facts and organizing them in a concise manner. The inspector must be observant of signs important to the central theme of the inspection or investigation; resourceful in applying innovative methods to unusual situations; able to pick out from the sum total of conversation and directed inspections that which is meaningful to the purpose; and skillful in directing the interview and inspection to obtain the factual material needed.

In order to develop the qualities needed, the inspector must have a capacity for learning in the technical and legal disciplines. The technical aspects encompass a broad understanding of the entire field of air quality management and source control technology. The inspector must be able to speak the language of air pollution and its control and should use each inspection as a learning process.

The inspector must develop a potential for legal enforcement, developing the capability to relate numbered regulations to corresponding situations encountered in the field. In some cases, the inspector must align with a prosecuting attorney who is unfamiliar with the air pollution statutes, who may have very little knowledge or experience in air pollution cases and who may have little time for advance preparation.

Not withstanding their central role in an enforcement action, the inspector must develop rapport with the engineering and technical groups. In the larger and more complicated litigations, the inspector will be called on to function as a member of the enforcement team.

Orientation and Training

In the first weeks on the job, the inspector must learn the air pollution laws and regulations, including the section numbers; the administrative procedures, especially the paperwork routines; and the policies of enforcement. In the months that follow, that knowledge must expand to include the identification of industrial processes and control equipment, along with the parameters, which relate to their emission potential; a basic understanding of combustion processes and their equipment operation; and the ability to expertly determine the opacity of plumes.

Opportunities for the inspector to continue learning include EPA self-instructional courses, air pollution training courses and workshops; technical meetings, seminars and conferences; university or community college courses; and professional and trade journals.

References

Gruber, C.W., and P.M. Giblin, "Air Pollution Field Enforcement: Student Manual", EPA 450-80-075, March 1980.

U.S. Environmental Protection Agency, "Conducting Environmental Compliance Inspections" – Inspector's Field Manual Eighth Edition, EPA 910/9-91-047 November 1997

Chapter 3
The Enforcement Process

Goal

The purpose of this lesson is to present an overview of the enforcement process by which sources are brought into compliance, with emphasis on the functioning of the agency inspector within the process.

Objectives

At the end of this lesson, the student should be able to:

1. State the mission of the enforcement operation of an agency.
2. Identify four major enforcement systems.
3. State at least six ways construction permits aid enforcement.
4. Identify the Federal jurisdiction for new construction permit review.
5. State the purpose of a "Policy of Enforcement".
6. State the three degrees of compliance.
7. State at least eight of the milestones included in a Compliance Plan Schedule.

Introduction

The mission of the enforcement operations of an agency is to carry out those field tasks designed to bring sources into compliance with regulations at the earliest possible time and to maintain their compliance. Enforcement actions vary widely among agencies, and policies setting enforcement strategy are as individualistic as the agencies themselves. This chapter presents various enforcement mechanisms. Although inspectors are not free to choose from the mechanisms available, it is hoped this chapter will widen their perspective of enforcement.

Enforcement Systems

Control strategies are woven into four enforcement systems for implementation: (a) permits to construct and initially operate; (b) permits to operate which require periodic reinspection on a scheduled basis; (c) compliance plan enforcement; and (d) surveillance and complaint response.

Permits to Construct and Initially Operate

The purpose of this permit is to prevent construction of a new stationary source or modification of an existing source, if emissions from that source would: (a) result in a violation of applicable portions of the control strategy; (b) prevent attainment or maintenance of one or more of the National Ambient Air Quality Standards (NAAQS); and (c) cause significant deterioration of air quality which is currently better than that required by the NAAQS.

Permit systems are administered by local, state and/or federal agencies, depending on local or state regulations and the source category related to the Clean Air Act (CAA). All sources that have significant emission potential are included in state and local permit regulations. As a result of the 1977 CAA, Section 110 requires that all approved State Implementation Plans (SIPs) have a permit system for any new major emitting facility relating to the provision of Part C (Prevention of Significant Deterioration (PSD)) and Part D (Nonattainment areas) of the Act. The 1990 Clean Air Act Amendments lowered the major source threshold for nonattainment areas with more serious nonattainment problems.

In most agencies, the administration of the permit system is in the hands of the professionally trained engineers. They are responsible for evaluating applications for permits, making calculations necessary for determining probability of compliance with air pollution laws and making decisions on the approval or denial of permits. Once a permit has been granted, it is the duty of the inspector to maintain assurance that the applicant is complying with all the requirements of the permit document.

For sources not requiring federal permit, some agencies use "registration" instead of "permits." Some use state permits for all but minor sources, and "registration" for the minor sources (say, less than 10 tons/year potential). Registration processing is similar to permit processing, except preconstruction review and approval is usually not required.

The permit and registration systems aid enforcement and may also aid the applicant by: (a) providing for engineering review prior to construction, so that any necessary changes can be made with less cost than after construction begins (not applicable to registration); (b) preventing construction before it starts if the new source does not comply in all respects; (c) requiring, if needed, that the permit documents highlight parameters which are important to proper functioning of the control equipment; (d) insuring that required emission monitors will be installed; (e) requiring, in some cases, that the permit document include an operations and maintenance program; (f) denying operating permits if inspection or tests show noncompliance, so the source cannot legally operate until it is in compliance; (g) giving notice of change when adding, modifying or deleting sources; (h) keeping the emission inventory up to date; and (i) acting as a good continuing training program by having the inspector do the permit inspections, allowing a view of the equipment as it is being constructed.

Cyclic Operating Permits

Requiring sources to file applications for renewal of their operating permit on a regular time cycle is a strong enforcement tool. The purpose is to set up a scheduled review of all sources and reissue or deny an operating permit where compliance or noncompliance is the result of the evaluation process. Cyclic operating permits aid enforcement by:

a. Subjecting sources to periodic review.

b. Allowing the denial of an operating permit, making operation of a source a violation.

c. Providing a periodic update of the original permit documents regarding ownership change, process change, materials change, etc.

d. Providing a systematic check of compliance status by:

- Observing visible emissions.

·Inspecting emission monitors and control device instrumentation.
·Reviewing recorded emissions data.
·Inspecting control devices for good operating and maintenance procedures.

e. Updating the emission inventory.

f. Exposing plant personnel to the presence of inspector and the importance of operating in compliance.

Compliance Plan Enforcement

The purpose of a compliance plan inspection is to inspect progress toward specific milestones of a compliance plan, administrative order, court order or Section 113(d) delayed compliance order. Many agencies will formalize administrative orders into negotiated compliance plans. Compliance plans may also be generated in cases brought before a hearing board or into a court of law. Once such plans are negotiated or directed, their implementation is subject to verification by onsite inspection.

The most important parts of the compliance plan are the scheduled tasks and their completion dates, entered into the plan as recognizable milestones indicating progress toward the ultimate compliance status. The compliance plan should always include a specified penalty for failure to meet the various completion dates. A compliance plan for the construction or modification of a major facility would include the following milestones:

a. Engineering study, pilot studies and source testing to generate process and emission data, and cost estimates.

b. Approval of funds by management (Board of Directors).

c. Completion of final design, bids taken and best proposal selected.

d. Approval of APC Agency. Construction permit secured.

e. Order placed for equipment.

f. Delivery of equipment.

g. Installation and system start-up.

h. Source test for compliance.

i. Operating permit secured.

A well-monitored compliance plan materially benefits enforcement efforts because:

- ·Time slippage can be spotted and action taken to increase the speed of the compliance program.
- ·Valuable time is saved in generating legal compulsion if there is no action or gross deviation from the time schedule.
- ·Penalties for noncompliance are apparent to the source.

Surveillance and Complaint Response

Surveillance is accomplished by a systematic program of looking for observable violations within the inspector's assigned district. Observations are made from outside the source boundary and are either on a random basis or according to a schedule by time or source class. Surveillance should be around-the-clock where conditions and agency personnel permit and should include unannounced onsite inspections.

Response to citizen complaint is a significant part of the inspector's job. A complaint can involve a specific violation such as visible emission, or it can and often does relate to nuisance. Complaint management will be covered in Chapter 11.

Enforcement Actions

All sources are not always in or out of compliance now and forevermore. Compliance status can fall into one of three categories:

a. *Continuing compliance*--the source is equipped and will operate continuously with great assurance that it will be within the regulations. Requires minimal surveillance--a good source.

b. *Functional compliance*--a marginal source in compliance at time of observation or inspection, but little assurance of long term compliance.

c. *Noncompliance*--violating conditions supported by valid evidence justifying enforcement action.

Enforcement action must be taken whenever the inspector establishes the facts and gathers evidence to prove the occurrence of a violation of the rules and regulations, a permit to construct or operate, or the terms and conditions of an order or compliance plan.

The objective of enforcement is to bring all sources which are in violation into a continuing compliance status as soon as possible. Enforcement alternatives range from voluntary compliance upon specific notice to comply to "file legal action first and talk later." Most agencies operate somewhere in between, depending on the circumstances of the violation, the agency resources, the specifics of the statutes, and the availability and effectiveness of legal assistance including the judicial processes of the area. Alternative enforcement procedures include:

a. Notice of violation with administrative orders to correct. Used for first offenders and for relatively new requirements.

b. Administrative conference or hearing leading to a formal administrative abatement order and an agreed-to compliance schedule.

c. Citations which are paid without court appearance, similar to traffic tickets.

d. Administratively imposed penalties according to a schedule of fines.

e. Civil or criminal suits leading to imposition of fines and other punishments and/or judicial orders incorporating specific compliance plans.

f. Court ordered injunctions to stop the violating practice.

g. Administrative revoking of permits to construct or permits to operate, making further work or operation unlawful.

Enforcement Policy

In a preceding section, seven enforcement mechanisms available to an agency were given. An agency's choices of enforcement action and notification methods are handed down to field personnel as a policy of enforcement. Agencies nearly always have more than one inspector and some may have as many as 20 or 30 enforcing the same regulations. Only by having a clearly defined enforcement policy or an established set of enforcement procedures will inspectors working in the field have the guidance to react to like situations uniformly. Once established, the enforcement policy and procedures are communicated to the field officers by:

·written directives.
·verbal instruction from supervisors.
·meetings of inspectors with supervisors.
·word of mouth from other inspectors
·distribution of case summaries.

References

Gruber, C.W., and P.M. Giblin, "Air Pollution Field Enforcement: Student Manual", EPA 450/2-80-075, March 1980.

Sullivan, T.F.P., "Environmental Law Handbook, Fifteenth Edition ", Government Institute, Rockville Maryland, 1999

Chapter 4
Off-Site Surveillance

Goal

The purpose of this lesson is to bring into focus that element of the enforcement program which seeks out violating conditions by Level 1 surveillance of a district, a limited area or a specific source using visual, instrumental or effects indicators. The elements needed to establish a violation and how they apply to opacity surveillance are included.

Objectives

At the end of this lesson, the student should be able to:

1. Explain the system of levels used in categorizing source inspections.
2. State at least five violating conditions sought out during Level 1 surveillance.
3. Explain three ways surveillance is exercised.
4. State at least five questions to be answered to prove a violation.
5. Identify the point of observation of a plume for visible emission evaluation.
6. Differentiate between water vapor and particulate opacity.
7. Demonstrate how to properly document a visible emission violation.
8. Explain the meaning of certified smoke reader.
9. Define opacity.
10. From a set of opacity readings and a given regulation, determine compliance or violation.
11. Identify three other off-site surveillance techniques.

Introduction

The efforts involved in inspecting air pollution sources are generally categorized according to a system of "levels", as follows:

Level 1	Visual evaluation of stack opacity and fugitive emissions from off the plant site.
Level 2	On-site evaluation of the control system, relying on plant instruments for the values of any inspection parameters.
Level 3	Similar to Level 2, but relying on measurements by the inspector to determine missing or inaccurate inspection parameters.
Level 4	Similar to Level 3, but including the development of a process flowchart, determination of measurement port locations and evaluation of safety hazards and protective equipment needs. If the process or control equipment do not change, this level of inspection would only be conducted once.

The inspection level that is actually utilized is dictated by the individual situation and based on the judgement of the inspector. For example, if a Level 1 inspection indicates no problems, the inspector may elect to terminate the inspection and proceed to another facility. Or, if in the course of a Level 2 inspection, critical information is needed to complete the evaluation, the inspector may elect to proceed to Level 3, making on-site measurements to obtain the data.

This chapter deals with procedures for that element of the enforcement program that seeks out violating conditions by off-site or Level 1 surveillance. Usually this involves sensory perceptions; however, special purpose surveillance may also include the use of sampling instruments. In the next chapter, procedures involved in conducting effective Level 2 and 3 inspections will be discussed.

Surveillance Principles

Surveillance is a field operation which provides for the observation and detection by sensory perception of events which in themselves are violations or which strongly indicate noncompliance conditions within a source facility. Surveillance is carried out by: (1) systematic observation of the activity in an assigned district; (2) observation of a single source prior to entering the facility for inspection; and (3) by monitoring an area with instruments or procedures that produce quantitative or qualitative data.

In both general and pre-inspection surveillance, the following are some of the observable manifestations that are sought and recorded:

a. Plumes of readable opacity.

b. Fugitive emissions from source operations.

c. Large particle fallout.

d. Evidence of plant damage.

e. Obnoxious odors, especially if citizen complaint has been received.

f. New facility construction, expansion or modification for which a permit may not have been obtained.

g. Open fires, where prohibited.

h. Change of ownership without new owner obtaining a required certificate of operation.

i. Illegal fuel delivery, where fuel use is regulated.

District Surveillance

District surveillance is carried out by having the inspector spend part of his or her field time "on patrol" or by exercising surveillance when in the field on other assignments, going from job to job. Vehicle patrol is the principle surveillance method. Inspectors drive their vehicles throughout a defined area to observe visible and other evidence of emissions and to detect possible violations of rules and regulations. A few larger agencies assign special enforcement officers in uniform to exercise surveillance and investigate complaints, and some agencies even use aircraft to identify potential violators.

As the inspector becomes familiar with an area, sources requiring the greatest attention and areas of high source density will likely be concentrated on. A checklist of facilities that are currently involved in permit cases, hearing board actions, recurrent violation or complaints provides a useful tool for focusing surveillance activities.

Air pollution conditions can become a problem due to fog and atmospheric stagnation periods, often occurring during the evening and early morning hours. Many nuisance complaints are reported during the evening, since individuals usually wish respite from any form of pollution during their leisure hours. The scheduling and deployment of enforcement personnel to after-hours surveillance will depend on information on complaints, knowledge of the sources in the individual districts and data on hours of operation.

Pre-Inspection Surveillance

Source surveillance is the primary duty of the agency inspector. Activities include checking on construction and operating permits, checking progress on compliance plans and investigating complaints. Prior to entering a source facility, the inspector should conduct a Level 1 visual surveillance, allotting the necessary time to thoroughly check the potential non-conforming activity and to look for other signs which might influence the facility inspection strategy.

A preferred plan is to seek a vantage point where the entire facility can be observed. Since this may be some distance from the source, binoculars will assist in viewing the detail operations and reading signs which might be significant. If a vantage point is not available, drive around the facility to cover as much as can be viewed from the surface. Following the pre-entry surveillance, the inspection plan should be reviewed to include any changes made necessary by what is observed.

Surveillance by Instruments or Effects Indicators

Ambient Sampling

Some air pollution agencies are faced with the necessity of enforcing fence-line standards. The fence-line standard is monitored for compliance by placing samplers upwind and downwind of the source and determining by difference the net contribution of the facility. The most common standard of this type involves total suspended particulate matter (TSP) or PM-10 and its determination by high-volume sampling. The technique could be extended to gaseous pollutants, with detection by direct indicating detector tubes or from laboratory analysis of a collected sample.

Deposition Sampling

Nuisance particulate fallout can be evaluated by deposition sampling. The two more common techniques employed are dust-fall jars and adhesive impactors. A dust-fall jar is any wide-mouth vessel, 4-6 inches in diameter, capable of being placed at a field location. Plastic is preferred, but glass or metal may be required in order to conduct some chemical analyses. A small quantity of non-volatile liquid is sometimes added to prevent re-entrainment. The particle catch is usually evaluated by weighing, but the sample could be subjected to particle counting, particle identification or chemical analysis.

Identifiable wind-blown particles, 20 µm and larger, can be captured on strips of adhesive coated paper wound vertically around a cylinder. Typically, an inverted glass jar is used, held in place by the jar lid fastened to a suitable stand. The exposed sticky surface captures the particles of the sampler face that looks toward the source. The particle catch is evaluated by particle counting and identification.

Remote Sensing

Some plume properties can be determined by sensing from remote locations, usually with lasers. The most common application is the use of LIght Detection and Ranging, or LIDAR, for the remote sensing of opacity (see 40CFR60, Appendix A, Method 9, AM1). Plume opacities of less than 50 percent are determined with 3 percent accuracy using measurements of the amount of light backscattered from back of the plume to that scattered in front.

Lasers can also be used to sense gaseous pollutants. DIfferential Absorption Lidar, or DIAL, determines gas concentration by measuring the differential absorption of two laser beams reflected back to a receiver from the target. Systems include dye lasers for SO_2, O_3 and NO_2; carbon dioxide lasers for O_3 and C_2H_4; helium-neon (He-Ne) laser for CH_4; and tunable diode lasers for a number of gases. Other techniques include passive optical remote senors such as Fourier-transform infrared spectrometers (FTIR), ultraviolet beam correlation Interferometry (UVCI), Tunable Diode Lasers(TDL) correlation spectrometers (COSPEC and GASPEC) and grating spectrometers.

There are a number of potential advantages to optical (which includes laser) remote sensing. Optical sensors can probe difficult to reach areas, such as plumes from smoke stacks. They can measure average concentrations over long paths, making them useful for surveillance of large areas. Also, optical measurements can be made in real time with a response on the order of seconds or minutes. Other advantages are: multi-gas analysis can be performed with a single field spectrum, potential spatial survey monitoring of industrial facilities and coadding of spectra to improve detection capabilities is easily performed. Finally, optical systems can measure reactive gases without depositing them in sampling lines or changing them chemically.

Effects Indicators

A large number of materials react or interact to cause a noticeable change in their appearance or properties. Lead-based paint, for example, is discolored by exposure to H_2S. Also, release of some gases will cause effects in vegetation. Observation of the type, severity and extent of such damage can provide useful information in identifying the nature and source of the pollutants involved. A pictorial atlas titled "Recognition of Air Pollution Injury to Vegetation" was compiled by the Air Pollution Control Associations TR-7 Agricultural Committee in order to determine specific gaseous pollutant damage to a variety of plants and trees .

Enforcement of Visible Emissions Regulations

The term opacity means the degree to which transmitted light is obscured by a plume. Opacity is usually expressed as a percentage of perfect transparency, with 100 percent opacity being opaque. Limitation on opacity is a major part of any enforcement program because it provides a means of assessing particulate emissions by direct reading. The degree of opacity cannot be equated to a mass emission, except for certain sources with very stable plume characteristics. However, opacities exceeding allowable limits usually call into question compliance with the mass emission limit.

There may be occasions when the inspector will have suspicions of a mass emission violation, even though there is no opacity violation. For example, a review of a source's file may indicate that there were no visible emissions during a stack test that barely showed compliance with the mass emission limit. If at a later date a higher, but complying, visible emission is observed, the inspector should suspect that a violation of the mass emission limit is occurring. In this case, another source test could be requested, provided the source has not taken corrective action.

A plume is a contaminant-laden stream exiting from a specific outlet, such as a stack or vent. Referring to Figure 4-1, a plume is characterized by (1) a point of release and formation just at the outlet, or a few feet above in the case of a detached plume; (2) the body or stream of the plume, containing relatively concentrated contaminant levels and confined by the momentum of the escaping gases; and, sometimes, (3) a point at which the plume dissipates.

The point of discharge of the emission, or the point of maximum opacity, is the point at which the opacity is read. The point of dissipation is important in determining whether the plume is a contaminant, water-vapor, steam or some combination. Depending on wind velocity, humidity and temperature, condensed water-vapor or steam may dissipate more rapidly than contaminants contained in the plume. Where most of the emission appears to consist of water-vapor, the opacity is read at the point of dissipation or evaporation.

The most widely use reference method for determining opacity is EPA Method 9, "Visual Determination of Opacity Emissions from Stationary Sources" (40CFR60, Appendix A). A companion document is the EPA publication "Guidelines for the Evaluation of Visible Emissions: Certification, Field Procedures, Legal Aspects and Background Material" (EPA-340/1-75-007). Some state and local jurisdictions may still use the Ringelmann Chart for measuring the densities of dark smokes as shades of gray. One Ringelmann equals 20 percent opacity.

Guidelines for Evaluating Visible Emissions in the Field

This section outlines the steps to be followed to satisfactorily evaluate visible emissions in the field. Recommended guidelines are included for the collection of all information that is necessary to document a violation of the opacity regulation and for use in any subsequent legal proceedings.

Office Preparation

In most instances the inspector will have sufficient notice before making a field inspection to adequately prepare for the visit. Preparation is a very important aspect of the inspector's work. The following items concerning the facility in question should be researched:

a. Plant location.

b. Names and positions of responsible plant contacts (company officers or management personnel).

c. Type and number of processes.

d. Type of process to be observed.

e. Process operating conditions.

f. Type and location of control equipment.

g. Probable location of source emissions.

h. Possible observation sites.

i. Regulations applicable to the source.

j. Status of source with respect to any variance or exemption from the agency's rules and regulations. Observation is not required if the source is on a variance or exempt from the regulations.

k. Involvement of steam plume, if any. Time of observation may need to be adjusted to a time of the day when the steam plume might not be present.

Familiarity with the opacity regulations and the regulation exemptions will help prevent an inspector from documenting what is perceived to be a violation, when in actuality it is not. For example, a regulation might state that, although an opacity greater than 20 percent constitutes a violation, a source may emit visible emissions of 40 percent opacity for 3 minutes out of 60 minutes if it is undergoing process modification, start-up, cleaning, etc.

The recommended procedure is to evaluate the plume opacity in such a way that compliance is not dependent on plant operations. In the previous example, an emission greater than 20 percent for any time period greater than 3 minutes would constitute a violation, and the observation strategy could be adjusted to account for this. In this way the investigator knows that a documented and enforceable violation has occurred, without having to fear the company reporting at a later date that the reading cannot be utilized because the plant was undergoing a process change at the time of the visible emission evaluation.

Field Equipment

The following equipment should be available for use by the inspector:

a. Safety equipment.

b. Stopwatch.

c. Clipboard, note pad and at least two pens (pencils must not be used for recording opacity readings).

d. Compass.

e. Air velocity meter.

f. Range finder.

g. Psychrometer.

h. Binoculars.

i. Camera.

j. Topographic maps.

k. Necessary forms, including ample spare copies.

l. Pouch to carry the equipment.

In order to insure that it is in good working order, the equipment should be inspected in the office before departing on a field observation.

Observer's Location

The evaluator should select an observation point consistent with the following guidelines (see Figures 4-2 to 4-4):

a. The line of sight from the source to the observer should be unobstructed.

b. The line of sight should be at right angles to the wind direction.

c. The sun should be oriented within a 140° sector to the observer's back.

d. The location should be safe.

e. If the pollutants are emitted at ground level, the observer should be as close to the source as possible.

f. If the pollutants are emitted from an elevated position, the inspector should be at a suitable distance from the source.

g. With good visibility, it is suggested that the observer be within about a quarter of a mile from the source.

h. When visibility is restricted, the observer should be within a distance that is about one-quarter of the visual range.

i. When evaluating emissions from rectangular outlets, the observer should be positioned at right angles to the longer axis of the outlet.

If a position can be selected that is not on company property and that meets all of the above requirements, the inspector may begin the field evaluation of the source. The inspector should not notify company officials that an evaluation is to be conducted.

If the inspector decides that it is not possible to select a suitable point off company property, then the evaluation should be carried out from a location on company property. If the site selected is on company property but is accessible to the public, the inspector may begin the evaluation without notifying company officials. If, however, the site is not accessible to the public, the inspector must obtain permission from a responsible company official to enter the plant. Before notifying the company of the proposed evaluation, it is recommended that the inspector take several opacity readings from the best available site off company property. These preliminary readings can then be used as a comparison between stack emissions before and after company notification. If a noticeable change is observed, the inspector should record this fact.

When it is necessary to enter the plant property in order to make the observations, every attempt should be made to ensure the cooperation of management . Entering a plant, especially for the first time, can present a delicate situation. The following steps are suggested to correctly and courteously enter a facility for the purpose of conducting the evaluation:

a. When entering the plant be prepared to state your name, affiliation and position, and have identification available for presentation.

b. State the nature of your visit and request an interview with a company officer or responsible employee of the company.

c. Describe to the company representative the nature of work or duties you intend to perform on the premises and request their permission to do so.

d. Should you meet with refusal and attempts to discussion the situation are unsuccessful, contact your office for further instructions.

e. Should you be given permission to proceed to a specific area without escort, ask for directions and go there directly.

f. Spend as little time as possible with entrance procedures so as not to become liable to charges of interfering with company work.

g. Do not sign any documents, such as liability waivers or others, that are conditions for you presence on the company premises. Discussion between your supervisor and the plant official are the best means of resolving problems of this nature.

h. Maintain a business-like and cordial relationship with company officials and employees at all times.

i. The inspector should note the length of waiting time, the cooperation and attitude of plant personnel, and any changes in operating conditions which result from his or her presence. The latter may effect the credibility of the inspector's findings should testimony about these conditions be required at a later date.

j. Record the name, title and telephone number of the company official and note the time that the official was informed that an evaluation was to be conducted.

The inspector's ultimate objective is the improvement of the ambient air quality by ensuring that sources emit pollutants in compliance with regulations. This objective can be achieved much more readily with the willing cooperation of the company. The visible emissions evaluation affords the inspector an opportunity to engage in some public relations work. The inspector should therefore endeavor to maintain a polite yet professional attitude while on company premises.

Evaluation Procedures

Once a suitable observation site has been selected, the inspector may begin evaluation of the source, recording all pertinent information on an approved set of forms. Those forms appearing in the Method 9 description are shown in Figures 4-5 and 4-6.

At the present time there are two types of opacity regulations in use. These are based on the following concepts:

a. Opacity is to be averaged over a specified time period--six minutes in the Method 9 procedures--and this average opacity is compared to the regulation limit.

b. There is no need to average the observed opacities--any observed opacity that is greater than the regulation limit constitutes a violation.

Often the opacity regulation will permit the source to emit visible emissions greater that the regulation limit for a specified time interval--typically 3 minutes in any 60 minute period.

The inspector should begin the evaluation by recording the source identification parameters, site location and ambient weather conditions on the observation forms, and by drawing a reasonably detailed sketch. The sketch should include sufficient detail to allow a person who has not visited the facility to determine the source that was evaluated and the location of the observation point. In general , the sketch should depict:

a. Source location.

b. Observer location.

c. Distance from observer to source.

d. North direction.

e. Wind direction (from which the wind is blowing).

f. Sun position.

g. Landmarks and nearby roads or streets.

h. Plume type (looping, coning, fanning, etc.).

i. Distance plume is visible.

An example of a sketch is shown in Figure 4-7.

Plume observations should be made at the point of greatest opacity in that portion of the plume where condensed water vapor is not present. Only one inspector should evaluate a given source during any given period of time. In cases where the source is continually evaluated and re-evaluated over extended periods of time (days or months), it is acceptable, indeed preferable, to have different inspectors perform the evaluations. The observer should not look continuously at the plume, since this can lead to eye fatigue. Instead, the inspector should observe and evaluate the plume momentarily at 15-second intervals.

When condensed water-vapor is present in the plume as it exits from the outlet, opacity observations should be made beyond the point at which the condensed water-vapor is no longer visible.. The observer should record the approximate distance from the emission outlet to the point in the plume at which the observations are made. When water-vapor in the plume condenses and becomes visible at a distinct distance from the emission outlet, the opacity should be evaluated at the outlet prior to condensation of the water-vapor and formation of the steam plume.

In order to meet the requirements of Method 9, the required number of readings is as follows:

a. In all cases, a minimum of 24 readings, corresponding to 6 minutes of observation, must be taken.

b. In cases where the regulation permits an exemption period for excess emissions, a minimum of 24 observations must be recorded <u>over and above</u> the number of readings equal to the permissible exemption period. For example, if the regulation permits 3 minutes of excess emissions in any hour, a minimum of 12 readings (3 minutes) plus 24 readings (6 minutes) must be recorded.

While it is a simple matter to establish the minimum number of readings necessary to meet the requirements of Method 9, it is not a simple matter to establish the number of readings necessary to document an enforceable violation of the opacity regulations. Whether there is sufficient proof that a violation did occur will depend on the amount of evidence collected in the field. The more readings above the limit that are observed, the stronger will be the case if the results are used as evidence at any subsequent legal proceedings. Some guidelines to aid in this matter are as follows:

a. In most cases, the amount of evidence that should be regarded as the minimum necessary to document an enforceable violation would consist of at least one set of 24 readings with an average opacity at least 10 percent above the limit.

b. Concerning regulations based on actual opacity instead of average opacity, it is recommended that before legal proceedings are initiated, the observed opacity should exceed the limit by at least 10 percent for at least three minutes in any hour. This is in addition to any exemption time period that may be permitted for excess emissions.

c. Weather conditions during the observation period should be taken into account when considering the number of observations and the degree of excess emissions needed to document a violation. Test conducted by EPA indicate that the possibility of a positive bias is greatest when a contrasting background is used (i.e., white plume with a blue sky). In a similar manner, when a non-contrasting background is used the possibility of a negative bias is greatest. In fact, the test results indicate that the chance for positive error in reading opacity of white plumes is essentially non-existent when a non-contrasting background is present.

d. The actual opacity of emissions from the source can be used as a further guideline in determining the number of readings that are necessary. For example, if the regulation limit is 20 percent and the opacity of an emission is 100 percent, an observation time of six minutes in excess of any exemption period should be sufficient evidence to ensure that a violation could be enforced. If, however, the opacity averages about 30 percent, considerably more readings would be necessary.

Opacity is usually determined as an average of all readings taken over a time period corresponding to the applicable standard. For example, for a six-minute standard, the opacity is defined as the average of a set of any 24 consecutive readings taken at 15 second intervals. The recorded observations are divided into sets of 24 consecutive readings, and the average opacity for each set is determined. The sets need not be consecutive in time, but in no case should two sets overlap.

<u>Documentation of a Violation</u>

Much of the time spent by enforcement personnel will be in the collection and reporting of data and evidence. In fact, most of the data collected by such personnel are of an evidentiary nature. Whether such data are used in a emission inventory or in the prosecution of a violation, they will consist for the most part of facts and findings acquired through direct observation. They should be stated in such a manner as to be clear, concise and free of prejudices and other subjective factors.

To provide sufficient basis for court prosecution in a criminal case, each element of the crime (in legal terminology, the *corpus delicti*) must be proved. To do so, the enforcement office or other principal witnesses must gather the evidence for a *prima facie* case, i.e., a case which at first view shows guilt and which, unless rebutted, adds up to the commission of a violation of a rule or regulation. In a criminal court case, the burden of proof of rebuttal is placed on the defendant, after such evidence has been presented by the plaintiff, usually the people of the state.

If any element of the case is missing, the *corpus delicti* is not established and there is no case. Thus, if the rule alleged to have been violated is the prohibition that "a person shall not discharge into the atmosphere from any single source...any air contaminant" of any particular quality or quantity for more than the maximum permissible time period, it must be proved that: (1) a person, (2) discharged, (3) into the atmosphere, (4) from a single source, (5) a contaminant, (6) of the quality prescribed (opacity), (7) for more than the time specified.

The evidence needed in court in order to establish a violation should be documented in carefully prepared reports. The information most commonly required is as follows:

a. The nature and extent of the violation.

b. The time and location of the violation.

c. The person(s) responsible for the violation.

d. The equipment involved in the violation.

e. The operational, design or maintenance factors which caused the violation.

The specific evidence documented during a visible emission observation is as follows:

a. Name of the source and its location, given as a street address or with respect to fixed point such as an intersection.

b. The beginning and ending time of the observation period.

c. The degree of opacity recorded for each 15 second period.

d. Orientation of the observer, the sun and the emission point--explain if circumstances do not permit the required sun orientation at the rear of the observer.

e. Estimate of distance from the observer to the emission point--note that line of sight was clear, or explain if it was otherwise.

f. Approximate wind direction and estimate of wind speed.

g. Temperature and humidity, especially if a wet plume is involved.

h. Description of the sky, if used as background--color and presence of clouds, especially if plume is white or gray.

i. Background and its color, if other than the sky.

j. Color of the emission.

k. Name and title of observer.

The types of evidence used in court cases or administrative hearings include: (1) testimonial evidence, that is, direct testimony by witnesses; (2) demonstrative evidence, or physical evidence used to support the testimonial evidence; and, (3) evidence presented by expert witnesses.

The inspector will be most concerned with the presentation of testimonial evidence regarding observations made. Examples include observations on visible emissions, on odors, on presence or status of construction, on items of equipment, on process or operational conditions and on conditions under which samples were obtained. Testimony will also include direct statements made to the inspector by operators of equipment and plant owners or by complainants, and records of such external factors as atmospheric and weather conditions, including temperature, relative humidity, sky condition, visibility, lighting, and wind speed and direction.

Demonstrative evidence is almost any physical evidence used to support direct testimony. It may include damaged property or vegetation, samples of fuel or process materials, records of analyses and photographs. In some cases the inspector will be called on to interpret demonstrative evidence, such as photographs, but in many cases this type of evidence needs description or interpretation by an expert. Damaged materials or vegetation samples may often be brought directly into the courtroom, provided the specimen is small enough to be transported and the damage pattern is not altered or disturbed. In some cases, test specimens may be placed in a pre-planned pattern around the suspected source and retrieved for laboratory examination after a suitable time for exposure. Specimens could include test fabrics of differing material and dyestuffs, metal plates and greased slides or plates.

Test data may include reports of source analyses, ambient sampling conducted in the vicinity of a source and on materials charged to the process in question. Source tests may range from rather simple tests for solid particles at a single discharge to complex multi-point sampling for a variety of particles, gaseous contaminants and ancillary data such as gas composition, temperature and moisture content. Environmental sampling data collected in the vicinity of a source may include reports of analyses from manually operated sampling devices or recorder charts or electronically stored data from continuous analyzers. Recorded data which can be correlated with the time of complaints and with meteorological data, such as wind speed and direction and atmospheric stability, can be very useful. Analyses conducted on process material or fuels might include sulfur and ash content, particle size distribution and feed material composition.

Photographic evidence is usually used to give a graphic illustration of descriptions presented in direct testimony. Examples might include still or motion pictures of visible stack emissions; photographs showing the construction status of equipment, illustrating the condition of control devices or showing the effectiveness of fume-hood collection; pictures of damaged materials, and photomicrographs of fine particulate matter.

The Inspector as an Expert Witness

The primary evidence of an opacity violation is the direct testimony of an expert trained in reading opacity. The way an inspector qualifies as an expert witness is to become certified by attending "smoke school". Certification is accomplished by reading a series of black and white smokes to a specified degree of accuracy, as determined by a calibrated transmissometer. The method of qualifying and the required accuracy for certification is given in 40CFR60, Appendix A, Method 9.

References

Gruber, C.W., and P.M. Giblin, "Air Pollution Field Enforcement: Student Manual", EPA 50/2-80-075, March 1980.

USEPA, "Basic Inspector Training Course: Fundamentals of Environmental Compliance Inspections", Office of Enforcement and Compliance Monitoring, February 1989.

USEPA, "Visual Determination of the Opacity of Emissions from Stationary Sources",40CFR60, Appendix A, Method 9.

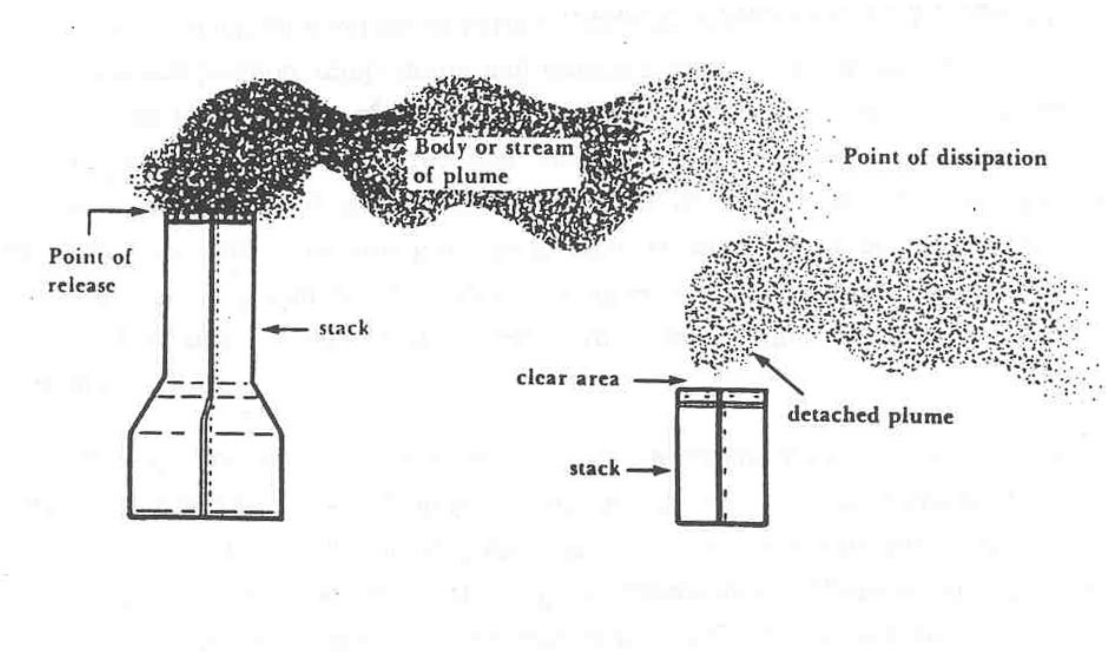


Figure 4-1. General structure of continuous and detached plumes.

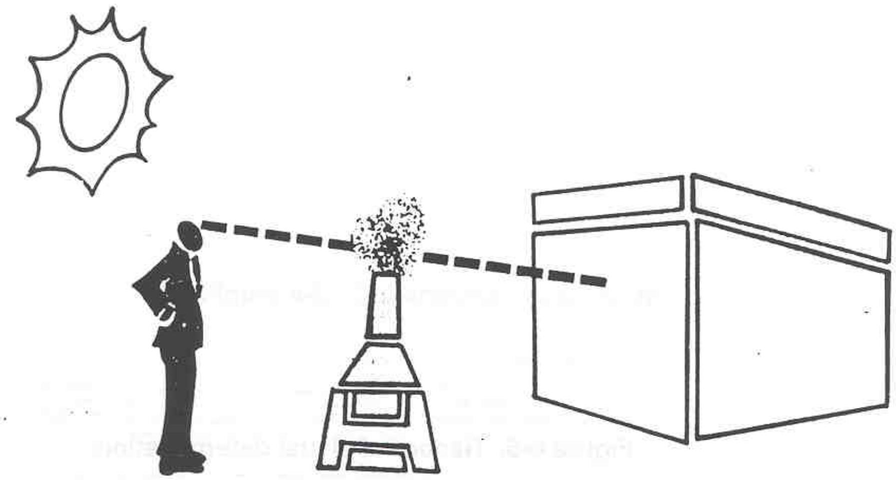


Figure 4-2. Light source should emanate from the rear of the observer during daylight hours (reflected light).

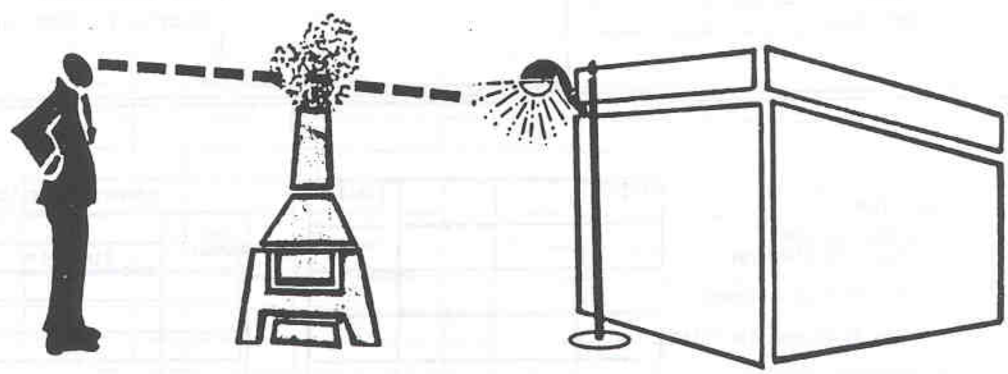


Figure 4-3. During darkness, the light source should emanate from behind the plume, opposite the observer (transmitted light).

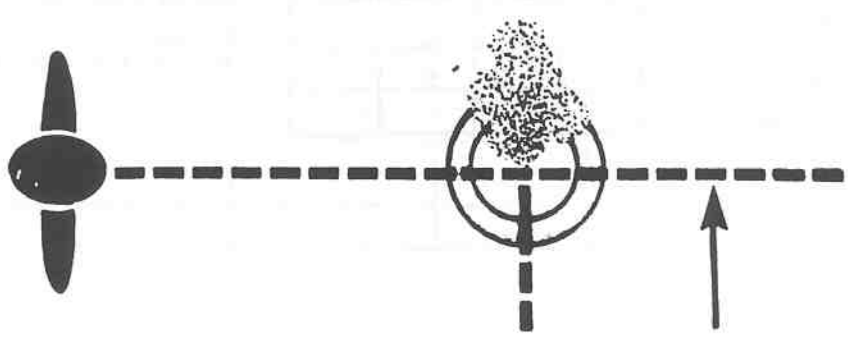


Figure 4-4. Readings should be made at right angles to wind direction and from any distance necessary to obtain a clear view of stack and background.

Figure 4-5. Record of visual determination.

PAGE___ of___

COMPANY_______________
LOCATION_______________
TEST NUMBER_______________
DATE_______________
TYPE FACILITY_______________
CONTROL DEVICE_______________

HOURS OF OBSERVATION_______________
OBSERVER_______________
OBSERVER CERTIFICATION DATE_______________
OBSERVER AFFILIATION_______________
POINT OF EMISSIONS_______________
HEIGHT OF DISCHARGE POINT_______________

	Initial			Final
CLOCK TIME				
OBSERVER LOCATION Distance to Discharge				
Direction from Discharge				
Height of Observation Point				
BACKGROUND DESCRIPTION				
WEATHER CONDITIONS Wind Direction				
Wind Speed				
Ambient Temperature				
SKY CONDITIONS (clear, overcast, % clouds, etc.)				
PLUME DESCRIPTION Color				
Distance Visible				
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time	Opacity	
	Start--End	Sum	Average

Readings ranged from ____ to ____ % opacity

The source was/was not in compliance with ____ at the time evaluation was made.

Figure 4-6. Observation record form.

Page —— of ——

Company ....
Location ....
Test Number ....
Date ....

Observer ....
Type facility ....
Point of emissions ....

Hr.	Min.	Seconds				Steam plume (check if applicable)		Comments
		0	15	30	45	Attached	Detached	
	0							
	1							
	2							
	3							
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							
	21							
	22							
	23							
	24							
	25							
	26							
	27							
	28							
	29							

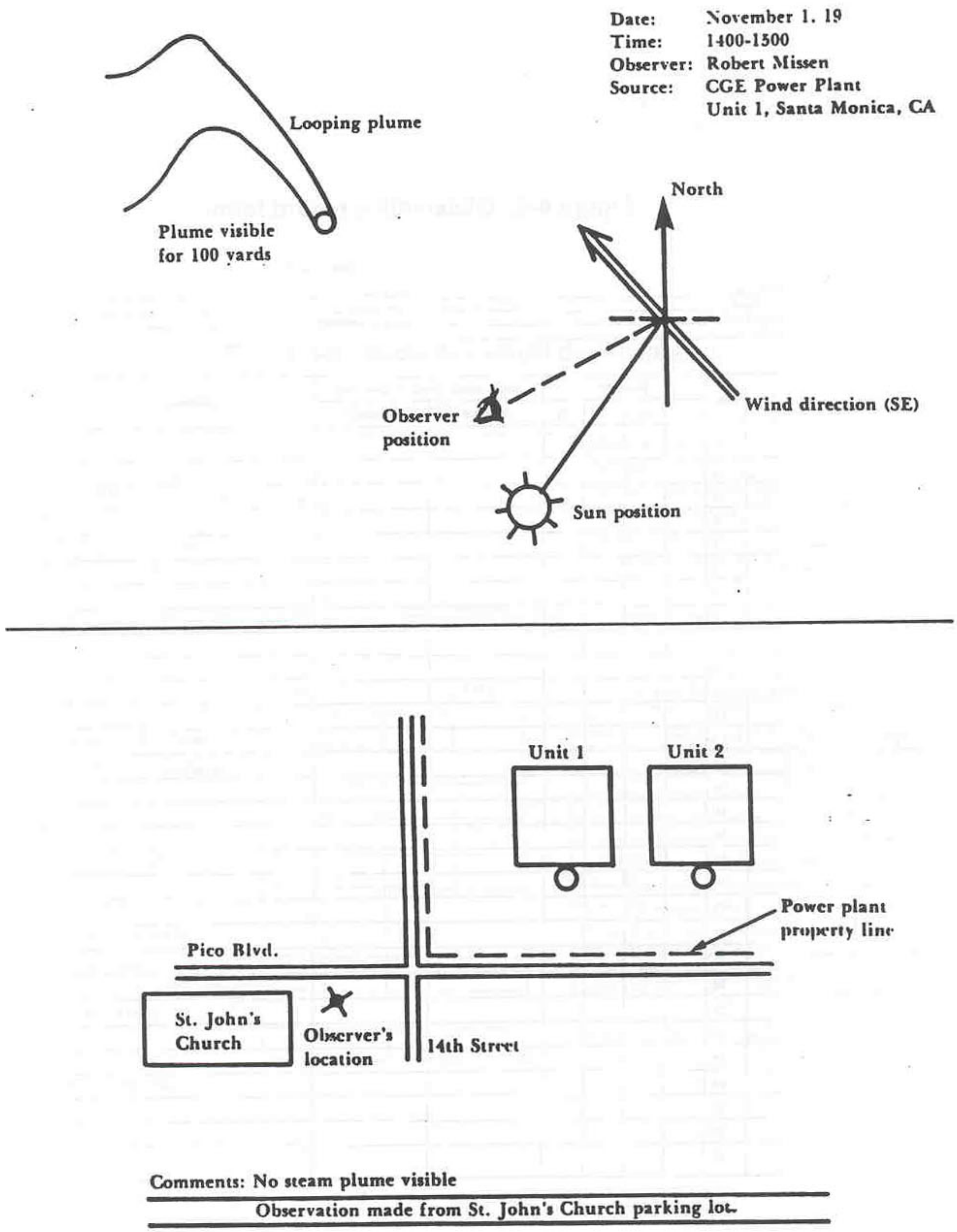


Figure 4-7. Field sketch.

Chapter 5
On-Site Inspection of Sources

Goal

The purpose of this lesson is to outline a procedural methodology for conducting on-site Level 2 and 3 inspections of sources. Techniques for handling confidential data and maintaining chain of custody are also discussed.

Objectives

At the end of this lesson, the student should be able to:

1. Define on-site inspection

2. Identify the types of inspections and the purposes for which each are made

3. Explain each of the elements in the inspection process:

    - Pre-inspection preparation
    - Pre-entry observations
    - Entry
    - Opening conference
    - Inspection documentation
    - Closing conference
    - File update and report preparation

4. Explain how to handle confidential information

5. Explain how to maintain chain of custody documentation

Introduction

The purpose of this chapter is to describe the basic principles employed in inspecting a source to develop facts needed to determine compliance or non-compliance with a rule or regulation. The methods of obtaining information, making inspections of equipment, gathering data and handling confidential information are presented, along with a discussion of the decision making process and the preparation of the inspection report.

Types of Inspections

Level 2 and 3 inspections of an air pollution emission source involve entering a facility for the purpose of obtaining information or collecting evidence. An inspection may be conducted as a result of a violation observed from an off-site Level 1 inspection; as a follow-up to a previous inspection; to check on equipment for a construction or operating permit; to determine the status of a compliance plan; or as the result of a complaint.

Many inspections are conducted for a single purpose, such as checking to see whether construction is continuing after a permit application has been denied. Other inspections are comprehensive, gathering information on all equipment and processes located within the facility. The type of inspection relates to the reason for which the inspection is made. The following terminology is assigned for ease of communication.

Facility Inspection

The facility inspection is a comprehensive inspection made of all the equipment and processes at one source premises. A source premises is one geographical location and may include one or more structures or operating areas. The emission points may be single or multiple, with sources numbering in the hundreds for large industrial complexes such as refineries, chemical plants, steel mills, etc. In some cases, a single complex source premises may be subdivided into areas, each of which becomes a facility (e.g., the furnace shop of a steel mill).

Facility inspections are sometimes referred to as plant inspections, source inspections, annual inspections, inventory inspections and scheduled inspections. While terminology and procedures may vary among control agencies, all inspections of this type are concerned with accounting for all possible sources of air pollution located at a facility and with assessing the compliance or non-compliance of all elements within the facility. In general, these inspections will fall into one of three categories:

a. *Construction permit inspection:* The construction permit inspection is made periodically throughout the construction period, or on completion of construction, to see that the conditions of the issued permit have been met. In complex facilities, such inspections are sometimes made by the agency engineer who granted the permit. In such cases, the inspector should arrange to visit the site with the engineer sometime during the final states of construction to become familiar with the source facility, especially the emission points, the control equipment and the emissions monitoring instrumentation. Permits for initial operation are usually obtained separately, but may be included with the construction permit application. Prior to granting the initial certificate of operation, a source test is usually required. The inspector or the permit engineer or both are usually present to observe such tests.

b. *Cyclic inspections:* Cyclic operating permits are required where the facility, following construction, is granted a time limited operating permit. Periodically, an inspection of the entire source premises or some designated facility within a complex is required to ascertain compliance and qualification for operating permit renewal.

c. *Compliance plan inspections:* The compliance plan inspection applies to those sources which are operating under an order that includes a schedule of milestones indicating progress in the ultimate correction of a violation condition. Inspection is limited to the particular process, and site visits are made to determine if the time schedule set down in the plan is being met.

Violation Inspection

A violation inspection is made to gather facts related to a violation observed as a result of off-site surveillance. The investigation is usually limited to the process associated with the recorded violation; however, it may be extended to other areas of the facility if non-conforming conditions are observed.

Complaint Inspections

Site visits are often made to investigate citizen complaints. Specific regulations may be involved if pre-entry observation shows violating conditions.

Inspections Relating to Emergencies

Emergencies are of two types: (1) local emergencies--incidents involving the release of contaminants that may be toxic or have the potential for other undesirable health or environmental effects, and (2) air pollution episodes in which the buildup of contaminants in the atmosphere approaches or exceeds pre-determined alert stages and which may necessitate the curtailment or shutdown of source activities on a large scale. These conditions will require swift response on the part of enforcement officers and performance of special inspections.

Elements of the Inspection Process

This section describes the procedures common to most air compliance inspections. In general, these procedures can be organized according to the time they occur in the inspection process: (1) pre-inspection preparation, (2) pre-entry observations, (3) entry, (4) opening conference, (5) inspection documentation, (6) closing conference, and (7) file update and report preparation.

Pre-Inspection Preparation

Pre-inspection preparation is necessary to ensure effective use of the inspector's and the facility's time, and to ensure that the inspection is properly focused. Central to this preparation is a review of the available background information on the facility to be inspected. This review should enable the inspector to become familiar with the facility's process and emission characteristics, allowing the inspection to be conducted in a timely manner and minimizing inconvenience to the facility. The following types of information should be reviewed:

a. Basic facility information.

- Names, titles and phone numbers of facility contacts.
- Maps showing facility location and locations of areas potentially impacted by emissions.
- Process and production information.
- Flowsheets identifying sources, control devices, monitors, etc.
- Potential safety hazards and safety equipment requirements.

b. Pollution control and other relevant equipment data.

- Description and design data for control devices and relevant process equipment.
- Sources and characterization of emissions.
- Continuous emission monitoring system(s) data.
- Previous inspection information and reports.

- Baseline performance data for control equipment.

c. Regulations, requirements and limitations.

- Most recent permits for facility.
- Applicable Federal, State and local regulations and requirements.
- Special exemptions and waivers.
- Acceptable operating conditions.

d. Facility compliance and enforcement history.

- Complaint history, including reports, follow-ups, findings and remedial actions.
- Past conditions of non-compliance.
- Previous enforcement actions.
- Pending enforcement actions, compliance schedules and variances.
- Self-monitoring data and reports.

The next step in the pre-inspection preparation is the development of an inspection plan. This plan should address the following items:

a. *Inspection objectives:* Identify the precise purpose of the inspection in terms of what it will accomplish.

b. *Tasks:* Decide on the specific tasks which will accomplish the inspection objectives, including the exact information which must be collected.

c. *Procedures:* Determine the procedures to be used in completing the tasks, particularly special or unfamiliar procedures.

d. *Resources:* Determine what equipment and personnel will be required.

e. *Schedule:* Estimate the time requirements for the inspection and determine a reasonable time for it to begin (usually when the plant is operating at representative conditions).

Obtaining and preparing inspection and safety equipment is another important part of pre-inspection preparation. The type of equipment will vary depending on the inspection objectives, the level of the inspection, and the process, control equipment and safety requirements of the facility; however, a general list of recommended equipment is provided in Table 5-1. All equipment should be checked, calibrated and tested before use.

In addition to equipment preparation, the inspector must consider what written materials, forms, documents, etc., will be required during the inspection. These materials may include any or all of the following:

a. Maps

b. Flowcharts

c. Plant layout

d. Applicable regulations

e. Inspection checklists

f. Field notebook

g. Reference materials

h. Visible emission observation forms

i. Inspection plan or agenda

j. Credentials

k. Facility information

l. Baseline data

The last item that must be considered is whether the inspection is to be announced or unannounced. The advantages of the unannounced inspection are: (1) the opportunity to observe the source under normal operating conditions; (2) detection of visible emissions and O&M-type problems and violations; (3) creation of an increased level of attention by a source to its compliance status; and (4) projection of a serious attitude toward surveillance by the agency. The most significant negative aspect of performing an unannounced inspection is that the source may not be operating at desired levels or key plant personnel may not be available. An alternative to the unannounced inspection is to contact the source shortly before the scheduled inspection time.

Pre-Entry Observations

Two types of observations conducted prior to plant entry have been found valuable in determination of facility compliance. These are observation of the plant surroundings and the visible emission observation. Observations of areas surrounding the plant and visible emission observations from outside the plant may reveal a variety of signs of operational practices and pollutant emissions which can aid in pre-entry evaluation.

Entry

This section details accepted procedures for entry into a facility to conduct an on-site inspection. It does not cover procedures for obtaining an inspection warrant in the case of refusal of entry, since refusal is not prevalent.

Arrival at the facility must be during normal working hours. Entry through the main gate is recommended unless the inspector has been previously instructed otherwise. Upon arrival, the inspector should locate a responsible plant official, usually the plant owner, manager or chief environmental engineer. In the case of an announced inspection this person would most probably be the official to whom notification was made. The inspector should note the name and title of this plant representative.

Upon meeting the appropriate plan officials, the inspector should introduce herself or himself, present the official with proper credentials and state the reason for requesting entry. Credentials vary with each agency, but most include the inspector's photograph, signature, physical description, and the authority for the inspection. Credentials should be presented whether identification is requested or not. After plant officials have examined the credentials, they may wish to telephone the agency to verify the inspector's identity. Credentials should never leave the sight of the inspector.

Consent to inspect the premises must be given by the owner or operator or their representative at the time of the inspection. Express consent is not necessary. As long as the inspector is allowed to enter, entry is considered voluntary and consensual. If there is difficulty in gaining consent to enter, the inspector should tactfully probe the reasons and work with officials to overcome the obstacles. Care should be taken to avoid threats, inflammatory discussions, or deepening of misunderstandings. Whenever the situation is beyond the authority or control of the inspector, their supervisor should be contacted for guidance.

When the facility provides a sign-in sheet, log or visitor register, it is acceptable for inspectors to sign it. However, under no circumstances should an inspector sign any type of waiver that would relieve the facility of responsibility for injury or which would limit the rights of the agency to use data obtained from the facility. Likewise, an inspector should not sign non-disclosure agreements, since regulations on confidentiality of business information already protect the facility. If such a waiver or release is presented, the inspector should politely explain that they cannot sign it. If entry is refused because of this, the inspector should leave the facility and immediately report the pertinent facts to their supervisor. All events surrounding the refused entry should be fully documented.

If the plant official asks the inspector to leave the premises after the inspection has begun, the inspector should first try to resolve the problem and continue with the inspection. If resolution is not possible, the inspector should leave the facility and notify their supervisor. If the inspector is denied access only to certain parts of the facility, the inspection should be completed to the extent allowed. The inspector should note those areas to which entry was denied and the reasons for denial. After leaving the facility, the inspector should contact their supervisor for further instructions.

Opening Conference

Once legal entry has been established, the inspector should proceed with a vital part of every inspection, the opening conference. The purpose of this meeting is to inform the plant official(s) of the purpose of the inspection, the authority under which it will be conducted, and the procedures to be followed. The opening conference also provides an opportunity to strengthen agency-source relationships through a positive attitude and helpful assistance. Effective execution of the opening conference often facilitates the remainder of the inspection.

During the opening conference, the inspector is responsible for covering the following items:

a. *Inspection objectives:* An outline of inspection objectives will inform plant official of the purpose and scope of the inspection and may help avoid misunderstandings.

b. *Inspection agenda:* Discussion of the sequence and content of the inspection, including operations and control equipment to be inspected and their current operating status. The types of measurements to be made and the samples to be collected should also be addressed.

c. *Facility information verification:* The inspector should verify or collect the following information:

- Name and address of the facility.
- Names and telephone numbers of plant contacts.
- Principal product(s) and production rates(s)
- Type and location of emission sources.

d. *List of records:* A list of records to be inspected will allow officials to gather and make them available.

e. *Accompaniment:* It is imperative that a facility official accompany the inspector during the inspection, not only to describe the plant and its principal operating characteristics, but also to identify confidential data and for safety and liability considerations.

f. *Safety requirements:* The inspector should determine what facility safety regulations, including safety equipment requirements, will be involved and should be prepared to meet these requirements. The inspector should also inquire about emergency warning signals and procedures.

g. *Meeting schedules:* A schedule of needed meetings with key personnel will allow them to allocate time to spend with the inspector.

h. *Closing conference:* A post-inspection meeting should be scheduled with the appropriate officials to provide a final opportunity to gather information, answer questions, and make confidentiality declarations.

i. *New requirements:* The inspector should discuss any new rules and regulations that might affect the facility and answer questions pertaining to them. If the inspector is aware of proposed rules that might affect the facility, the facility could be encouraged to obtain a copy.

j. *Duplicate samples:* Facility officials should be informed of their right to receive a duplicate of any physical sample collected for laboratory analysis or to conduct simultaneous measurements.

k. *Confidentiality claims:* Company officials should be advised of their right to request confidential treatment of trade secret information.

l. *Photographs:* The inspector should request permission to take photographs during the inspection.

Inspection Documentation

Taking physical samples, reviewing records and documenting facility operations are the methods used by the inspector to develop the documentary support required to accomplish inspection objectives. The documentation from the inspection establishes the actual conditions existing at the time of the inspection, so that the evidence may be objectively examined at some later time.

Types of documentation include the field notebook, field notes and checklists, visible emission observation forms, drawings, flowsheets, maps, laboratory analyses, chain of custody records, statements, copies of records, printed matter and photographs. Since any documentation gathered or produced in the course of the inspection process may eventually become part of an enforcement proceeding, it is the inspector's responsibility to ensure that it can pass legal scrutiny.

Field Notebook

The core of all documentation relating to an inspection is the field notebook. Since the inspector may eventually be called upon to testify in an enforcement proceeding, detailed records of inspections, investigations, samples collected, and related inspection functions must be kept. The types of information that should be entered into the field notebook include:

a. *Observations:* All conditions, practices and other observations relevant to the inspection objectives or that will contribute to valid evidence should be recorded.

b. *Procedures:* Inspectors should list or reference all procedures followed during the inspection, such as those for entry, sampling, records inspection and document preparation. Such information could help avoid damage to case proceedings on procedural grounds.

c. *Unusual conditions or problems:* Unusual conditions and problems should be recorded and described in detail.

d. *Documents and photographs:* All documents taken or prepared by the inspector should be noted and related to specific inspection activities.

e. *General information:* Names and titles of facility personnel and the activities they perform should be listed, along with other general information. Pertinent statements made by these people should be recorded. Information about a facility's record-keeping procedures may be useful in later inspections.

The field notebook forms the basis for both the inspection report and the evidence package and should contain only facts and pertinent observations. Language should be objective, factual, and free of personal feeling or terminology that might prove inappropriate. The field notebook is part of the agency's files and should not be considered the personal property of the inspector, although copies may be made for the inspector's working file.

Visible Emission Observation Form

Since visible emission observations are such a frequently used enforcement tool, a separate form is typically used for data recording. This form should be designed to include all supporting documentation necessary for the data to be accepted as evidence of a violation. It is recommended that the inspector utilize such a form, and that an appropriate reference be made to the form in the field notebook.

Samples, Chain of Custody and Laboratory Analyses

Samples are often gathered by inspectors. For the laboratory analysis of a sample to be admissible as evidence, a logical and documented connection must be shown between the samples taken and the analytical results reported. This connection is shown by using chain of custody procedures which serve to document sample integrity from the time the sample was taken until the time it is analyzed. Chain of custody procedures are discussed in a later section.

Drawings and Maps

Schematic drawings, flowsheets, maps, charts and other graphic records can be useful as supporting documentation. They can provide graphic clarification of site location relative to the overall facility, relative height and size of objects, and other information which, in combination with samples, photographs and other documentation, can produce an accurate and complete evidence package. Drawings and maps should be simple and free of extraneous detail. Basic measurements and compass points should be included to provide a scale for interpretation.

Copies of Records

A facility's records and files may be stored in a variety of information retrieval systems, including written or printed materials, computer or electronic systems, or visual systems such as microfilm and microfiche. When copies of records are necessary for an inspection report, storage and retrieval methods must be taken into consideration. Written or printed records can generally be copied on site, while computer or electronic records may require the generation of hard copies for inspection purposes. Visual systems usually have copying capacity built into the viewing machine. If possible, arrangements for copies should be made during the opening conference.

Immediate and adequate identification of records reviewed is essential to ensure the ability to track these records through the agency's custody process and ensure their admissibility as evidence. When inspectors are called on to testify, they must be able to positively identify each particular document, state its source and give the reason for its collection. The following items are suggested to identify records:

a. *Initialing and dating:* The inspector should develop a unique system for initialing and dating records so that their validity can be easily verified. Both the original and the copy should be initialed, and all identification notations should be placed on the back of the document.

b. *Numbering:* Each document or set of documents should be assigned a unique identifying number. That number should be recorded on each document and in the field notebook.

c. *Logging:* Documents obtained during the inspection should be entered in the field notebook according to some logical system. As a minimum, the following information should be included:

- Identifying number.
- Date.
- The reason for copying the material.
- The source of the record.
- The manner of collection.

Statements

On rare occasions it may be useful to the objectives of the inspection to obtain a formal statement from a person who has firsthand knowledge of relevant facts. The principal objective of obtaining a statement is to record in writing, clearly and concisely, relevant factual information so that it can be used as documentary support. The following procedures and considerations are suggest whenever it is necessary for the inspector to take a statement:

a. Determine the need for the statement. Will it provide useful information? Is the person making the statement qualified to do so by personal knowledge?

b. Ascertain all the facts and record those which are relevant and which the person can verify in court. Make sure all information is factual and firsthand. Avoid taking statements that cannot be personally verified. In preparing the statement, use a simple narrative style and avoid stilted language.

c. Positively identify the person (name, address, position) and show why they are qualified to make the statement.

d. Have the person read the statement and make any necessary corrections. All mistakes that are corrected must be initialed by the person making the statement.

e. Ask the person making the statement to write a brief concluding paragraph indicating they have read and understood the statement. Have the person making the statement sign it.

f. If the person refuses to sign the statement, ask for an acknowledgement in the persons own hand that it is true and correct (e.g., "I have read this statement and it is true, but I am not signing it because...."). Failing that, declare at the bottom of the statement that the facts were recorded as revealed and that the person read the statement and avowed it to be true. Attempt to have any witness sign the statement, and include the witness' name and address.

g. Provide a copy of the statement to the signer, if requested.

Printed Matter

Brochures, literature, labels and other printed matter may provide important information regarding a facility's condition and operations. These materials may be collected as documentation if, in the inspector's judgement, they are relevant. All printed matter should be identified with the date, inspector's initials and related sample numbers, and reference to these materials should be made in the field notebook.

Photographs

The documentary value of photographs ranks high as admissible evidence. Clear photos of relevant subjects, taken in proper light and at proper lens settings, provide an objective record of conditions at the time of the inspection. However, since photographic documentation often elicits a negative reaction from plant officials, it should be used sparingly and only when necessary to document an inspection finding.

When a situation arises that dictates the use of photographs, the inspector should obtain the company's permission. The inspector may offer to provide the company with duplicates; and, as with other data collected, should ascertain whether any of the photographs contain information the company wishes designated as confidential. If the company refuses to allow photographs and the inspector believes the photographs will have a substantial impact on future enforcement proceedings, an enforcement attorney should be consulted for further instructions. At all times, the inspector is to avoid confrontations that might jeopardize the completion of the inspection. The inspector should also remember that photographs may always be taken from areas of public access (e.g., outside the fence, from the road, from a public parking lot, etc.), as long as no unusual equipment is used.

Photographs taken with instant developing cameras are useful for inspection because they allow an immediate confidentiality review and provide the opportunity for the inspector to immediately provide the company with duplicate shots. However, a single-lens reflex camera will take higher quality photographs and should be used whenever available. It is suggested that all photographs be made with color print film. Also, it is helpful to photograph a subject from a point that will indicate its location and direction. The addition of an object of known size is useful to help indicate the approximate size of the subject. In areas where there is a danger of explosion, flash photographs should not be taken.

A log should be maintained in the inspector's field notebook for all photographs taken during an inspection. Entries should be numerically identified, so that after the film is developed the prints can be serially numbered to correspond to the notebook descriptions. If necessary, pertinent information from the notebook can be transferred to the back of the photograph. Notebook entries should include the following information:

a. Signature of the photographer.

b. Description of the film used (type, ASA number, origin, expiration date, etc.)

c. Focal length of lens being used.

d. F-stop and shutter speed at which the camera is set.

e. Lighting conditions encountered.

f. Time of day and weather conditions.

g. Date.

h. Location.

i. A brief description of the subject being photographed.

Closing Conference

The closing conference with plant officials enables the inspector to conclude the inspection by answering any questions the company may have, filling in any gaps in the data collected, and identifying any information considered confidential. The closing conference also provides an opportunity to improve agency-source relations by extending helpful advice and assistance. It is very important that the inspector follow-up on all referrals and offers of help. A letter, phone call or repeat visit will indicate interest on the part of the agency. As a minimum, the following elements should constitute the closing conference:

a. *Review of inspection data:* The inspector should review the data gathered and identify and fill any gaps in the information. The inspector should ensure that there is general agreement on the technical facts.

b. *Inspection follow-up discussion:* The inspector may answer inspection related questions from plant officials, but should only state matters of fact. The inspector should not make judgements or conclusions concerning the facility's compliance status, legal effects or enforcement consequences.

c. *Declaration of confidential business information:* Plant officials should be given the opportunity to make a claim of confidentiality on material provided to the agency. The inspector should note all information claimed confidential and handle these materials accordingly.

d. *Preparation of receipts:* The inspector should prepare and deliver receipts for any samples or records taken.

File Update and Report Preparation

The data an inspector collects and substantiates may later be used as evidence in an enforcement proceeding. It is the inspector's responsibility to see that these data are organized and arranged so that other agency personnel can make maximum use of them. Thus, the file update and inspection report preparation activities are an important part of the inspection process. These should be done as soon as possible after the inspection to ensure that all events are still fresh in the inspector's memory.

Several types of files are utilized for storing facility information. These include EPA's Compliance Data System (CDS) and National Emissions Data System (NEDS), the agency's source files and the inspector's working file. Data in these files should be reviewed for missing or out-of-date information and then updated using the inspection data.

The inspection report serves two very important purposes: (1) it provides other agency personnel with easy access to the inspection information; and (2) it constitutes a major part of the evidence package which will be available for subsequent enforcement proceedings. To meet these objectives, the information contained in the inspection report should be:

a. *Accurate:* All information must be factual and based on sound inspection practices. Observations should be the verifiable result of firsthand knowledge. Compliance personnel must be able to depend on the accuracy of all information.

b. *Relevant:* Information in an inspection report should be pertinent to the objectives of the inspection. Irrelevant facts and data will clutter a report and may reduce its clarity and usefulness.

c. *Comprehensive:* Suspected violations should be substantiated with as much factual, relevant information as is feasible to gather. The more comprehensive the evidence is, the better and easier the outcome of any enforcement action will be.

d. *Coordinated:* All information pertinent to the subject should be organized into a complete package. Documentary support accompanying the report should be clearly referenced so that anyone reading the report will get a complete and clear overview of the situation.

e. *Objective:* Information should be objective and factual. The report should not speculate on the ultimate result of any factual findings.

f. *Clear:* The information in the report should be presented in a clear and well-organized manner.

g. *Neat and legible:* Allow time to prepare a neat and legible report.

Handling Confidential Business Information

As part of the data gathering involved in an air compliance inspection, the inspector may collect information claimed confidential by the company. It is recommended that such information be avoided unless it is essential to the inspection objectives. The less confidential data collected, the less confidential data that will require safeguarding. During the inspection, the inspector should communicate to the plant officials that the agency has an organized and secure system for handling confidential business information.

Trade secrets and confidential information are protected from public disclosure by Section 114(c) of the Clean Air Act. The type of information that may be claimed confidential is defined in 40CFR2; however, from the inspector's standpoint, confidential information may be defined as any information received under a claim of confidentiality. This information could be in written form, in photographs, or in the inspector's memory.

It is the inspector's responsibility to inform company officials of their rights regarding confidentiality claims. The following paragraph, excerpted from 40CFR2, provides suggested language:

> "If you believe that any of the information required to be submitted pursuant to this request is entitled to be treated as confidential, you may assert a claim of business confidentiality, covering all of any part of the information, by placing on (or attaching to) the information a cover sheet, stamped or typed legend, or other suitable notice, employing language such as 'trade secret', 'proprietary', or 'company confidential'. Allegedly confidential portions of otherwise non-confidential information should be clearly identified. If you desire confidential treatment only until a certain date or until the occurrence of a certain event, the notice should so state. Information so covered by a claim will be disclosed by EPA only to the extent, and through the procedures, set forth at 40CFR2, Subpart B."

Under ideal circumstances, a facility official will accompany the inspector and make preliminary indications of information which may be claimed confidential. The inspector should not speculate whether any data claimed confidential will eventually be determined to be confidential. This determination is a legal and administrative policy decision and not within the inspector's authority. Company officials should be informed that they may also make claims of confidentiality at a later time.

If possible, confidential information should not be entered into the field notebook. One technique is to use a non-confidential reference to the information in the notebook and separate sheets (which are considered separate documents) on which to record the confidential information. Copies of records or others documents claimed confidential may also be separated and kept with the confidential field notes. At the end of the inspection, the inspector should make a complete inventory of the confidential information received. That inventory should include the document number, the date received, the number of pages and a brief description. Each page of confidential information received should be stamped with a statement such as the following:

CONFIDENTIAL BUSINESS INFORMATION

CLAIMED CONFIDENTIAL

DOCUMENT______PAGE______OF_______
REC'D FROM__________DATE_________
REC'D BY____________ID___________

If the company has declared a physical sample confidential, the inspector should mark the seal "Confidential Business Information".

The inspector may sometimes be on the road for several days while doing inspections. During this time, it is his or her full responsibility to ensure that the information collected is handled securely. Suggestions for handling confidential data in the field are as follows:

a. Documents and field notes are considered secure if they are in the physical possession of the inspector and are not visible to others while in use.

b. Confidential inspection documents should be kept inside an unlabeled envelope which is in a locked briefcase. If it is impractical to carry the briefcase into a given situation, it may be stored in a locked area such as a motel room or the truck of a car.

c. If it is necessary for the inspector to review a confidential document, it should be done in privacy since the "Confidential Business Information" marking is likely to arouse curiosity. If privacy is violated, the documents must be shielded from view immediately.

d. Physical samples should be placed in locked containers and stored in a locked portion of a motor vehicle. Chain of custody procedures provide further protection for ensuring the integrity of the sample.

Immediately on returning to the office, the potentially confidential information should be placed in a secure file cabinet designated especially for confidential information. Samples considered confidential should be assigned a document number and sent to an approved laboratory for analysis. The chain of custody and analysis results should bear this document number. At all times prior to analysis and/or disposal, the samples should be stored in a locked cabinet.

In preparing the inspection report, it is recommended that confidential information be referenced in a non-confidential manner (e.g., by referring to the document in the confidential files and providing a general description of it). If necessary, the confidential data may be included in the report, but then the entire report must then be treated as a confidential document.

Chain of Custody Procedures

An important aspect of the introduction of evidence during enforcement proceedings is documentation of the possession and handling of that evidence from the moment of its collection until its introduction as evidence. This documentation is generally referred to as the "chain of custody". Chain of custody documentation is applicable to samples, photographs, field notes and laboratory notes; however, the most rigorous proof of a chain of custody is usually required for physical samples.

A sample or document is considered to be in custody if:

a. It is in one's physical possession.

b. It is in one's view.

c. It was in one's physical possession and it was secured so that it couldn't be tampered with.

d. It is kept in a secured area with access restricted to authorized personnel only.

e. It is kept in a container or other receptacle sealed with an official seal (see Figure 5-1) that will be broken when the receptacle is opened.

Establishing and maintaining the chain of custody requires adherence to a number of procedures which ensure the integrity of the sample. These procedures are initiated with the identification of the sample and continue through sample transit and laboratory analysis and until the introduction of the data into evidence. Sample integrity is generally easier to document as the number of people who handle the sample decreases. Thus, all chain of custody procedures are aimed at limiting the number of persons who handle the sample or data. The following procedures are suggested:

a. *Establishing custody:* Sample custody is initiated at the time of collection by labeling the sample with a sample tag (see Figure 5-2) and sealing the sample with the official seal. If the company declares a physical sample confidential, the inspector should mark the tag and seal "Confidential Business Information". If it becomes necessary to break a seal, it should be mounted on a piece of paper, properly initialed and dated, and submitted with the sample records to provide part of the continuous history of the sample. The sample itself should be resealed with a new seal. No more than one sample should be sealed under one seal.

b. *Preparing sample documentation:* A major aspect of the chain of custody is the preparation and maintenance of written information describing the collection, shipment, and storage of the sample. Preparation of this documentation is the responsibility of the inspector and laboratory personnel. Properly maintained, this documentation serves as a clear and complete account indicating the sample has remained intact from collection to introduction as evidence. The sample must be consistently identified throughout this documentation. Sample numbers are usually used for this purpose. One unique number for each sample is placed on all documentation relating to that sample.

c. *Coordinating sample and documentation:* The inspector must assure that the relationship between the physical sample and the related documentation is clear, complete and accurate. The sample number, date and inspector's initials should appear on all documents, and the forms should be filled-in accurately and completely. An example chain of custody form is shown in Figure 5-3.

d. *Ensuring custody during transit:* Shipment of the sample to the laboratory will involve the following procedures:

- Samples must always be accompanied by the chain of custody record. Copies of documents should be retained by the originator.

- Sample packages which are mailed must be sent registered or certified mail with return receipt requested.

- If sent by other common carrier, such as UPS, a bill of lading should be used.

- Samples should be shipped to the person designated laboratory custodian and labeled "Deliver to Addressee ONLY". This person accepts custody and continues the chain of custody from that point onward.

- All receipts and shipping documents must be included in the chain of custody documentation.

- Shipped samples should always be properly packed to prevent breakage, and the package should be sealed or locked so that any evidence of tampering may be readily detected.

References

Gruber, C.W., and P.M. Giblin, "Air Pollution Field Enforcement: Student Manual", EPA 450/2-80-075, March 1980.

Segal, R., and J. Richards, "Inspection Techniques for Evaluation of Air Pollution Control Equipment", Volume II, EPA-340/1-85-022b, September 1985.

USEPA, "Basic Inspector Training Course: Fundamentals of Environmental Compliance Inspections", Office of Enforcement and Compliance Monitoring, February 1989.

Table 5-1

Recommended Inspection and Safety Equipment

Necessary for Most	Required for Some
Hardhat	Respirator with appropriate cartridge
Safety glasses or goggles	Velometer
Gloves	Pump and filter system
Coveralls	Bucket
Safety shoes	Differential pressure gauges
Ear Protectors	Combustion gas analyzer
Tape measure	Thermometer or thermocouple
Flashlight	pH paper or pH meter
Stopwatch	Multimeter
Duct tape	Sample bottles
NIOSH/OSHA Pocket Guide to Chemical Hazards	Strobe
	Inductance ammeter
	Tachometer
	Oxygen and combustibles meter
	Self-contained breathing equipment
	Rope

Figure 5-1. Example of official seal for chain of custody.

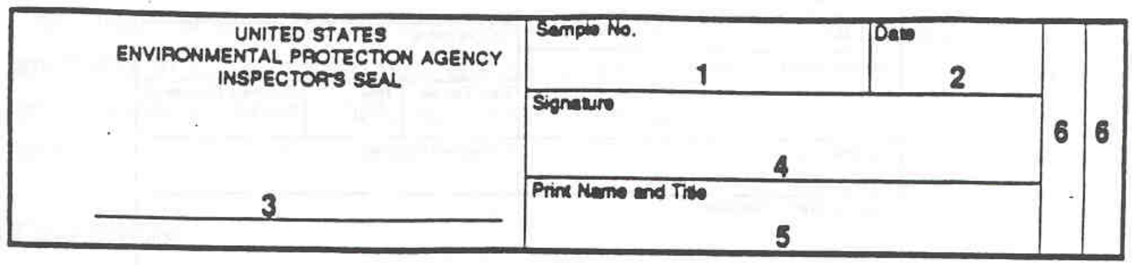


Figure 5-2. Example of a sample tag.

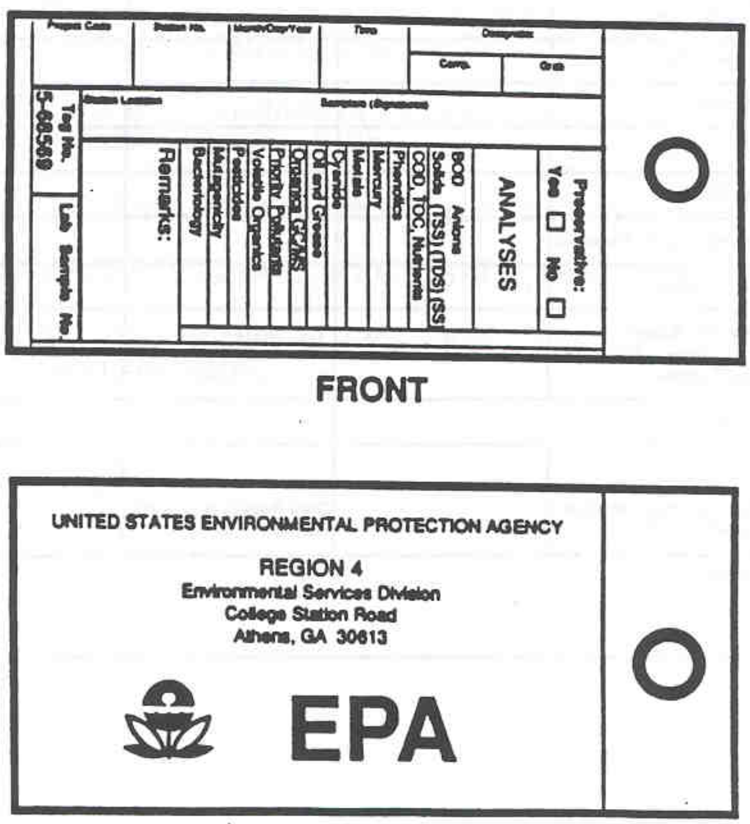


Figure 5-3. Example chain of custody record.

EPA United States Environmental Protection Agency Chain of Custody Record		Sample Number	Task Number
		Inspection Number	
		Sample Name	
Inspector Name and Address		Date Sample | Time	Duplicate Requested ( ) Yes ( ) No
Inspector Signature		Location of Sampling	
Analysis/Testing Required			

Laboratory			
Date Received			
Received By			
Sent Via			
Sample Condition			
Condition of Seals			
Units Received			
Storage Location			
Assigned By			
Assigned To			
Delivered By			
Date Delivered			
Number of Units Received			
Units Analyzed			
Date Seal Broken			
Date Received			
Resealed By			
Storage Location			
Date Results of Analysis Issued to EPA		Date Results of Analysis Issued to Facility	
Remarks			

Chapter 6

Federal Clean Air Act

Goal

The purpose of this lesson is to develop an understanding of the U.S. Clean Air Act and its enforcement.

Objectives

At the end of this lesson, the student should be able to:

1. Define the responsibilities of Federal, state and local government in the enforcement air pollution statutes.

2. Understand the NAAQS and SIP. State the responsibility of EPA when states fail to enforce their implementation plans.

3. Understand the New Source Review program.

4. Know when a PSD, Nonattainment and a NSPS permit must be obtained.

5. Understand potential to emit, the bubble concept, offsets, and nonattainment classifications.

6. Define NSPS, BACT, and LAER.

7. Understand the new HAP program, MACT, and Residual Risk.

8. Know the Enforcement Provisions of the CAA: Civil, Administrative, and Criminal.

The U.S. Clean Air Act (CAA)

Introduction

During the 1900s, the industrial revolution exploded causing numerous air pollution episodes: Meuse Valley (Belgium) in 1930, Donora, PA. in 1948, London in 1952 and New York in 1966. Before 1955, air pollution was regulated exclusively and scantily by state and local governments. Private parties were confined to common law remedies. As a result of these episodes and a growing concern about air pollution, the Air Pollution Control Act of 1955 was passed by Congress. This Act required the U.S Department of Health, Educatioin and Welfare (HEW) to research the effects of air pollution and pollution control. This Act also gave federal funding and technical assistance to the states to set up their own air pollution programs. During the Kennedy administration, Congress debated on federal verses states role in dealing with the air pollution problem. President Kennedy supported greater federal responsibilities. The Compromise was the Clean Air Act of 1963 (replacing the 1955 Act), which now funded states to establish their own air programs and for the HEW to develop air quality criteria for advisory purposes only. Debates between Senator Muskie and the automotive industry resulted in the Clean Air Act being amended in 1965 to give the federal government authority to set automobile emission standards (only for carbon monoxide and hydrocarbon emissions). Before the government set any emission limitations, the manufactures voluntarily complied with installing pollution controls on their 1968 vehicles.

In 1967, Congress enacted the Air Quality Act, which designated states the responsibility of establishing regional air quality standards based on federal air quality criteria. However, the states failed to develop an air program. Therefore, Congress in 1970 amended the Clean Air Act (CAA), which sharply increased federal authority over regulation of air pollution. It gave this authority to the newly created, Environmental Protection Agency (EPA) and established the basic structure of air pollution regulation in our Nation. (The EPA was created by President Nixon's "Reorganization Plan #3", about one month prior to the promulgation of 1970 CAA Amendments.) The 1970 CAA Amendments established federal, uniform, national ambient air quality standards (NAAQS) and required the states to establish an implementation plan, which would make their state's air quality meet these NAAQS. These Amendments placed the major responsibility for control of air pollution from stationary sources with states through their implementation plans. Also, the 1970 Amendments designated exclusively the control air pollution from new mobile sources to the EPA. Thus, EPA sets the standards for new automobile engines, fuels or fuel additives, and aircraft emissions. The reason for this is obvious. If every state had a different standard for these types of mobile sources, there could be a substantial interference with interstate commerce. The 1970 Amendments also established a hazardous air pollution program and required the EPA to establish new source performance standards for significant sources of air pollution.

Without changing the basic structure and any responsibilities, the CAA was significantly amended in 1977 and again in 1990. The 1977 Amendments added the “prevention of significant deterioration” and “non-attainment” provisions to the Act. The 1990 Amendments overhauled the hazardous air pollution program, strengthened the enforcement and non-attainment provisions, and added the operating permit, acid rain and ozone depletion programs.

What does the Clean Air Act regulate? The CAA, in section 302, defines “air pollution” as material that is emitted or otherwise enters the ambient air and causes negative health effects; or damages plants, property or animals; or causes an unreasonable interference with the enjoyment of life or property. The EPA defines ambient air as “that portion of the atmosphere external to buildings, to which the public has access”. Accordingly, the CAA regulates only pollution that enters the outside air. The CAA does not regulate indoor air pollution.

National Ambient Air Quality Standards

As required by the CAA, the EPA must publish "criteria documents" for pollutants that satisfy certain conditions specified in section 108(a). Under section 109, EPA must establish National Ambient Air Quality Standards (NAAQS) for every pollutant that has been designated a "criteria" pollutant. EPA has promulgated National Ambient Air Quality Standards for six air pollutants: ozone, particulates (PM-10, PM-2.5), sulfur oxides, carbon monoxide, nitrogen oxides and lead. The Act requires that EPA review these standards every five years. EPA has not added a new pollutant to this list since 1978, but has, in 1997, revised the ozone standard and added PM-2.5 to the particulate standard.

There are two types of NAAQS specified in section 109 of the CAA. Primary NAAQS are set at a level which, allowing an “ample margin of safety”, are requisite to protect human health and the environment. These are health-based standards that do not allow costs to be taken into consideration. Secondary NAAQS are set at a level that is adequate to protect public welfare. Both primary and secondary NAAQS specify the maximum concentrations of these pollutants that can be present in the air. Promulgation of a primary NAAQS triggers the states' obligation to prepare a State Implementation Plan (SIP).

Air Quality Control Regions

The CAA divided the country into 247 air quality control regions based on common meteorological, industrial and topographical factors. These regions are classified either Attainment, Nonattainment or Unclassifiable. These area designations are "pollution specific" (i.e. a region may be classified attainment for SO2, but nonattainment for ozone and particulates). An area is classified as "attainment" when a specific criteria pollutant in that region is less than its designated NAAQS. An area is classified as "nonattainment" when a specific criteria pollutant in that region is greater than its designated NAAQS. An "unclassifiable" area is an area that cannot be classified because there is a lack of information to determine whether the area meets the NAAQS.

As of 1990, nonattainment areas have different classifications for three criteria pollutants. Ozone nonattainment areas are divided into five classes: Marginal, Moderate, Serious, Severe, or Extreme. Nonattainment areas for carbon monoxide and particulates are divided only into two classes: Moderate or Serious. Classifications have different substantive requirements for each criteria pollutant. These requirements can be cumulative or unique. Unique requirements increase as the severity of the classification increases (deadlines for attainment, offset ratios, definition of "major source"). Cumulative requirements are additive (i.e. a Serious classification has to do all the requirements of its class and all the lower classes, Moderate & Marginal).

Nonattainment areas are "classified" based on their severity of nonattainment. Ozone and carbon monoxide measure severity by calculation of a "design value". The "design value" for ozone is the average of the fourth highest exceedance of the NAAQS measured in each of the three years. Carbon monoxide's "design value" is the fourth highest ambient air concentration over a 3-year period.

Particulates do not use design values, but instead base severity of nonattainment on the "likelihood of compliance" with particulates deadline dates. A designation of Moderate would result if a region was PM-10 nonattainment before 1990 or is now PM-10 /PM-2.5 nonattainment. A Serious designation for particulate nonattainment is given if EPA thinks the region will not meet its nonattainment deadline date to meet the primary NAAQS for PM-10/PM-2.5.

State Implementation Plans (SIPs)

Under the Clean Air Act, EPA is required to establish national ambient air quality standards (NAAQS). In general, the 1970 amendments set June 30, 1975, as the date for attainment of these standards. Section 110 of the Act required all states to submit an implementation plan showing how attainment would be achieved and maintained by the statutory dates. These SIPs include emission limitations for stationary sources and control strategies and form an enforceable commitment on the part of the states.

Attainment was not achieved in all areas by the 1975 deadline, so Congress amended the Clean Air Act in 1977 to allow areas to continue the process of coming into compliance with air quality standards. Those areas that attained the standards prior to August 7, 1977, were required to maintain those standards.

In nonattainment areas, Congress placed restrictions on the growth of sources and required SIP revisions to be submitted that would demonstrate attainment on or before December 31, 1982, for all pollutants except carbon monoxide and ozone. If a state could demonstrate a need, that date could be extended to December 31, 1987. For mobile source related problem areas, the states were to demonstrate attainment as expeditiously as practicable, but no later than December 31, 1987.

Once again, many areas failed to attain the NAAQS by the required date, and, in 1990, Congress amended the Clean Air Act to impose new and more complex requirements in non-attainment areas. The 1990 Amendments emphasize an incremental approach to achieving attainment of the NAAQS. That is, attainment deadlines have been relaxed as compared to the 1977 Clean Air Act, but more stringent control requirements apply as an area's nonattainment problems become more severe.

The CAA required states to develop State Implementation Plans. SIPs contain a variety of provisions. Among these are emission standards that ensure that the state's air quality does not violate NAAQS, development of an ambient air quality-monitoring network, and enforcement procedures and policy. SIPs must be submitted to EPA for review and approval. If a state SIP does not meet the requirements of the CAA, EPA can reject the SIP and publish its own Federal Implementation Plan (FIP). Additionally, EPA has several sanctions available that it can impose on states that fail to submit an approvable SIP (highway funding reduced or new industrial projects must offset emissions at a 2 to 1 ratio).

When EPA approves a SIP, it promulgates the SIP as a federal regulation. Once approved, a SIP remains federally enforceable unless both the State and EPA approve a change. If a state or local program fails to enforce any requirement of its SIP, it can be enforced by EPA.

New Source Review: Permit Requirements

Under the Clean Air Act of 1970, states were required to have a permit system for pre-construction review of stationary sources. Besides establishing the New Source Performance Standards (NSPS) program, the 1970 Act dealt with permits in virtually a single paragraph, setting out a very broad requirement that states have a program for preventing the construction or modification of any source, which would prevent the attainment, or maintenance of an NAAQS. In contrast, the 1977 Amendments provided considerable detail as to what must be reviewed prior to the issuance of a permit. It established a new permit system for major emitting facilities constructed or modified in attainment areas (Prevention of Significant Deterioration (PSD)) and in a nonattainment areas. More detail to new source permit review was added by the 1990 Clean Air Act Amendments, which lowered the major source threshold for nonattainment areas with more serious nonattainment problems.

New Source Performance Standards (NSPS)

Section 111 of the Act requires the EPA to publish a list of categories of stationary sources, which may contribute significantly to air pollution, which causes or contributes to the endangerment of public health or welfare. At present there are 65 source categories identified. The EPA must then propose regulations establishing standards of performance, called new source perforce standards (NSPS), for new sources within each category. The NSPS are nationwide emission limitations. These standards may be by design, equipment, work practice or operational standards where numerical emissions limits are not feasible. The NSPS must reflect “the degree of emission reduction achievable through application of the best system of adequately demonstrated” controls “taking into consideration the costs” of emission reduction.

NSPS apply to new and or modified sources. A modification is a physical change in operation of the source that will cause any increase the emissions. Therefore, existing sources, which do not change their process or modernize their equipment may avoid NSPS requirements. The NSPS are nationally applicable and apply in both attainment and nonattainment areas. Enforcement of these standards is usually delegated to state and local agencies.

Prevention of Significant Deterioration (PSD)

Prior to the 1977 Amendments, the CAA had no specific concept of preserving those areas of the country with air quality cleaner that prescribed by the NAAQS. The "purpose" of the CAA was said to "protect and enhance" the quality of the Nation's air. In interpretation of this provision, a court held in *Sierra Club v. Ruckleshaus (1972)* that EPA had a nondiscretionary duty to prevent significant deterioration of air qualities in these clean areas. The court ordered EPA to revise all SIPs to prevent significant deterioration in these clean areas. In response to this opinion, EPA developed a new regulatory program to prevent "significant deterioration" of air quality. EPA proposed regulations outlining how PSD was to be implemented through state construction permit reviews. When Congress adopted amendments to the Clean Air Act in 1977, it largely incorporated EPA's regulations into the Act. The PSD program remains in the current CAA in Part C, sections 160-169A.

The PSD program establishes the following threshold for preconstruction review: ***A major new*** *stationary* ***source*** *in an* ***attainment area*** *must obtain a* ***PSD permit****.* A "major" source is defined as any source having a "potential to emit" emissions of any regulated pollutant greater than 250 TPY or 100 TPY for 28 specified sources. "Potential to emit" is the amount of a regulated pollutant that a facility emits based on the facility's maximum capacity of the source after taking into account the anticipated functioning of air pollution control equipment and any permit limitations on the source's hours of operation. In defining "source" EPA has adopted the "bubble rule" for PSD and nonattainment programs. It defines "source" to include the emissions of a regulated pollutant from the entire plant (like a bubble over the plant) and not each individual source of pollutants within the plant. A "new" source includes major modifications to an existing source, which will cause a increase of any regulated pollutant to exceed "significant" quantities (quantities listed by the EPA).

An "attainment area", for PSD review, includes not only those areas that have reached attainment of a NAAQS, but also those areas that are "unclassifiable" (due to lack of information to determine whether the area meets the NAAQS). The area classifications are made on a pollutant-by-pollutant basis. Also, the same area may be a PSD area because it does meet the NAAQS for particulates and nonattainment because it exceeds the NAAQS for ozone.

A "PSD permit" will require that the new source will utilize the "best available control technology" (BACT) and that emissions do not exceed an "allowable increment" and the NAAQS. BACT is the "maximum degree of emission reduction…available" taking into account economic, energy and environmental factors. BACT must be at least as stringent as the NSPS and is determined on a case-by-case basis.

The permit application must also contain modeling information. It must show that the baseline concentration (background pollution concentration from all sources operating) plus contribution from the new source, will not exceed the "allowable increment".

In determining the "allowable increment", under the PSD program, areas are divided into three different classifications: Class I is the "cleanest" (i.e. national parks) in which only a small amount of degradation is allowed. Class II is "moderate" (most of U.S.) in which larger amounts of degradation are allowed. Class III is the "dirtiest" (industrial areas) in which the largest degradation is allowed, but never must it exceed the NAAQS. Section 163 of the CAA lists the "allowable increment" in each Class and for each criteria pollutant.

Therefore, the basic PSD requirement, as set out in Section 165 of the Act, provides that no new major stationary source for which construction is commenced after August 7, 1977, may be constructed unless:

a. A permit has been issued specifying the emission limitations;
b. An evaluation of existing air quality data has been conducted;
c. Certain specified air quality increments are not exceeded;
d. Best available control technology (BACT) is applied to the source;
e. The requirements for protection of pristine (Class 1) areas are met;
f. There is an analysis of air quality impacts projected for the area as a result of growth associated with the proposed facility; and
g. Monitoring will be conducted to determine the effect of the facility's emissions on air quality.

Nonattainment Preconstruction Review

The 1970 version of the CAA did not include any provision concerning nonattainment. It very optimistically set mid-1977 as the outermost date by which the NAAQS were to be attained. When the attainment date passed, many areas were found to be exceeding one or more of the air quality standards. Under the 1970 Act, the only course of action available was to revise the applicable SIP to ensure attainment and maintenance of the standards. The states and EPA were then faced with the question of what to do about growth in nonattainment areas during the period in which the SIPs were being revised.

To address this problem, EPA developed regulations on "emission offsets". Although there was no provision in the 1970 CAA for such a concept, EPA viewed it as a compromise alternative to a no-growth policy. Congress apparently agreed, because the 1977 amendments specifically adopted the requirements of EPA's policy on new sources in nonattainment areas. The 1977 Amendments required these new major sources, among other things, to meet strict emission limits and to “offset” their new emissions by a reduction of emission from other sources in the same nonattainment area. Additionally, Congress extended the latest compliance date for non-attainment areas to 1987.

Once again, many areas failed to attain the NAAQS by the required date, as a result Congress, in 1990, amended the CAA. The 1990 Amendments modified the nonattainment provisions of the 1977 Amendments. States must now include in their SIP plan, a special graduated control program for ozone, carbon monoxide and particulates. The more serious the noncompliance, the more stringent the control measures imposed, but the later the deadline for compliance with the NAAQS.

The rule for preconstruction review in nonattainment areas is as follows: *A **major new** stationary **source** in an **nonattainment area** must obtain a **nonattainment permit**.* A “major” source is defined as any source, which has a potential to emit emissions of any nonattainment pollutant greater than 100 tpy, or lower depending on the nonattainment classification (i.e. 50 tpy for volatile organic compounds (VOC) and nitrogen oxides (NO_x) in Serious ozone nonattainment areas, 25 tpy for Severe areas, and 10 tpy for Extreme areas). “Potential to emit”, and “source” are defined the same as in the PSD program. “New” also is the same as in the PSD program, except in ozone nonattainment areas (in Serious or Severe areas: de minimus is 25 tpy VOC; in extreme areas there is no de minimus amount.

A “nonattainment permit” requires all the following:

1. *LAER*: Sources must meet the most stringent, technology-based level of control called “lowest achievable emission limit” (LAER). In determining LAER, the reviewing authority must consider the most stringent emission limitation contained in any SIP in the country and the lowest emission which is achieved in practice by the same or similar type of source.

2. *Complete Compliance:* All existing major sources, in the same state, that are owned or controlled by the owner or operator of the proposed source must be in compliance with all applicable requirements under a SIP and the CAA.

3. *Emission Offset Requirement:* The proposed new source must offset its emissions from existing sources in the area (whether or not under the same ownership); so that the company is taking out of action more emissions than they propose to put in. In ozone, particulates and carbon monoxide nonattainment areas, the 1990 amendments imposed higher offset requirements as the nonattainment classification becomes more severe (offset ratio for VOC is 1.1 to 1 in Marginal ozone nonattainment areas; offset ratio for VOC is 1.3 to 1 in Severe ozone nonattainment area).

Hazardous Air Pollutants

Under the 1970 CAA, section 112 required the Administrator of EPA to establish standards for air pollutants to which no ambient air quality standard is applicable and which in the judgment of the Administrator may cause, or contribute to "an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness". The EPA was required to promulgate a list of pollutants that met this statutory definition of "hazardous air pollutants" (HAP) and to develop "National Emission Standards for Hazardous Air Pollutants" (NESHAP) that would provide an "ample margin of safety to the public health". This health-based standard could be read to preclude considerations of cost or technological feasibility, and possibly to require (in cases of scientific uncertainty about safety of exposure levels) the establishment of zero-risk level for emissions. This vagueness left EPA's regulations open for challenge by both industry as too harsh and environmentalist as too lax. As a result, EPA had a difficult time implementing the NESHAP requirements. Between 1970 and 1990, EPA only promulgated NESHAPs for eight pollutants: asbestos, benzene, beryllium, mercury, vinyl chloride, coke oven emissions, inorganic arsenic and some radionuclides.

In the 1990 CAA, under section 112, Congress completely changed the approach to hazardous air pollutants from a health-based to a technology-based regulation. In these Amendments, Congress now defined a hazardous air pollutant as "any air pollutant listed in Section 112 (b)". In this section, 189 substances were listed as hazardous air pollutants.

EPA may add or delete pollutants from this list based on a determination that these substances may cause "adverse effects to human health or the environment". Substances can also be added or deleted by an individual who petitions the EPA. These Amendments required EPA to publish a list of categories and subcategories of major and area sources of hazardous air pollutants. In July 1992, EPA published an initial list of 174 major source categories and 8 area source categories of hazardous air pollutants. These Amendments also required EPA to pass technology-based emission standards (called MACT) for each of these listed HAP source categories according to a statutory schedule. The schedule required that all source categories must have MACT standards promulgated by the year 2000. In September 1992, EPA followed the source category list with a schedule for promulgation of emission standards, which specifies when each of the listed source categories will be regulated. If EPA fails to promulgate a MACT according to the source category schedule, then the "MACT hammer" applies: This hammer mandates that 18 months after MACT due date, major sources must meet a MACT standard that is determined by the state on a case by case basis.

Under 1990 CAA, section 112, NESHAPs are now to be established as <u>technology-based</u> standards based on "maximum achievable control technology" (MACT), taking into consideration the <u>cost</u> of achieving such emission reduction. "Major sources" of hazardous air pollutants must meet MACT limitations. The MACT standards may differ for new and existing sources within a source category. For new sources, the standard must be based on the "best controlled similar source". New sources must comply with MACT immediately. A "new source" is any source that is constructed or modified after the date of the proposed MACT. For existing sources, the standard must be based on the emission limits achieved by the "best controlled 12% of existing sources". Existing sources have up to three years to comply.

Under this program, a "major source" is defined as any stationary source (can use bubble concept) having the potential to emit more than 10 tons per year of any listed HAP or 25 tons per year of any combination of the listed HAP. An "area source" is any source stationary source of HAP that is not a major source. Many area sources are likely to be regulated under EPA's urban air toxic strategy.

The 1990 Amendments authorizes EPA to establish additional requirements to control any "residual risk" that exists after eight years after promulgation of MACT. The EPA will conduct a risk assessment to determine if any residual risk remains to the public health. If a risk remains, then EPA must pass an additional <u>health-based</u> standard that will provide an “ample margin of safety” to the public. These second-tier standards are known as “residual risk” standards.

The 1990 Amendments developed additional regulatory programs concerning hazardous air pollutants. One of them is the “early reduction program”. This program offers industry an incentive to reduce their HAP before a MACT is proposed. If a Company reduces its HAP by 90 % (gaseous) to 95 % (particulate) and adjust for high risk pollutants, then the Company is given six years after MACT is promulgated to comply with MACT.

Another HAP regulatory program, established by the 1990 Amendments, concerns the prevention of accidental releases of extremely hazardous substances, This program required EPA to develop a list of at least 100 substances that pose the greatest risk of causing death or serious injury (listed at 40 cfr part 68). Facilities that use these extremely hazardous substances, above an established threshold limit, must prepare & implement a risk management plan. This plan mainly establishes a response program in the occurrence of a release of these listed hazardous substances. Enforcement of these hazardous air pollution programs is often delegated to state and local agencies.

Acid Rain Program

Acid rain results when fossil-fuel burning plants emit sulfur dioxide and nitrogen dioxide. These substances can be transported hundreds of miles before they return to earth as sulfuric or nitric acids in wet (rain) or dry precipitation. Effects of acid rain include acidification of lakes as well as damage to forests, man made materials, and health.

The 1990 Amendments created the Acid Rain Program. The purpose of this program is to reduce acid rain that is formed from sulfur dioxide and nitrogen oxides emissions to the atmosphere by reducing these emissions from fossil fuel-fired steam generating units.

<u>Sulfur Dioxide (SO2) Emission Reduction Program</u>

This program imposes a national emission cap of 8.95 million tpy of SO2 from electric utility power plants to be achieved in 2 phases (phase 1 to take effect by 1995 and phase 2 to take effect by 2000). Phase I mandates that 107 utility power plants (those with the highest SO2 emissions and listed in the 1990 CAA) must meet SO2 emission limit of 2.5 lbs/mmBtu. Phase II is more stringent and far reaching than Phase I: existing coal fired electric utilities must meet SO2 emission limit of 1.2 lbs./mmBtu., and a new coal fired electric utility cannot emit any SO_2 or receive any allowances from EPA (they must purchase their allowances).

This program establishes a "marketable trading" plan for SO_2. Sources subject to emission limitations under this section are assigned SO_2 "allowances" by statutory formula. An allowance is an authorization to emit one tpy of SO_2. Allowances are traded at an auction by those eligible to hold allowances. The purpose of the “marketable trading” program is to allow power plants flexibility in determining how to comply with emission reductions. They can install a pollution control device, convert to low sulfur fuel or purchase additional allowances to meet their SO_2 limits. If a source reduces it sulfur oxide emissions below its baseline, it may receive sulfur oxide allowances, which can then be sold.

Nitrogen Oxides (NOx) Emission Reduction Program

Sources, which are subject to the sulfur allowance program, are also required to reduce nitrogen oxide emissions. The 1990, Acid Rain Program requires EPA to set NOx emission limits for fossil fuel-fired steam generating units subject to the Phase 1, SO_2 program. It also required EPA to promulgate annual allowable emission limitations for nitrogen oxides for certain types of utility boilers.

Operating Permit Program

In the 1990 Amendments, Congress adopted a permit program modeled after the National Pollution Discharge Elimination System (NPDES) permit program. These permit requirements, called the operating permit program, are now contained in Title V, sections 501 to 507. This program requires states to develop and implement an operating permit program for “major” stationary sources of air pollution. States had until November 15, 1993 to adopt an operating permit program and submit it for EPA approval. EPA must then approve or disprove the state program within one year after submittal.

Title V of the CAA required that the following “major” stationary sources to obtain an operating permit:

a. major source (emits or the potential to emit greater than 100 tpy);

b. major source under HAP, PSD, or nonattainment provisions; or

c. any source regulated under acid rain, area sources under HAP, NSPS provisions and any other source designated by the EPA.

Title V required that an operating permit "application" must include all of the following:

a. all emissions of pollutants for which the source is major and all emissions of regulated air pollutants;
b. identification of all points of emissions;
c. emission rates in tpy and in other terms necessary to establish compliance;
d. description of air pollution control equipment; and
e. identification of all air pollution control requirements.

States have 18 months to take final action on an operating permit application. An operating permit must be issued for a fixed term of up to 5 years. States can charge permit fees for implementation and enforcement cost of the permit program. This fee must be at least $25 per ton of regulated pollutant. If a company failures to obtain an operating permit, this will cause fines up to $10,000 per day for each violation.

Title V required that an operating "permit" must contain all of the following:

a. applicable emission limitations and a compliance schedule,
b. monitoring and related record keeping and reporting requirements, and
c. any other conditions as are necessary to assure compliance with the CAA .

Stratospheric Ozone Program

Title VI of the 1990 CAA addresses stratospheric ozone depletion. It establishes a program to protect stratospheric ozone by phasing-out over a period of time the production and sale of ozone depleting chemicals generally along the lines called for by the *Montreal Protocols*. According to the CAA, ozone-depleting chemicals are classified as either Class I or Class II substances. Class I substances include five groups specified in the 1990 Amendments plus certain chlorofluorocarbons, halons, methyl chloroform, and carbon tetrachloride. EPA can add substances to this list based on a finding that the substance "causes or contributes significantly to harmful effect on the stratospheric ozone layer". Class II substances includes 33 hydrochlorofluorocarbons and their isomers. EPA can add substances to this list based on a finding that the substance "is known or may reasonably be anticipated to cause or contribute to harmful effects on the stratospheric ozone layer".

The Stratospheric Ozone Program calls for phasing out the production and consumption of Class I and II substances. Beginning in 1991, it is unlawful for any person to produce or import any Class I substance in any quantity greater than certain percentages specified in the CAA. Beginning in 2000, all production of Class I substances is prohibited. Class II substances are to be phased out by 2030. Exceptions are made for limited quantities of halons solely to test for corrosion on airplanes and Class I and Class II substances necessary for use in medical devices. Phase-out will be achieved through the use of transferable "allowances" for the production of Class I and II substances. The EPA will reduce the number of "allowances" so that production of the substances will be phased-out by the appropriate deadline.

Federal Enforcement

Civil Action

Section 113(b) of the CAA provides that EPA can initiate civil actions for past and on going violations. These actions are brought by the Department of Justice (DOJ) in U.S. District Court for appropriate relief, including a permanent or temporary injunction, and/or a civil penalty of not more than $25,000 per day of violation. These violations can be of the requirements and prohibitions contained in the state implementation plans and permits as well as the rest of the requirements in the CAA.

Administrative Penalties

As a result of the 1990 Amendments, the EPA, under section 113, now has broad authority to impose administrative orders and penalties on alleged violators without going to court. Section 113(a), allows EPA to issue an “administrative compliance order” (ACO) for most violations of the CAA (except Title II, Mobile Sources). Except in cases concerning HAP, the ACO is not effective until a conference is held with the violator to discuss the order. Failure to comply with an ACO may subject the source to civil penalties. However, EPA must initiate separate civil judicial or administrative action pursuant Sections 113(b) or 113(d), respectfully, to collect penalties or mandate compliance with the ACO. Judicial review of an ACO is unavailable, because it not considered a “final action.

New, under the 1990 Amendments, Section 113(d) of the CAA authorizes EPA to issue “administrative penalty orders” (APO) of up to $25,000 per day of violation with a cap of $200,000. An APO can be issued for any violation of the CAA except Title II, Mobile Sources. Upon receipt of an APO, a violator has 30 days to request an administrative hearing with the EPA. This hearing will be held according to the procedures required by the Administrative Procedure Act. This “administrative penalty order” is appealable by filing with the U.S. District Court within thirty days.

Section 113 also now authorizes EPA to issue “field citations” for minor observations observed in the field. Fines can be issued for up to $5,000 per day of violation with fewer procedural requirements.

Criminal Action

The CAA’s criminal sanctions provision under section 113 has been substantial changed by the 1990 Amendments. “Knowing” violations of the CAA can result in fines of up to $250,000 (individuals) $500,000 (corporations) per day of violation and up to five years imprisonment. “Knowing” actions to falsify reports, of failure to keep necessary monitoring records and of material omissions from such reports and records, can result in the same fines as above and up to 2 years imprisonment. “Knowing” failure to pay a fees or administrative fines can result in fines of up to $100,000 (individuals) $500,000 (corporations) per day of violation and up to one year imprisonment.

Section 113 also now imposes criminal penalties for “knowing” or “negligent” releases of hazardous air pollutants into the ambient air and “knowingly” place another person in “imminent danger of death or serious bodily injury”. For a “knowing” release, fines can be as much as $250,000 (individual) $1,000,000 (corporation) per day and up to 15 years imprisonment. For a “negligent” release fines can be as much as $100,000 (individual) $200,000 (corporation) per day and up to one year imprisonment.

Citizen Suits

Under Section 304, citizens may sue after giving at least 60-day notice to the pollution source, EPA, and State. They can sue pollution sources for non-compliance with an emission standard or order issued by the EPA. They can sue the EPA for failure to perform any non-discretionary acts required by the CAA. As a result of 1990 Amendments, Section 113(f), a citizen may now receive a reward of $10,000 for giving information to EPA that leads to successful criminal or civil suits.

EPA Emergency Powers

The Pre-1990 CAA, Section 303 provided that when a pollution source is presenting "imminent and substantial endangerment to the health of persons", and the "appropriate state or local authorities have not acted to abate such sources", the Administrator may bring suit to immediately restrain the violation. EPA has rarely used this provision. The 1990 Amendments now allow these emergency orders when there is “imminent and substantial endangerment to the public health or welfare or the environment", and do not require the EPA to allow State or local authorities to address the situation.

References

Sullivan, T.F.P., “Environmental Law Handbook, Fifteenth Edition ”, Government Institute, Rockville Maryland, 1999.

Martineau Jr., R.J., and Novello D.P., “The Clean Air Handbook”, American Bar Association, Illinois, 1998

Boubel R.W., Fox D.L., Turner D.B., Stern A.C., “Fundamentals of Air Pollution”, Academic Press, San Diego, California, 1994

Chapter 7

Constitutional Limitations on Governmental Actions; State and Local Laws and Administrative Procedures

Goal

The purpose of this lesson is to develop an understanding of the Constitutional limitations put on governmental activity. Also, to develop an appreciation for the source of authority for state and local control programs and the various mechanisms for achieving enforcement, focusing on administrative procedures to secure compliance.

Objectives

At the end of this lesson, the student should be able to:

1. Identify the Fourth Amendment as providing protection from unlawful search and seizure and understand the limitations for gaining entry to a source premises.

2. Identify the Fifth Amendment as providing protection against self-incrimination (except for corporations).

3. Identify the Fourteenth Amendment as establishing the principals of due process and equal protection.

4. State the source of authority for controlling air pollution within a state.

5. Differentiate between common law and statutory law, including reference to nuisance.

6. Explain legislative and adjudicatory hearings.

7. Recognize that neither administrative nor court orders are self-enforcing.

8. Understand the process of enforcing orders and the adversarial nature of enforcement actions.

Introduction

This chapter will explain some of the limitations put on governmental activity by the U.S. Constitution. Also, this chapter deals with the legal basis for air pollution statutes and regulations and with basic administrative procedures.

Constitutional Provisions

There are several amendments to the U.S. Constitution which need to be considered by inspectors in the discharge of their duties (see Table 7-1). These Constitutional protections place a limitation on governmental activity.

Right of Entry: The Fourth Amendment

This amendment guarantees that citizens (including corporations) will be free from unreasonable search and seizure. It requires that a search warrant be obtained when entry is denied. In order to procure a search warrant, there must be “probable cause” that a violation exists. In *Camara v Municipal Ct. of San Francisco (1967*), the U.S. Supreme Court said that only “reasonable cause” is needed for administrative searches; (this standard requires less proof than is necessary for “probable cause”).

For an inspector, the search and seizure situation arises because most air pollution control statutes have a provision allowing entry into a facility at reasonable hours for the purpose of investigating suspected pollution activities. Usually, inspectors are not required to obtain a search warrant prior to conducting an investigation. The warrantless search is generally justified by the view that air pollution laws are for the protection of public health. If a warrant is not required, the key to the propriety of the search is reasonableness (“reasonable cause”). The search has to be reasonably related to air pollution control purposes and a certain amount of propriety has to be exercised, i.e., the inspection must be conducted during reasonable hours by individuals showing proper identification to the owner or manager of the facility. Therefore, a warrantless search will be justified when there is “reasonable cause” that a violation of a statute (CAA) exists at the facility (i.e. visible emissions or a complaint), or that the plant was inspected as a result of pre-existing scheme or plan for entries (to prevent malevolent motivated inspections).

In *Marshall v. Barlow (1978)*, the U.S Supreme Court held that the Occupational Safety and Health Administration (OSHA) warrentless search statute was unconstitutional. This required OSHA inspectors to obtain warrants prior to entering plant property to determine compliance with OSHA regulations. To date, there has been no such requirement placed on air pollution inspections. This can be because the CAA "Right of Entry" Statute (section 114(a)(2)) allows only limited warrantless administrative searches. Or, since the effects of an air pollution violation are felt directly by the public, the public's right to an investigation of the source seems stronger than in an in-plant situation. In any event, the issue raised by administrative searches involves a weighing of an individual's right to privacy against the need of a city, state, or Federal program to protect its citizens from hazards to their health or welfare.

Normally, warrants are only sought after entry is refused, because there is no need for a search warrant when the owner or operator has given his consent. If an EPA inspector is refused entry, the standard procedure for EPA will be obtain a search warrant and not even try to use the statutory authority. This avoids constitutional confrontation.

Prohibition against Self-Incrimination: The Fifth Amendment

This Amendment guarantees that persons cannot be required to give testimony against themselves. This protection applies in criminal cases. If the evidence collected is only used for civil actions such as injunctions or fines, the Fifth Amendment is not applicable. In addition, the Fifth Amendment rights apply only to individuals and not to corporations or partnerships.

Most air pollution control statutes have a provision requiring sources to supply emission inventory and other data to the enforcement agency. The Fifth Amendment has not posed a deterrent to the use of self-reported data when air pollution enforcement actions are civil actions rather than criminal prosecutions. In a case where the evidence or samples taken might be used in a criminal action, the person in authority; at the place where evidence is to be taken should be advised of his rights to remain silent, to have an attorney, and to be made aware that any evidence taken may be used against him in a subsequent criminal action.

Due Process and Equal Protection: The Fourteenth Amendment

This Amendment guarantees due process of law and equal protection for all citizens. It states that governmental action shall not deprive a person of life, liberty, and property without due process. There are two types of due process: Procedural and Substantive. "Procedural due process" provides people a right to a hearing or other procedures (i.e. notice) before some governmental action is initiated. For example, before an agency passes regulations, one of the best ways of ensuring Procedural due process is to provide an opportunity for public hearing prior to the adoption of regulations or prior to major agency action.

The second type of due process, "Substantive due process", scrutinizes government action. "Strict scrutiny" is used when governmental action impinges on a fundamental right (i.e. freedom of speech and religion, right of privacy, etc.). "Minimum scrutiny" is used when a lesser right is at stake (i.e. people's health that is protected by an air pollution statute). The Substantive due process test for "minimum scrutiny" for an environmental statute is that the statute be applied by the enforcing agency in a <u>reasonable manner</u> and that any standard adopted bear a <u>reasonable relation</u> to the interest it is designed to protect (i.e. public health, the quality of air resources, etc.).

The equal protection clause of the Fourteenth Amendment forbids the enactment of laws that establish <u>arbitrary</u> systems of classification or that permits <u>discrimination</u> between persons of the same classification. It scrutinizes governmental action the same as due process. The "minimum scrutiny" test for equal protection provides that persons or subjects may be classified for legislative purposes if such classifications are <u>reasonable</u> and bear a <u>rational relationship</u> to the purpose of the regulation. For example, a VOC control regulation may be directed at hydrocarbon storage tanks of a certain size, while excluding smaller tanks. This would not be unreasonable because the size of a storage tank is related to the amount of evaporative loss and is, therefore, a valid consideration in VOC regulation. However, a regulation would be arbitrary if it provided that any hydrocarbon storage tank with a bumblebee painted on its side would be exempt from regulation. Such a rule would not have any reasonable bearing on air pollution control.

State and Local Laws and Administrative Procedures

The second part of this chapter deals with the legal basis for state and local air pollution statutes and regulations and an introduction to basic administrative procedures.

<u>Police Power</u>

Police power forms the basis of state and local authority to control air pollution. Simply stated, police power is power reserved to the states by the U.S. Constitution that allows states to establish laws for the preservation of public order and tranquility; the promotion of the public health, safety, and morals; and, the prevention, detection and punishment of crimes. While states have police power to pass laws, local government can pass laws only if the state delegates them power to pass them (via enabling statutes), or if the local government has been granted home-rule power from their state constitution.

As long as pollution control legislation is founded on the need to protect the public health, not much question can be raised about its constitutional validity. However, some pollution control statutes cover additional areas, such as recreational and aesthetic interests. It is probably safe to say that the strength of a statute's constitutionality decreases as its coverage is extended beyond public health considerations.

Administrative Law

Administrative agencies have no inherent or residual authority, but can act (pass laws, etc.) only from authority that is “delegated” to them from state or federal statutes. These statutes are call “enabling” laws or acts.

Enabling legislation usually will specify the procedures that an administrative agency must follow. The agency must act in accordance to these procedures. If the enabling legislation is silent on agency procedures, then the agency must follow the procedures outlined in the Administrative Procedure Act (APA). There is a federal APA for federal agencies, and state Apes for state agencies.

When the different government bodies pass laws, the laws will be statutes, regulations or ordinances, depending on what governmental body passed the law. When legislative bodies pass laws, they are called “statutes” (i.e. federal CAA and state environmental acts). When local governmental units pass laws, they are called “ordinances”. When governmental agencies (state or federal) pass laws, they are called “regulations”. All federal agency regulations are contained in the “Code of Federal Regulations” (CFR). The proposed and final federal regulations are published daily in the “Federal Register”. State agencies follow a similar procedure.

Common Law Nuisance

Pollution was labeled a nuisance as early as 1611, when an English Court affirmed the granting of an injunction and awarded damages to a plaintiff upon a showing that the defendant had erected "a hog stye so near the house of the plaintiff that the air thereof was corrupted". As common law, it was not a personal environmental right to breathe clean air, but rather a property right, which was protected in a nuisance action.

Common law nuisance is defined as a substantial and unreasonable interference with another's use of his property. In testing for the existence of a nuisance, the courts balance the severity of injury caused by defendant's conduct verses the defendant's conduct. For example, in allowing an injunction (i.e. shut down or limit defendant's conduct), the court will balance the following factors: defendant's hours of operation, degree of harm caused, who was there first (coming to the nuisance), laches (how long did plaintiff allow the interference before suing), nature of both parties use of their property, conduct of others in the community, will an injunction put people out of work, and the availability of a pollution control method. There are two types of nuisance: private and public. A private nuisance harms only the plaintiff. A public nuisance harms the community (i.e. gambling house or obstruction of a highway).

The common law nuisance concept is evident in the fact that most clean air statutes define air pollution as "the presence in the atmosphere of air contaminants in such concentration and of such duration as are or may tend to be injurious to the public health, welfare and the reasonable use and enjoyment of property". A nuisance theory can be used effectively in areas where there is no air pollution control standard. For example, in an odor case, the most effective evidence is the testimony of witnesses who can relate how odors from a source make them ill, cause their food to taste funny, keep them awake at night, etc.

In planning a nuisance action, it is helpful for the complainants to keep some sort of diary in order to be as specific as possible about the nuisance conditions. For example, they should record the date, time, and wind direction (if possible) when the odors are the most severe. They must be able to connect the nuisance with the source, as well as show some adverse effect from the nuisance.

Notwithstanding its usefulness in areas not suited to emission limitations, there are a number of problems associated with a nuisance case:

a. It is fairly subjective, and it is therefore ill suited to guide engineering and business decisions.

b. The court "balances the equities" as explained above.

c. The interference must generally be of a type, which would affect a person of ordinary sensibilities.

The Statutory Approach

Since the 1930s, there has been a trend toward dealing with specialized areas of law by creating administrative agencies to "fill in the details" of a broad statutory framework. This has been done very effectively in the area of air pollution control. Legislators establish agencies, which in turn hire technical personnel and develop expertise to enact rules and regulations in specific areas. Advantages to this approach include:

a. More objectivity and predictability.

b. No harm must be proven when prosecuting for violation of an emission regulation because the legislature has, in effect, declared that any emission exceeding the standard is unlawful.

Hearings Prior to Regulation Adoption

In adopting air pollution control standards, agencies not only rely on their own technical personnel but also on input from regulated industries and the general public. One of the most effective mechanisms for obtaining this information is through public hearings. In fact, many federal and state statutes require a public hearing prior to the adoption of a regulation or SIP revision (e.g., _163(c)(1) of the CAA). This type of hearing is referred to as legislative or fact-gathering and differs from adjudicatory hearings in that it is not an adversary proceeding and there is generally no cross-examination of witnesses or use of the rules of evidence. The function of this hearing is simply to inform the public of proposed regulation and to collect information and data on the proposal.

Adjudicatory Hearings

The Federal government and most states have an Administrative Procedure Act which sets out certain requirements for contested case hearings. These hearings are judicial in nature. At the Federal level, the hearings examiners are referred to as Administrative Law Judges.

The term adversary should not be confused with antagonistic. The adversary system simply ensures that the ultimate truth of the matter is reached by the full presentation of all positions and arguments. At these hearings, the parties are generally represented by counsel and the rules of evidence are followed. All witnesses must be subject to cross-examination.

One area in which this type of hearing can be very effective is in enforcement proceedings. When an administrative agency feels that a company is in violation of a statute but does not have quite enough information for court action, it can benefit from conducting an adjudicatory hearing. These hearings are sometimes called "show cause" hearings, because the company is given notice to appear and show cause why an enforcement action should not be initiated. If, after reviewing evidence presented at the hearing, the agency is unable to find a justification for the source's noncompliance status, an enforcement order may be entered.

An administrative order can be extremely useful in that it can set out a detailed timetable for compliance. However, if this administrative order is violated, the control agency usually must go to court in order to enforce it. (In the case of the CAA, Section 113(a), administrative order enforcement, the EPA can initiate either civil judical proceedings or a Section 113(d) “administrative penalty order” via an EPA administrative hearing.) Therefore, if a compliance schedule is going to extend over a long period of time, it is generally preferable to have the schedule entered as a court order which can be enforced through contempt of court procedures.

Whether enforcement is sought through administrative or court actions, it is important to recognize that inspectors are one of the most important elements in the enforcement process, since they are the usual individuals on the scene. Any sample they collect or any violation they observe may be used as evidence in a hearing or in court.

Adjudicatory hearings can also be used prior to the issuance of construction permits. At these hearings, the applicant would have the burden of proof to demonstrate that all of the applicable permit requirements will be met. This will be particularly necessary in areas where the air quality increment will be consumed totally or in large part by a single source. The hearing format gives the staff of the control agency and the general public an opportunity to fully examine all aspects of the permit issuance. The CAA recognizes this in requiring a public hearing prior to the issuance of a PSD construction permit under Section 165.

Table 7-1

The Constitution of the United States

Selected Amendments

Article IV

The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

Article V

No person shall be held to answer for a capital, or otherwise infamous crime, unless on a presentment or indictment of a Grand Jury, except in cases arising in the land or naval forces, or in the Militia, when in actual service in time of War or public danger; nor shall any person be subject for the same offence to be twice put in jeopardy of life or limb; nor shall be compelled in any criminal case to be a witness against himself, nor be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation.

Article XIV

Section I: All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person with its jurisdiction the equal protection of the laws.

References

Gruber, C.W., and P.M. Giblin, "Air Pollution Field Enforcement: Student Manual", EPA 450/2-80-075, March 1980.

Sullivan, T.F.P., “Environmental Law Handbook, Fifteenth Edition ”, Government Institute, Rockville Maryland, 1999.

Martineau Jr., R.J., and Novello D.P., “The Clean Air Handbook”, American Bar Association, Illinois, 1998

Chapter 8

Litigation Procedures

Goal

The purpose of this lesson is to describe the important aspects of the legal enforcement processes and the involvement of the inspector in such cases.

Objectives

At the end of this lesson, the student should be able to:

1. Differentiate between civil and criminal litigation.
2. Define pre-trial discovery.
3. Define deposition.
4. Define interrogatory and tell when it comes into play.
5. Identify the principal rules of evidence.
6. Understand how evidence in admitted in court through authentication and relevance.
7. Know the different types of evidence.
8. Explain the basis for testifying as an expert witness.
9. State at least ten Do's and Don'ts for a witness when giving testimony.

Introduction

This chapter summarizes the basic rules of evidence and procedures for trial, with particular emphasis on the role of a witness.

Types of Litigation

Section 113 of the Clean Air Act allows EPA to file civil or criminal actions against persons who commit certain air pollution violations. Many states have passed criminal statutes (felony and misdemeanor) concerning hazardous pollutants. However, most state air control statutes allow only civil actions, and most local ordinances are only enforceable through criminal misdemeanor actions. Civil and criminal enforcement actions serve different functions and have different advantages and disadvantages.

Civil Actions

This type of action results in the levying of civil penalties and injunctive relief. Statutes generally provide for penalties of $50 to $1,000 per violation and in some cases, as high as $25,000 per day. Even though this may seem a tremendous deterrent to polluters, there are situations where it could be cheaper for a violator to pay these penalties rather than to comply.

One of the most effective air pollution control remedies is an injunction, where a court orders a source to take certain corrective steps within a given time schedule and to be in final compliance by a certain date. If the source does not comply with the court order, it can be held in contempt of court. A prohibitory injunction can be used to shut down a facility. Such a drastic measure is seldom used and most control agencies prefer to seek mandatory injunctions which set out a timetable for compliance.

After notice, a temporay injunction may be granted at an “ex-parte” hearing in order to “prevent irrepairable harm”. A preliminary injunction will be granted after only a short hearing if the “likelihood of success” of winning the case can be shown. A permanent injunction is garnted only after a full trial of the case.

Criminal Actions

Most local government prosecutions in municipal court involve criminal misdemeanor actions. These are not as well suited for the prosecution of on-going continuous violations because the fines for misdemeanors are generally set so low that a violator could simply pay a fine and continue to pollute.

In the criminal area, courts must be stricter in requiring that a control agency scrupulously observe the constitutional rights of the defendant. In addition, in a criminal case the control agency must prove the violations "beyond a reasonable doubt" rather than simply by "a preponderance of the evidence" as in civil cases. Furthermore, when a criminal action is brought against a corporation, the possibility of jailing a lower echelon employee may not be a sufficiently stringent deterrent. Since most of the litigation in which inspectors will be involved is civil, the discussion of litigation procedures will center on civil actions.

Pre-trial Discovery

The key to success in any type of litigation is preparation. Contrary to some of the popular television shows, there are rarely opportunities to drop bombshells in the courtroom. The purpose of pre-trial discovery is so that there are “no surprises” at trial. It gives an opportunity for the parties to discover the evidence that the other party will use in its case. Under federal and state rules of procedure there is ample opportunity for both sides to discover the evidence which the other side will present in court. In addition, under the Freedom of Information Act and Open Records Acts, control agency records are subject to full disclosure, even without discovery procedures.

Deposition

A deposition involves the oral questioning of a witness who is under oath. The testimony is not taken in open court, but it is reduced to writing and can be used at the time of trial. Attorneys representing all parties in the litigation are given an opportunity to be present and ask questions. Objections to questions can be made by opposing attorneys, but rulings by the presiding judge are made only if or when the deposition is offered for introduction into court proceedings. In general, any prospective witness can be deposed. Depositions serve a number of functions:

a. A general fishing expedition to try to determine what a witness knows or will testify to.

b. To perpetuate the testimony of a witness who will not be available at the time of the trial.

c. To later impeach a witness if their trial testimony is different from testimony in depositions.

Interrogatories

Interrogatories are a set of written questions to be answered by a prospective witness in a lawsuit. While interrogatories are cheaper than depositions, since no court reporter is needed and attorneys do not all have to gather for the asking of questions, they do not provide the flexibility of a deposition. For example, in a deposition, if a witness' answer opens up another area of information, the questioner can immediately proceed to explore this. This is, of course, not possible with interrogatories. Also, when a person is responding to written questions, there is more time to consider the response and give only as much information as is absolutely required.

Types of Evidence

There are four types of evidence: real, testimonial, demonstrative and judicially noticed. Real evidence consists of tangible objects that can be seen or felt. Real Evidence may be documentary (written material that speaks for itself; i.e. contract or will); physical (something tangible that was part of an event); or scientific (analysis based upon known and established methods). Testimonial evidence is information supplied by witnesses rather than objects, documents, or scientific analysis. Testimonial evidence may be given by a fact or an expert witness. A fact witness testifies to what he observed or experienced to the limit of his five senses and competency. An expert witness testifies on his expert opinion on the facts or data presented. An inspector is usually a fact witness.

Demonstrative evidence is used to illustrate or clarify information. It may be a diagram, model, representation or illustration used to help prove or disprove a fact. Judicially noticed evidence are things so commonly known or recognized that they do not require authentication. An example of this is that the sun always rises in the east, or that a foot is 12 inches.

Principal Rules of Evidence

The rules of evidence form the basis on which a trial is conducted. They determine whether certain testimony is admissible, and they are designed to ensure that a decision is based on proper facts.

Authenticity and Relevance

For evidence to be admitted in court, it must be authentic and relevant. Authentic means the evidence must be what it is claimed to be. For example, authentication of a physical object, such as pollution sample, would be shown by testimony to prove its chain of custody. (This proves that the sample came from a specific place and has not been altered on purpose or mischance.) Authentication of other evidence such as writings, recordings, photographs, conversations, etc. is established by laying a foundation. When you lay a foundation, you show that one piece of information leads to the next in a logical sequence. For example, to lay a foundation for a photograph the following must be established: (1) familiarity with scene or object in picture; (2) explain basis for familiarity; (3) recognize the object or scene in picture; and (4) that the photo is a true and accurate picture of the object or scene.

Besides being authentic, evidence must also be relevant. Evidence is relevant when it tends to make the existence of the fact in question either more or less probable than it would be without the evidence. This is called probative value. Relevant evidence can sometimes be excluded if its probative value is outweighed by the unfair prejudice or confusion the evidence can cause if admitted.

In a civil proceeding, documentation is anything which helps establish the foundation, authenticity or relevance leading to the truth of a matter. It may become evidence itself. The inspector's photos, notes, reports, chain of custody forms, and any business records obtained are all examples of documentation. Evidence and documentation are not necessarily the same thing. Evidence is used to establish the truth for an issue being contested in court or a formal hearing. Good documentation may become evidence or support evidence. Bad documentation will only raise more questions and often causes the truth to be lost.

Hearsay Rule

An *out of court statement,* used for the *truth of the matter asserted,* is "hearsay". The hearsay rule prohibits testifying to statements made out of court because such statements were not made under oath, there is no chance for cross-examination, and there is no opportunity to observe the demeanor of the person(s) making the statements. Statements that are not hearsay are "prior sworn inconsistent statements" (used for impeachment purposes only) and "admissions by a party opponent"; (e.g., A plant owner states, "I know my factory is violating the regulations, but I'm not going to do anything about it".) One of the many exceptions to the hearsay rule is for "business records", if they are made during the regular course of business, at or near the time of the event in question and the person testifying has personal knowledge of how records are kept. Another exception is for "recorded recollection”. For example, an inspector, who is now a witness and has insufficient recollection, can have his writings admitted into evidence, only after the inspector failed to recollect the content of writing after having his memory refreshed. Also, expert witnesses may testify to hearsay within their area of expertise. For example, a doctor may testify to a review of the literature regarding the topic in question.

Best Evidence Rule

Evidence presented must be in the best form for proving the facts in question. For example, the letter itself is the best evidence of what was stated in a letter, rather than a witness' recollection of the contents of the letter. The “best evidence rule” applies when the content of the writing is in issue. The rule will allow for a “duplicate” if there is no dispute over authenticity.

Leading A Witness

Counsel may not lead witnesses or ask questions which suggest the answers. This prohibition does not apply to witnesses being cross-examined or to expert witnesses at any time.

Do's and Don'ts for Witness

1. Listen attentively to each question.

2. Think before responding (your attorney may use this opportunity to raise valid objections).

3. Speak slowly and distinctly, both on the witness stand and in a deposition.

4. Answer questions directly.

5. Avoid extended qualifications or explanations.

6. Do not be verbose. Answers should be as brief as is necessary. Don’t volunteer information and know when to shut up.

7. Do not interpret facts unless called upon to do so as an expert witness.

8. Stick to the facts.

9. Be honest; do not stretch the facts.

10. Never guess when answering a question. If you don't know the answer, say so.

11. Never hesitate to frankly admit that you don't remember certain physical facts.

12. Never memorize a story.

13. Do not read directly from notes, although notes may be used to refresh your memory.

14. Beware of questions that seek to force a yes or no answer.

15. Refuse to be ashamed or startled into giving an answer you didn't intend to give.

16. Never argue with opposing counsel (or the judge).

Informal Conferences Off-the-Record or In-Chambers

The judge or the attorneys representing the parties may request that certain discussions be off-the-record, which means the discussion will not be a part of the official court record. The judge may end formal proceedings in the courtroom and continue discussions in-chambers or call in-chambers meetings for discussion of possible compromises on the issues or negotiations among or between the parties. Such chambers conferences may or may not result in further proceedings in open court and on the record. Witnesses may or may not be asked to participate in proceedings in-chambers, as the judge specifies. Many enforcement actions are resolved in Agreed Judgments without going to actual trial.

References

Smith, W.D. “Conducting Environmental Compliance Inspections: Inspector’s Field Manual Eight Edition”, EPA 910/9-91-047, November 1997.

Gruber, C.W., and P.M. Giblin, "Air Pollution Field Enforcement: Student Manual", EPA 450/2-80-075, March 1980.

Lipson, A.S. “Is it Admissible, 1999 Edition”, James Publishing, Inc., Costa Mesa, California, 1999.

Chapter 9

Courtroom Procedures

Goal

The purpose of this lesson is to demonstrate courtroom procedure by viewing and discussing the video, "Role of the Witness".

Objectives

At the end of this lesson, the student should be able to:

1. Distinguish between effective and ineffective court demeanor.
2. Identify effective use of photographs, maps and charts in giving testimony.
3. React effectively to questioning under cross-examination.
4. Present effective testimony when called upon to do so.

Introduction

In a court proceeding, a witness is presented to the Court by one of the parties to the litigation, i.e., the witness supports the claim of either the plaintiff or the defendant. Responses to questioning by the attorney representing the party on whose behalf the witness is testifying is termed direct testimony. After the direct testimony is presented, attorneys representing the opposing party may then cross-examine the witness. When cross-examination is completed, the original offerer may ask questions that relate to answers given by the witness during cross-examination. This is termed re-direct testimony.

The Role of the Witness

The purpose of the video, "The Role of the Witness", is to provide a demonstration of courtroom procedures, with particular emphasis on the testimony of an agency inspector. The video was prepared by the University of Kansas, and presents a case involving enforcement of the requirements for asbestos abatement. Students have an opportunity to observe cross-examination techniques and to see the applicability of the rules of evidence in the context of particular testimony. The importance of cross-examination is vividly demonstrated.

The fundamental benefit to be derived from the video is the portrayal of the professional and impartial demeanor of the witness. The inspector does an excellent job of showing how effective calm and unbiased testimony can be.

Vocabulary of the Courtroom

Certain expressions used in the courtroom may be puzzling to persons not familiar with them. Judges are rarely addressed by name; instead, whether there is one judge (as in a trial court) or several (as in an appellate court), judges are referred to as "the Court" or "this Court". Attorneys rarely use personal pronouns referring to the court--you, yours, he, his, her, hers, etc. Instead, for example, a lawyer will begin a presentation to the judge with the expression, "May it please the court, ...". A witness should not let this unique language be confusing.

The statement that a Court can "consider the equities" in a proceeding before it, means that a Court, in either a contest or an agreed judgment, may extend deadlines and compliance schedules beyond those prescribed by statute. Similarly, the Court may assess or apprise a penalty less than the stated maximum.

References

Gruber, C.W., and P.M. Giblin, "Air Pollution Field Enforcement: Student Manual", EPA 450/2-80-075, March 1980.

Chapter 10

Overview of Federal Enforcement

Goal

The purpose of this lesson is to present the Federal enforcement options under the Clean Air Act.

Objectives

At the end of this lesson, the student should be able to:

1. Name the sections of the CAA, which pertain to EPA enforcement responsibilities.
2. Explain the changes the 1990 Amendments had on EPA enforcement activities.
3. Name the different types of federal enforcement action for violations of the CAA.
4. Know different types of criminal, civil and administrative penalties provided by the CAA and when they apply.
5. Explain the differences between an "administrative compliance order" and an "administrative penalty order".
6. Know the criteria EPA uses in evaluating penalties.
7. Understand the CAM rule and the "any credible evidence" rule.
8. Explain why is it beneficial for a company to conduct a compliance audit.

Introduction

The 1970 Clean Air Act (CAA) and its amendments state, "prevention and control for air pollution at its source is the primary responsibility of states and local government". The CAA requires that states are responsible for enforcement of their "state implementation plan" (SIP). Local governments can have air pollution enforcement responsibility, either by state delegation or by passing local ordinances. Although the vast majority of CAA enforcement is initiated by states, the CAA reserves concurrent enforcement powers for the federal government. As a result of the 1990 Amendments to the CAA, the EPA now have a broader range of enforcement options, with a greater potential for monetary penalties, than state enforcement programs. This lesson will be concerned with the enforcement options available to EPA in carrying out the provisions of the Clean Air Act. The EPA can take the following actions against persons found in violation of the Act:

1. Issue administrative compliance orders;
2. Issue administrative penalty orders;
3. Issue field citations;
4. Bring civil actions in U.S District Court;
5. Seek to initiate criminal proceedings.

Provisions of the CAA, which Pertain to Federal Enforcement

The provisions of the CAA which establish the Federal enforcement program are:

- Section 113(a): authorizes the EPA to issue an "administrative order" to comply with the CAA whenever it finds a violation of Title I (SIP, NSPS, HAP, New Source Review, etc.), Section 303 (emergency orders) of Title III, Title IV acid rain, Title V permits, and TitleVI stratospheric ozone.

- Section 113(b): allows the EPA to take a civil action (in U.S District Court via the U.S. Department of Justice) to obtain a civil fine or/and an injunction for any violation of the CAA.

- Section 113(c): allows the EPA to initiate criminal charges and fines for knowing, and negligent violations.

- Section 113(d): authorizes the EPA to assess civil penalties by using "administrative penalty orders" from, EPA conducted, administrative penalty hearings; also establishes the EPA "field citation program.

- Section 113(e): directs courts and EPA to consider a set of factors in assessing penalties.

- Section 113(f): allows EPA to grant awards (up to $10,000) to citizens for any information that leads to convictions of the CAA.

- Section 113(g): allows for public participation in proposed settlement agreements (except for cases involving noncompliance or mobile sources).

- Section 114: aids enforcement by allowing EPA to require the use of audit procedures; such as record keeping on control equipment parameters, production variables, or other indirect emission monitoring when direct monitoring is impractical, and compliance certification.

- Section 120: authorizes EPA to issue a notice of noncompliance and a noncompliance penalty for designated violations of the CAA.

- Section 205(c): authorizes EPA to assess civil penalties for violations of the mobile source provisions of the CAA.

- Section 303: establishes EPA "emergency orders" program.

- Section 304: allows "citizens suits" to enforce the CAA.

- Section 306: disallows any federal contracts to a person convicted of a criminal violation of the CAA.

Clean Air Act Enforcement History

Enforcement Prior to the 1990 amendments

Before the 1977 Amendments, CAA enforcement consisted of negotiations with violators and issuance of administrative orders under Section 113, with extended schedules for compliance. EPA could institute civil actions for an injunction against further violations or it could seek criminal penalties where it possessed appropriate evidence to meet the burden of proof. In addition, the 1970 CAA had no provision for public participation in the administrative enforcement process, and there were no standards for the issuance of administrative orders under Section 113.

The 1977 Amendments restricted the discretion of Federal enforcement actions. These Amendments required EPA to sue any major stationary source still in violation of a SIP more than thirty days after the Administrator notified the source of its violation. A copy of the "notice of violation" was sent to the state involved to afford the state an opportunity to take enforcement action within the thirty-day period. After expiration of 30 days, EPA was allowed to issue “administrative orders” requiring compliance with SIP provisions, issue an “administrative order” assessing a civil penalty or take civil enforcement action.

Clean Air Act Amendments of 1990

The 1990 Amendments rewrote most of Section 113, giving EPA broader enforcement powers. The criminal penalties were vastly expanded under Section 113(c). The punishment for existing crimes was enhanced to felony status, and the maximum fine was substantially increased. There are now four classes of criminal offenses: (1) negligent, (2) knowing, (3) knowing endangerment, and (4) tampering with monitors, falsification, and failure to make required reports.

Before 1990, virtually all CAA enforcement of civil penalties occurred in federal district court because there was no viable administrative alternative. The 1990 Amendments overhauled and greatly expanded EPA’s administrative authority under the CAA. It added a new Section 113(d) authorizing EPA to assess civil penalties through “administrative penalty orders”, and allowed the violator an administrative hearing held according to the Administrative Procedure Act (APA). Section 113(d) also established the new EPA “field citation program” to deal with minor violations of the CAA. These field citations may be contested through a non-APA type hearing.

CAA Enforcement Actions and Penalties

Criminal

Before the 1990 CAA Amendments, criminal offenses under the CAA were limited to misdemeanors and fines of up to $25,000 per day of violation. The CAA’s criminal sanctions provision under section 113(c) has been substantial changed by the 1990 Amendments. Today, “Knowing” violations of the CAA are a felony and can result in fines of up to $250,000 (individuals) $500,000 (corporations) per day of violation and up to five years imprisonment. “Knowing” actions to falsify reports, of failure to keep necessary monitoring records and of material omissions from such reports and records, is a felony and can result in the same fines as above and up to 2 years imprisonment. “Knowing” failure to pay a fees or administrative fines is a misdemeanor and can result in fines of up to $100,000 (individuals) $500,000 (corporations) per day of violation and up to one year imprisonment.

These CAA criminal provisions impose different liability standards on employees based on their hierarchy in the company. Accordingly, the definition of a criminally liable person excludes “an employee who is carrying out his normal activities and who is acting under orders from the employer,” unless employee’s conduct was “knowing and willful”.

Section 113(c) also now imposes criminal penalties for “knowing” or “negligent” releases of hazardous air pollutants (Section 112 of the CAA) or any “extremely hazardous substances” (Section 302(a)(2) of the “Emergency Planning and Community Right to Know Act”) into the ambient air and “knowingly” place another person in “imminent danger of death or serious bodily injury”. For a “knowing” release, fines can be as much as $250,000 (individual) $1,000,000 (corporation) per day and up to 15 years imprisonment. For a “negligent” release fines can be as much as $100,000 (individual) $200,000 (corporation) per day and up to one year imprisonment.

Section 306 of the CAA disallows the rewarding of any federal contracts to any facility owned or operated by a person convicted of a criminal violation of the CAA. The purpose behind this federal procurement bar is to prohibit the use of federal funds to subsidize or give advantage to persons violating the CAA.

Civil Judicial Actions

Section 113(b) of the CAA provides that EPA can initiate civil actions for past and on going violations. The Department of Justice (DOJ) in U.S. District Court brings these actions for appropriate relief, including a permanent or temporary injunction, and/or a civil penalty of not more than $25,000 per day of violation. These violations can be of the requirements and prohibitions contained in the state implementation plans and permits as well as the rest of the requirements in the CAA. Civil actions can also be brought whenever an owner or operator is attempting to construct or modify a major stationary source in violation of CAA new source review requirements. EPA has authority to halt the construction or modification of new sources that are violating new source review requirements.

When EPA files a case with the DOJ, the EPA will inform the DOJ on the description of evidence supporting the violations, a discovery strategy and analysis of an appropriate settlement penalty. As a result of Executive Order 12788 (1991), the DOJ is now required to contact the proposed defendant to attempt to settle the case before filing the complaint. This letter briefly describes the violations, proposes a settlement penalty, and suggests a time frame for a settlement conference. If a settlement is reached, the agreement is put into a consent decree, which is proposed for court approval. If a settlement is not reached then litigation is initiated in civil court.

Section 113 Administrative Orders and Penalties

As a result of the 1990 Amendments, the EPA, under section 113, now has broad authority to impose administrative orders and penalties on alleged violators without going to court. Section 113(a), allows EPA to issue an administrative order to comply for most violations of the CAA (except Title II, Mobile Sources). This “administrative compliance order” (ACO) must reasonably specify the nature of the violation and reasonable time for compliance, but in no event longer than one year after the date of the order’s issuance. If the ACO is for violation of a SIP, then the EPA must issue a “notice of violation” (NOV), to the source and the state, thirty days prior to the issuance of the ACO. Except in cases concerning HAP, the ACO is not effective until a conference is held with the violator to discuss the order. The conference is usually held 10 to 14 days after issuance of the ACO. Failure to comply with an ACO may subject the source to civil penalties. However, EPA must initiate separate civil judicial or administrative action pursuant Sections 113(b) or 113(d), respectfully, to collect penalties or mandate compliance with the ACO. Judicial review of an ACO is unavailable, because it not considered a “final action”.

New, under the 1990 Amendments, Section 113(d) of the CAA authorizes EPA to issue “administrative penalty orders” (APO) of up to $25,000 per day of violation with a cap of $200,000. An APO can be issued for any violation of the CAA except Title II, Mobile Sources. Upon receipt of an APO, a violator has 30 days to request an administrative hearing with the EPA. This hearing will be held according to the procedures required by the Administrative Procedure Act. This “administrative penalty order” is appealable by filing with the U.S. District Court within thirty days.

Also new, under the 1990 Amendments, Section 113(d)(3) authorizes EPA to issue “field citations” for minor observations observed in the field. Fines can be issued for up to $5,000 per day of violation. The source can contest these field citations through an informal hearing that is not subject to the Administrative Procedure Act. Nonpayment penalties and judicial review of hearing results on “field citations” are the same as procedures allowed for “administrative penalty orders”.

Section 120 Administrative Penalties

EPA or the state may assess a noncompliance penalty against a major source. The amount of the penalty can be no less than the economic value, which a delay in compliance beyond July 1, 1979, may have for the source owner. Before the 1990 Amendments, section 120 provided the only administrative penalty authority available under the CAA. Today the CAA now allows for recoupment of economic benefit in relatively streamlined administrative proceedings, therefore Section 120 administrative penalties will cease to be used the EPA.

EPA Emergency Powers

The Pre-1990 CAA, Section 303 provided that when a pollution source is presenting "imminent and substantial endangerment to the health of persons", and the "appropriate state or local authorities have not acted to abate such sources", the Administrator may bring suit to immediately restrain the violation. EPA has rarely used this provision. The 1990 Amendments now allow these emergency orders when there is “imminent and substantial endangerment to the public health or welfare or the environment”, and do not require the EPA to allow State or local authorities to address the situation.

Citizen Suits

Under Section 304, citizens may sue after giving at least 60-day notice to the pollution source, EPA, and state. They can sue pollution sources for non-compliance with an emission standard or order issued by the EPA. They can sue the EPA for failure to perform any non-discretionary acts required by the CAA. Any fines received as a result of a citizen suit does not go to the U.S. Treasury, but instead goes to the EPA for funding of air programs. Also, as a result of 1990 Amendments, under Section 113(f), a citizen may now receive a reward of $10,000 for giving information to EPA that leads to successful criminal or civil suits.

Differences between Civil and Criminal Enforcement

The principal differences between civil and criminal enforcement are that in criminal cases:

- Searches of property can occur only with consent or with a warrant based on sworn testimony that there is “probable cause” to believe that a crime has been committed.
- The defendant has other constitutional guarantees (i.e. Fifth Amendment protection from self-incrimination).

- Discovery of government-held information is limited, except for information that would tend to show the innocence of the accused.
- The burden of proof is more strict than that for civil cases: "beyond a reasonable doubt"
- The penalties are more severe: imprisonment or a fine, or both.

Penalty Assessment Criteria

Except for some minor instances, courts and administrative law judges are required to consider identical penalty assessment factors for both stationary and mobile source violations in judicial or administrative proceedings and citizen suits. When assessing the penalty, the following factors must be considered: size of the business, economic effect of the penalty, compliance history of the company, duration of violation, previous penalties for same offense, economic benefit that the company receives for failing to comply, and the seriousness of the violation.

Compliance Certification Program and Enhanced Monitoring

Section 114(a)(3), as revised by the 1990 CAA Amendments, requires major sources to submit annual compliance certificates, reports and enhanced monitoring. Annual compliance certifications should provide information concerning a source's noncompliance status. Congress intended these requirements to shift the burden of compliance assurance to the source. They are hoping this information will qualify as admissions and *prima facie* evidence of liability.

As result of Congress requiring "enhanced monitoring" of major sources, the EPA passed the "Compliance Assurance Monitoring" (CAM) Rule (62 Fed. Reg. 54900 (1997)). This Rule is intended to assure continuous compliance with CAA emission limitations through frequent monitoring of a facility's control equipment (i.e. monitor specific indicators of a control device's performance such as temperature, airflow, pressure, etc.) or any processes significant to achieving compliance. Performance specifications for CAM monitoring must assure that the data generated will "present valid and sufficient information on the actual conditions being monitored". The CAM Rule is applicable to Title V major sources. These sources are responsible for developing the monitoring approach that it believes will satisfy the CAM requirements. Title V permitting authority shall review and approve the CAM plan. The effect of the CAM Rule is that evidence of liability can now be more easily obtained.

The Any Credible Evidence Rule

Under Section 113(e)(1) of the 1990 Amendments, Congress gave the EPA authority to use (in lieu of applicable test methods) “any credible evidence” to prove a violation. This removed restrictions that require strict proof of violations based on EPA-approved reference test methods by using “any credible evidence”. The EPA adopted regulations to implement these provisions. (See: 62 Fed. Reg. 8314 (1997)). These regulations are called the Any Credible Evidence Rule. This Rule will allow the use of any credible evidence for enforcement purposes. Prior to the Any Credible Evidence Rule, EPA required that a violation of an emission standard would have to be proved by using EPA reference test methods. Now, by using this Rule, noncompliance can be shown by using any credible evidence such as continuous emission monitoring data or other emissions records. The effect of this Rule is not only an asset to EPA enforcement, but greatly helps out citizen’s suits by making evidence of noncompliance more easily obtainable by using freedom of information acts.

Compliance Audits

In light of the expansion of criminal liability under the CAA, a company should consider conducting an internal environmental compliance audit. Although the company will have an affirmative duty to report violations of the CAA when it discovers them, voluntary disclosure and cooperation with EPA will mitigate and reduce an enforcement action. In 1995, EPA issued a notice that provided that it would seek lower civil penalties and not pursue criminal action where a company discovered, voluntarily reported, and promptly corrected violations pursuant to an audit program.

Also, numerous states now have adopted audit privilege laws. Typically, the audit privilege laws offer either a qualified evidentiary privilege or immunity (or reduction) from penalties for violations discovered during a compliance audit. Most state privilege laws require that the company properly initiate corrective action.

References

Sullivan, T.F.P., “Environmental Law Handbook, Fifteenth Edition ”, Government Institute, Rockville Maryland, 1999.

Martineau Jr., R.J., and Novello D.P., “The Clean Air Handbook”, American Bar Association, Illinois, 1998

Chapter 11
Handling Nuisance Complaints

Goal

The purpose of this lesson is to introduce the principles of processing nuisance complaints, with special emphasis on the field investigation process.

Objectives

At the end of this lesson, the student should be able to:

1. Identify at least five sources of citizen complaints.

2. Identify the major information needed when receiving citizen nuisance complaints.

3. Document the procedure for investigation and case development of public nuisance complaint.

4. State various techniques for getting action from responsible parties in abating the source of the complaint.

5. Identify techniques for evaluating complaint conditions by measuring the effect.

6. Differentiate between a public and private nuisance.

Introduction

Responding to citizen complaints is an important task for the air pollution inspector. It can often be quite time consuming, with great difficulties in legal prosecution should that be necessary to secure abatement.

Public Nuisance, Legal Aspects

The inherent responsibility for enforcement against public nuisance begins with state and local statues. A typical regulation might read:

> "...No person shall discharge from any source whatsoever such quantity of air contaminants or other material which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public..."

The intent here is quite clear: no one should cause a public nuisance. However, the use of the phrase "cause ... annoyance to any considerable number of persons" to characterize the significance of the event is vague and may cause problems in enforcement of this regulation. Some agencies have suggested ten separate households as a rule of thumb for defining "considerable number" and then proceed with less if the situation is very bad, or require more if the nuisance is marginal.

An emission that affects only one person is a private nuisance and is not subject to prosecution under the above quoted statute. However, the agency has a responsibility to respond to all nuisance complaints, including those from a single complainant, and every attempt should be made to alleviate the nuisance situation. A single individual who suffers a nuisance is free to take legal action against the suspected source for damages or injunction. In such an action, the inspector may be called as a witness to testify to the extent or effect of the nuisance. A public nuisance is one which affects an indefinite number of persons in a community.

Causes of Nuisance Complaints

Nuisance complaints are typically triggered by one or more of the following:

- Offensive odors.
- A specific violation, most probably opacity.
- Large particle fallout--easily visible on porches, lawn furniture, and plants, etc., but difficult to identify the source.

- Fugitive dust from construction or demolition activities.
- Plant or material damage.
- Fugitive dust from an industrial source.
- Episodal releases potentially affecting public health.
- Open burning.
- General conditions such as "The air is awful today", "My eyes burn and my throat is sore", "The cat's hair fell out", etc.

Receiving a Complaint

A nuisance complaint can be transmitted to the agency by telephone, facsimile, letter, personal visit or by referral from a central governmental reporting agency. Most complaints are phoned in to a receiving clerk, who should be trained and experienced in processing such calls. Often the caller is irritated and emotional, rather than factual. Under such circumstances, the caller should be allowed to talk themselves out before being questioned for the facts needed to properly dispatch an inspector.

Each agency usually employs its own complaint form to log information received from the caller. Typical questions include:

- What is your full name, address and phone number?
- What is the condition being complained of?
- Where do you think it is coming from?
- Is it going on now?
- When did it start?
- Have there been other occurrences? Get specific dates and times.
- Is anyone there sick?
- Are other people bothered?
- Listen for other specific data related to the event.

The complaint form should also include space for the date, time and name of the person taking the complaint and the time the inspector is dispatched.

After the message log is completed, a complaint number is usually assigned, the time is stamped on the log and an inspector is sent to the scene. Complaints should be investigated as speedily as possible to improve the chances that the reported source may be reached while the violation or nuisance is still in progress.

Complaint Investigation

If the reported source of a complaint is in an inspector's district, much may already be known about the situation. Regardless, before departing on any complaint investigation, the inspector should take a few minutes to check the source's file to obtain the most recent history, if possible.

Upon arrival in the vicinity of the complainant, the inspector may decide to first observe the alleged source to determine if a violation is currently occurring. This approach is most effective when the source is definitely known and the events are recurring. If a violation is observed, the inspector may elect to serve a notice of violation or, if the cause of the complaint is easily corrected, secure a remedy to the situation.

If the cause of the complaint or the details of the event are uncertain, the inspector may decide to visit the complainant first. The advantage of the former approach is that, by the time the complainant is visited, the inspector may be able to report what actions have been taken to alleviate the problem.

Complainant Interview

The inspector should make every effort possible to avoid obvious identification of the complainant. Particular care should be taken not to park an official vehicle too close to the complainant's residence, should the complainant and the source be near each other. The identities of all complainants should be considered confidential and should not be disclosed to anyone not an employee of the enforcement agency.

If the complainant is not at home, the inspector should leave a message. If the complainant is at home, the inspector should provide identification and proceed with the interview. The inspector should be friendly but dispassionate, employing a non-direct technique that allows the complainant to vent frustration and anger over the matter so that the facts of the situation can be calmly discussed. It is best if the inspector not interrupt while permitting the complainant to speak their mind. However, it is particularly effective if, when facts appear, the inspector repeats them aloud for verification and then writes them down.

After the concerns of the complainant have been expressed, the inspector should proceed on a line of questioning that will determine both the cause of the complaint and the nature and source of the air pollution problem. This line of questioning is primarily intended to complete and verify the data supplied by the complainant.

The cause of a complaint may not always involve air pollution. Although most complaints are justified, some will concern problems over which the agency has no control and in which air pollution may play little or no role. These situations include backyard feuds, natural contaminants, resentment towards a nearby company or low concentrations of contaminants that affect particularly sensitive individuals. Although the inspector may have no legal powers in such cases, the complaint should be investigated to determine if an air pollution problem exists.

In conducting a complaint investigation, the information given over the phone is checked and enlarged to include the following:

- Name and location of source complained about.
- Frequency of occurrence.
- Time of day nuisance was first noticed.
- Duration of nuisance during each occurrence.
- Names and addresses of persons affected.
- Location and extent of property damage, if any.
- Description and frequency of any illness alleged to have resulted from air contaminants.
- Description of odors or other pollutants that may be involved.
- Any other information the complainant may have that will relate the nuisance to a specific source.

In an air pollution situation that appears to involve exposure to potentially toxic compounds, the inspector should record all observed or reported symptoms, such as:

nausea	eye tearing
vomiting	soreness of throat
headache	nasal discharge
eye irritation	turning blue
fever	cough
constriction of chest	difficulty breathing

The inspector may also wish to notify the enforcement agency so that a sampling vehicle can be dispatched to the scene to measure concentrations. If symptoms appear serious, a physician and the health authorities should be contacted. It should be noted that only a physician can make a diagnosis. However, the inspector may wish to record the name of the physician, the diagnosis and the treatment prescribed. This information may be important if a public nuisance action should be initiated.

While interviewing complainants, the inspector should not promise legal action nor commit the agency to any course of action. Instead, the laws involved and the evidence required to instigate legal proceedings should be explained to the complainant, noting that cooperation on the part of those who may be responsible will be sought first.

If odors, soiling or other property effects are involved, the inspector should examine the pattern of fallout or effects for any indication of the direction of the source. If possible, the wind direction should be determined to aid in tracing the contaminant.

As a rule, inspectors should not solicit opinions regarding the behavior of any source, and should instead confine themselves to those persons volunteering complaints. If the situation is widespread, neighborhood activists will usually canvass the area and organize the complainants. The inspector then interviews those individuals that come forward. Canvassing of the neighborhood by an agency inspector could be construed in a court of law as being prejudicial to the source.

The inspector should evaluate the consistency, correspondence and intensity of remarks made by various witnesses and attempt to find some degree of unanimity regarding the objectionability of the problem among those who might be equally affected. Diverse opinions and inconsistencies are the first signs that a public nuisance case may not be easily developed.

Inspection of the Source

From the facts gathered so far, the inspector may know the type or even the specific source responsible, especially if the contaminants have been identified and definite evidence of damage or detected odors on the complainant's property have been observed. In other cases, the identity of the contaminants may be known, but not their source of origin. In still other cases, the contaminants and the source may be completely unknown.

To establish a public nuisance, a source within a certain facility responsible for the offending emission must be proved. In some cases, the equipment involved may be obvious. In others, especially in a plant containing many pieces of equipment, the source may be difficult to locate. In this latter instance, each piece of equipment must be inspected in detail. Those which do not contribute to the problem are eliminated from consideration.

Quite often the complaint or nuisance involves the violation of regulations limiting the emission of a specific contaminant, the operation of unpermitted equipment, or the operation of permitted equipment contrary to permit conditions. In these instances, the action to be taken is indicated by the nature of the regulation violated. If, however, the nuisance is a result of quantities of contaminants which are allowed by the regulations, a public nuisance will have to be proven.

When an inspector visits a source in response to a complaint, the reason for the investigation is usually stated, unless, in the individual instance, it should be strategic not to do so. If the purpose is acknowledged, the inspector may also wish to explain that determining whether the complaint is justified is part of the investigation. This gives management the opportunity to state its case, since it knows that the inspector is not yet committed to any action.

As with the complainant, the inspector is courteous and attentive and takes notes. Using information acquired from the complainants, questions are developed and structured to provide a clear indication of the events involved. The source is then inspected, and actual operating conditions, cycles and times of operation are compared with the times and frequencies of the complaints.

Resolution of the Nuisance

Because the inspector is an indifferent observer between two parties in conflict, there is a natural tendency to act as mediator and attempt to find a solution to the problem that will satisfy the complainant, the source and the law. This is noble work; however, in such situations, the inspector must be careful not to incur liability, either individually or as a representative of the agency, for a failed strategy.

After the problem is identified and the specific source is isolated, means of abatement may then be determined. If the problem was a single occurrence, it probably was not anticipated and was perhaps caused by a breakdown, a fire, a power shortage or some other situation equally unforeseen. The chances of this same incident happening again are slim, preventative action is unlikely, and corrective measures unnecessary, except to repair or compensate for damages. Where the problem is operator error, it becomes the company's responsibility to ensure that personnel are adequately trained.

When the problem is continuing or recurrent, it becomes critical to eliminate the cause. Occasionally, an improved regular maintenance program will abate the problem, either by reducing the likelihood of a breakdown or by preventing a situation causing emissions. Sometimes the problem can be solved by altering the operation or process somewhat, without actually altering the equipment. This may involve changes in the processing rate, changes in operating conditions or changes in the materials being processed. Relocation of equipment within the plant may also solve the problem.

Ideally, when equipment is first put into operation, those operating conditions which could cause a public nuisance should be anticipated. Restrictions can then be placed on the permit to limit operations to those conditions which will not cause a nuisance.

The most common solution involves either replacing the processing equipment with a less polluting system or installing downstream control equipment. Afterburners, adsorbers, absorbers and condensers have all been used successfully to remove VOCs, toxic compounds and odors from gas streams; and cyclones, fabric filters, electrostatic precipitators and scrubbers have been effective with particulate matter.

Enforcement

The most difficult type of air pollution case is the public nuisance. A public nuisance frequently occurs when a number of persons are annoyed by a quantity of contaminants that is otherwise allowed. One problem arising in cases of this sort is to determine whether, indeed, the nuisance is public. If a private dispute is involved, then the citizen must initiate legal action. A public nuisance, however, involving a "considerable number of persons" or a reasonable cross-section of the immediate community affected, is handled as an agency enforcement action.

References

Gruber, C.W., and P.M. Giblin, "Air Pollution Field Enforcement: Student Manual", EPA 450/2-80-075, March 1980.

USEPA, "Basic Inspector Training Course: Fundamentals of Environmental Compliance Inspections", Office of Enforcement and Compliance Monitoring, February 1989.

Chapter 12
Odor Detection and Evaluation

Goal

The purpose of this lesson is to introduce the principles of odor detection and evaluation.

Objectives

At the end of this lesson, the student should be able to:

1. Define odor and odorant.
2. Identify the characteristics of odor perception.
3. State the four odor parameters.
4. Name which parameter is used in odor regulations.
5. Explain why odor measurement by instruments is difficult.
6. Define odor unit.
7. Name three instruments which aid odor threshold measurement.
8. Identify the characteristics of odor transport from source to receptor.
9. Explain a means of tracing an odor source.

Introduction

Odors that result from one chemical compound can be regulated in much the same manner as that employed for a criteria pollutant, i.e., set an air quality standard and regulate emissions to achieve it. However, odors generally result from a combination of compounds, sometimes in large numbers. In this situation, enforcement as a public nuisance is the approach typically followed. One problem complicating enforcement is that there are essentially no reliable, objective methods for field identification of specific compounds and conditions causing odors or for quantifying the concentration of odorants in the ambient environment. Nevertheless, an inspector trained in odor evaluation should:

a. Have knowledge of the sources, which produce odors, and the physical conditions that affect odor potential.

b. Be able to identify odors in the field.

c. Have knowledge of the conditions that affect odor perception and of scientific techniques used in odor evaluation.

d. Be able to objectively evaluate his or her own perception and level of odor sensitivity in relation to complainants and the general population.

This chapter will provide an introduction to these topics.

Characteristics of Odors and Odorants

A major difficulty in dealing with odors as an air pollution problem arises from the fact that an odor is not actually an air contaminant but rather a property of air contaminants, which can only be detected or measured through its effects on the human organism. Briefly, an odor is that property of a substance, which affects the sense of smell. A contaminant, which has an odor, is called an odorant.

The capacity in humans to perceive odors varies considerably among individuals and in one individual from time to time. Some persons ("anosmiacs") are very insensitive to odors, while others may be acutely sensitive to odors that are unnoticed by most people. This variability of individual sensitivity complicates the problem of estimating the prevalence of an odor nuisance.

The air pollution inspector is primarily interested in establishing the existence of an odor problem according to some legal criteria, e.g., a problem that constitutes a nuisance to a considerable number of persons over a continuing or significant period of time. In such situations, the inspector is concerned with identifying the odor, rating the odor's intensity, identifying the odorant, establishing the frequency of the nuisance, locating the "odor route", locating the source of the odorant, and influencing some operational or engineering control over the odorant.

Odor Perception

There are a few characteristics of odor perception, which the inspector should be familiar with in determining whether an odor problem exists. These are as follows:

a. The olfactory sense becomes fatigued after continuous exposure to an odorant.

b. An odor is usually detected whenever there has been significant change in odor quality or intensity. When increased in intensity, even a pleasant odor can become objectionable to one who has become used to it under continuous exposure.

c. Odors do not, in themselves, cause physical disease. The odor of many toxic materials (e.g., chlorine, sulfur dioxide, hydrogen sulfide) may serve as a warning, however. Odors may bring on nausea and have an adverse effect on asthmatics.

d. A person's ability to perceive odors varies from day to day.

e. Compounds of different constitution may yield similar odors, where as compounds of very similar constitution may yield different odors.

f. An unfamiliar odor is more likely to cause complaints than a familiar one.

g. The perception of odor level decreases with increasing humidity. High humidity, however, tends to concentrate odors in a given area.

h. Odor quality may change upon dilution.

i. Some persons can detect certain odor qualities but not others.

Odor Parameters

In investigating odor complaints to establish the existence of a nuisance, the inspector should attempt to identify the odorant, describe the odor and establish its objection ability, and provide some indication as to its severity. The following set of parameters is useful in such an evaluation:

·Quality or Character

·Intensity

·Acceptability or Hedonic Tone

·Pervasiveness

Although developed primarily for experimental use, these parameters are also useful for characterizing odors in the field. To facilitate enforcement, it is useful for the agency to have a single system for classifying odors. This is useful for inspectors analyzing the various component sensations, which odors may produce and may also be useful in interpreting complainant comments if they are forced to choose descriptors from the same system. For field purposes, one system is as good as another. The advantage of all systems is that they yield a useable odor vocabulary.

Quality or Character

The quality of an odor may be described either in terms of association with a familiar odorant, such as coffee or onions (characteristic odors), or by associating a familiar odor with an unfamiliar odorant. Aside from direct descriptive terms, the observer may add modifiers to the description to indicate shades or overtones of an odor. These may actually include subjective reactions such as "fragrant", "foul" and "nauseating", or characteristics of odor which may be associated with the sense of taste, such as "bitter", "sweet", "sour" and "burnt", or even partially with the sense of touch, such as "pungent", "acrid", "acidic" and "stinging". A useful rating system for characterizing odor quality is as follows:

a. Spicy: Conspicuous in cloves, cinnamon, nutmeg, etc.

b. Flowery: Conspicuous in heliotrope, jasmine, etc.

c. Fruity: Conspicuous in apple, orange oil, vinegar, etc.

d. Resinous: Conspicuous in coniferous oils and turpentine.

e. Foul: Conspicuous in hydrogen sulfide and products of decay.

f. Burnt: Conspicuous in tarry and scorched substances.

Intensity

Intensity is the perceived strength of an odor and increases as a function of concentration. The average observer can be expected to distinguish three levels of intensity, characterized as weak, medium and strong. A more useful odor intensity rating system is as follows:

a. No detectable odor.

b. Odor barely detectable.

c. Odor distinct and definite; any unpleasant characteristics recognizable.

d. Odor strong enough to cause attempts at avoidance.

e. Odor overpowering; intolerable for any appreciable time.

This system depends on observation and reporting of behavior, more that on subjective impressions of the complainant. The fact that a person desperately attempts to avoid a strong an unpleasant odor is a clear and verifiable indication of its intensity. Odor intensities classified as distinct or stronger may be particularly relevant in establishing the existence of a legal nuisance.

On the other hand, scientific purposes require an odor rating system that does not depend so heavily on the objectionable character of an odor, as follows:

a. No odor.

b. Very faint.

c. Faint.

d. Easily noticeable.

e. Strong.

f. Very strong.

This system has the advantage of distinguishing the intensity parameter from the acceptability parameter in a more definite manner.

Acceptability or Hedonic Tone

An odor may be classified as either acceptable or unacceptable depending on its intensity and quality. Odors normally considered as pleasant, such as flower fragrances and perfumes, may become unacceptable at very high concentrations (i.e., at very high intensities). Obnoxious odors may be unacceptable at much lower concentrations, where they are not clearly recognizable. Hedonic tone perception in the ambient air can be influenced by such factor as subjective experience, frequency of occurrence, odor character, intensity and duration.

Pervasiveness

The parameter of pervasiveness refers to the tendency of an odor to resist being dissipated by dilution. Precisely speaking, then, pervasiveness is related to the nature of the odorant and can only be quantified by dilution experimentation in the laboratory. In a more practical sense, a highly pervasive odor will tend to be detectable over a larger area and for a longer period of time and will likely be easier to track than a less pervasive one. Examples of compounds that require greater dilutions to dissipate their odor are hydrogen sulfide, butyl acetate, and amines. When odors of compounds are combined, the more pervasive compound will be the odor that is detected. An example in a 1:1 mixture of ammonia and hydrogen sulfide, ammonia is perceived at higher concentrations. When dilution occurs to this mixture away from the source point of origin, the hydrogen sulfide becomes the dominant compound odor.

Determinants of Odor Perception

Although odor is a property of an odorant, the nervous system and the brain of the observer mediate the report of a perceived odor. Therefore, differences in reports of odor perceptions may be due partly to differences in the physical conditions of exposure and partly to differences in the physiological and psychological status of the observer. To aid interpretation of odor evaluations, the following parameters should be included in an odor report:

- Identity of odorant(s)
- Concentration(s) of odor(s)
- Ambient conditions
- Status of observer

Techniques for the quantification and measurement of odors are presented in the following section. The relevance of the remaining parameters to problems of odor evaluation is discussed in this section.

Identity of Odorant

For the skilled observer, odor terminology is meaningless without actual exposure through odor training. To be prepared to make quick and accurate identifications, the inspector should be exposed to samples of typical odorants found in local industries. There is no substitute for this training. Verbal descriptions of odors do not implant as vivid imagery in the mind as do descriptions of visual or auditory phenomena. Properly trained, the inspector can often identify the cause of an odor problem by his or her own field investigation, even when the complainants are uncertain as to the nature or origin of the odor. Some common odorants and sources and their usual perceptions are as follows:

Complaint	Identification
Rotten eggs	H_2S
Rotten cabbage	Mercaptan
Natural gas	Mercaptan
Dead fish	Di-methylamine
Outhouse	Amines
Rotten odor	Rendering
Scorched popcorn	Grain drying
Coffee	Coffee roasting
Bleach	Chlorine
Ammonia	Ammonia
Phenol	Phenol

As stated earlier, one difficulty that arises in trying to associate particular odorants with their odors is that the chemical identities are not always known and they frequently consist of mixtures of odorants. In some cases, odors caused by mixtures may vary in their proportions under different conditions of production; these variations can lead to changes in perceived odor quality, but usually within some limited range, which does not prevent recognition by a trained observer. Recall also that odor quality may change with dilution. In mixtures of odorants this may be due to a difference in pervasiveness of the individual compounds; however, single odorants sometimes behave similarly.

Ambient Conditions

Changes in ambient conditions can influence odor perceptions and should be included in an odor report. Increasing humidity decreases perception; however, high humidity may tend to concentrate odorants in an area, causing increased levels. Also, changes in atmospheric stability and wind speed affect dilution and may influence the inspector's evaluation of odor quality. Finally, the perception of odor intensity is sometimes influenced by ambient temperature, with intensity perception decreasing with decreased temperature.

Status of Observer

The principal parameters of the observer status, which are relevant to odor evaluation, are sensitivity, expertise, and physiological and psychological conditioning. The sensitivity of observers for any given odor varies widely, and the relative sensitivities of two observers vary inconsistently for different odors. Furthermore, independent observers often disagree substantially regarding odor quality, particularly when evaluating odors of mixed odorants. For these reasons, statistical evaluations using panels of observers are more likely to provide reliable results than evaluations by individual observers.

Expertise can be developed through study and training, although it is necessarily limited by the physiological sensitivity of the observer. With respect to quality, expertise consists in the ability to recognize and discriminate between a numbers of odorants, either singly or in mixtures. Relative to intensity, expertise permits reliable discrimination between a large number of graded levels of intensity. Thus, a trained person can detect a smaller percentage difference in concentration levels of a given odorant than an untrained individual.

One problem of physiological origin in the evaluation of odors is fatigue of the olfactory nerves, which tends to diminish the sensitivity of the observer. The effect is especially noticeable after prolonged exposure to a rather high intensity of odor, and may seriously complicate the conduct and interpretation of odor threshold determinations in the laboratory. In addition, colds and other infections of the nasopharyngal tract can cause serious, if temporary, interference with the sense of smell and result in loss of sensitivity to many odorants. For observers in an odor panel, a preparation of a standard odor can be useful in checking on these variations in sensitivity.

Measurement of Odor Intensity

Thresholds may be either of two types, detection or recognition. The detection threshold is defined as the lowest concentration at which a specified percentage of the panel (usually 50%) detects a stimulus as being different from odor-free blanks. The recognition threshold is the lowest odorant concentration at which a specified percentage of the panel (again, usually 50% or the median) can ascribe a definite character to the odor. The type of threshold measured is dependant on the test purpose. The odor threshold concentration is the basis for determining the intensity of a perceived odor, although ambient conditions and observer status may cause appreciable variations. Odor thresholds for a few compounds are shown in the following Table 12-1.

Table 12-1 . Recognition Odor Threshold Values

Chemical	Threshold parts per million (ppm) by volume	Description
Acetic acid	1.0	Sour
Acetone	100.0	Chemical
Tri-methyl amine	0.0021	Fishy; pungent
Ammonia	46.8	Pungent
Carbon disulfide	0.21	Vegetable sulfide
Chlorine	0.314	Bleach; pungent
Di-phenyl sulfide	0.0047	Burnt; rubbery
Formaldehyde	1.0	Hay or straw like
Methanol	100.0	Sweet
Phenol	0.047	Medicinal

These data show that the volume of odorant needed to cause threshold levels varies widely. For example, when ammonia and di-phenyl sulfide samples are each diluted with an equal volume of air, the volume of ammonia required to reach the odor threshold would be 10,000 times the volume of di-phenyl sulfide required. Additionally the threshold values for particular chemicals widely vary depending the methodology involved. Contributing factor to this variability include panelist makeup and age, olfactory systems, stimuli and threshold procedures (U.S. E.P.A. March 1992). A wide range of odor thresholds presents a large degree of uncertainty and diminishes the usefulness.

Odor Threshold and Ambient Air Hazardous Identification

Odor thresholds can also be useful as a screening level, semi-quantitative approach for hazard identification in cases where:

1. The chemical identity of the odor is known or can reasonably be presumed;

2. Acute and chronic toxicity data are available and these data have been converted to

appropriate health-based ambient criteria; and

2. The odor threshold data is not highly uncertain (i.e., reliable measurement of odor threshold fall within an odor of magnitude range).

In these cases Table 12-2 applies. If the odor threshold is above the threshold for toxic effects of safety concerns and an odor is detected, then cessation of exposure is prudent until further testing can be done. In cases where the odor threshold is similar to or greater than the ambient criteria, the absence of odor is not informative. When the odor threshold is less than or similar to the ambient criteria and odor is detected, the hazard cannot be evaluated without analytical data. Although the detection of odor does not necessarily indicate risk in these cases, it does indicate a chemical exposure that should be analyzed and quantified. (U.S. E.P.A. March, 1992).

Table 12-2. Relationship Between Odor Threshold Values and Ambient Criteria

	Odor Threshold Below Ambient Criteria	Odor Threshold ≈ Ambient Criteria	Odor Threshold Above Ambient Criteria
No odor	Low level of concern	Analytical data required	Analytical data required
Odor detected	Analytical data required	Analytical data required	High level of concern

When an odor is caused by a single odorant it is relatively simple, conceptually at least, to measure the ambient concentration and compare the result to the published odor threshold as an indication of relative intensity. A similar result can be obtained for mixed odorants by obtaining a sample of odorous atmosphere or exhaust stream and dilute the sample with odor free air until a threshold is determined by a panel of observers or a single trained observer. In this manner, a relatively objective value for the "dilution factor" can be obtained. Dilution factor is defined as the ratio of the diluted volume at the threshold to the original sample volume.

For the trained observer, threshold is the point at which the perception of odor just begins. When a panel is used, threshold is determined by plotting, on log-probability coordinates, the percentage of the panel indicating positive odor responses vs. the dilution factor of the prepared samples presented to the individual panel members. The resulting curve tends to follow a straight line and the point where the plotted line crosses the 50% panel response ordinate is the threshold concentration. The dilution factor at the threshold is the odor concentration expressed in odor units per cubic foot. An odor unit is defined as the amount of odor needed to contaminate one cubic foot of odor free air to the threshold, or barely perceptible, level.

Any procedure, which permits sampling of the odorous air, diluting it with a measured amount of odor-free air and presenting the diluted mixture to a panel of observers or a trained observer, is satisfactory for determining dilution factor. The calculations are quite simple:

$$\text{Odor strength in odor units/cubic foot} = \frac{\text{Sample volume + Odor-free volume}}{\text{Sample volume}}$$

Example:

$$\text{Odorous + Odor-free = Mix}$$

$$5\text{ ml} + 95\text{ ml} = 100\text{ ml}$$

$$\frac{5\text{ ml} + 95\text{ ml}}{5\text{ ml}} = \frac{100}{5} = 20\text{ odor units/ cubic foot}$$

If a trained observer judged the above mix to be at threshold, then the original sample would have 20 odor units per cubic foot. If a panel had been used and the 50% response ordinate intersected the plotted response line at a dilution factor of 20, then the original sample would have an odor concentration of 20 odor units per cubic foot.

An odor emission rate in odor units per minute can be determined by multiplying the dilution factor times the stack flow rate in cubic feet/minute. This number could then be used in modeling input to evaluate expected ambient concentrations. Areas with predicted concentrations above 1 odor unit/cubic foot would be of concern.

Example:

A source with an odor concentration of 20-odor units/cubic foot and a flow rate of 10,000 cubic feet/minute would have an emission rate of:

$$\frac{20 \text{ odor units}}{\text{cubic foot}} \times \frac{10000 \text{ cubic feet}}{\text{minute}} = \frac{200000 \text{ odor units}}{\text{minute}}$$

Emission inventory information can also be compiled in terms of odor units.

Sampling for Later Evaluation

To confirm field estimates of odor intensity or to determine odor removal efficiency of control equipment, inspectors may collect samples of odorous gases of low moisture content using a glass probe connected by a clamped ball and socket joint to a gas collection tube (e.g., a 250 ml MSA sample tube) as shown in Figure 12-1. The odorous gas is drawn into the tube by a rubber squeeze bulb evacuator. Rubber or plastic tubing or other absorptive or heat sensitive materials should not be used on the probe side of the sample tube. Sampling problems that must be dealt with include: (1) condensation and cooling, which may result in the selective removal of odorants from the vapor phase; (2) adsorption of odorants onto the walls of the container and onto particles in the sample; and (3) chemical changes that occur after sampling which may alter the odorant.

For gases with high moisture content, such as may be found in steam plumes, precautions are required to prevent condensation of water vapor and possible absorption of odorants into the liquid. This can be achieved by using a syringe and hypodermic needle to aspirate a smaller sample into the sample tube, previously filled with odor-free air. A system of this sort is also illustrated in Figure 12-1. A capillary probe may be used to minimize error due to dead space in the probe. A test kit convenient for field use consists of six 250 ml sample tubes, a hand aspirator and several probes of glass tubing with ball joints for attachment to the sample tubes. A special capillary probe and syringe with hypodermic needle for sampling gases of high moisture content may also be included.

Dilution Techniques

Dilution techniques are applicable both to the inspector in making field observations and to the laboratory investigating team in providing for evaluation by odor panels. In field use, ambient air may be tested with the aid of a portable dilution device, such as the scentometer shown in Figure 12-2. This device is actuated by inhalation of the operator, thus dispensing with pumps and the need for electrical power sources. Holes which can be opened or closed with the fingers permit precalibrated dilutions of the ambient air stream with air, which is simultaneously deodorized by an activated charcoal filter. A useful feature is that the observer can combat the effects of olfactory fatigue by breathing only deodorized air for a period prior to an actual test.

Various devices, constructed on similar principles, have been used for dilution of odorants for laboratory evaluation; however, because of its simplicity, the method of choice is often the syringe technique. The odorous gas is displaced from the sample tube (for example, by mercury displacement) into a large graduated syringe, which is diluted by addition of odor-free air. Further dilutions are easily managed by the use of additional syringes, as illustrated in Figure 12-3. The last dilution, usually 10 to 1, is performed by the panelist, who is furnished with 10 ml of sample injected into a 100 ml syringe. The sample is diluted to 100 ml with odor-free air before sniffing it, and a positive or negative result as to detection of the odor is recorded.

Despite the ease of application of the syringe method, dynamic olfactometry and forced triangle odor evaluations are the methods of choice when accurately establishing odor thresholds. Dynamic olfactometers mix control air with odorous sample gas and distribute it to odor panel members. The most accurate versions have thermal mass flowmeters, automatic valves and a microprocessor to control variable odorant and clean dilution air inputs. With these systems, dilutions are more accurate and reproducible than is possible with manually adjusted valves and flow meters.

In forced triangle olfactometry, odor panelists are presented with multiple concentrations of the odorant, usually beginning with a concentration selected to be below the odor threshold and then increasing with each step. At each concentration, the panelist is presented with a triangle consisting of one odorant-containing sample and two controls containing odor-free air, from which a choice must be made.

For confirming the identity of suspected odorants or for quantitative determination of concentrations of identified odorants, gas chromatography or gas chromatography/mass spectrometry can be performed, using samples no larger than those necessary for the organoleptic evaluation.

Determining Sources Responsible for Odors

The possibility of instituting quick, effective action to control odors when complaints arise depends, to a large extent, on the inspector's knowledge of the odor potentials of the various industrial and other sources within the community. A simple odor patrol is probably the best indicator of existing or potential nuisance from odorous discharges. This consists of a regular periodic patrol around selected plants or in selected areas, documented by notes as to observed odors and indications of time, location and wind direction. Special patrols for complex industries, such as refineries and chemical plants, may be assigned to personnel specially trained for them and cognizant of the particular activities, which have odor potential. A record of these patrols is also useful in indicating where odor control efforts are most required.

In a routine inspection of an industrial plant, the normal air pollution configuration is often tracked from cause to effect, i.e., from the inputs to the process to the effects of any escaping contaminants on receptors and the environment. The tracing of an odor problem is usually just the reverse of this procedure. The investigation begins with the complainant and his or her environment and works back to the equipment responsible, typically using the following steps:

a. Interview complainants to obtain as much factual information as possible as to the intensity, evidence and source of the contaminant.

b. Identify the contaminant causing the nuisance.

c. Track the contaminant to its source or sources.

d. Inspect equipment at the source to determine capacity to emit the contaminant.

e. If appropriate, serve notices of violation to the source or motivate plant management to remedy the situation.

f. If appropriate, collect signed district attorney affidavits or other official forms from complainants who may testify in court.

In an odor nuisance, the inspector must establish the existence of two areas: the effect area--that area over which the nuisance exists; and the source area--that area which can be assumed by logical tracing techniques to contain the specific source or sources of the nuisance contaminant. The determination of a source area is often a first step in isolating the exact source and cause of the nuisance, especially in those cases where the specific source is difficult to establish initially.

Odor Transport

Odor Transport has several characteristics, which should be recalled in field investigations:

a. Odor flows downwind from source to receptor.

b. Transport from a vent or chimney is in a plume similar to a visible particulate plume.

c. Meteorology is favorable for transport with little dilution during the evening hours.

d. In unfavorable meteorology, odors can travel long distances.

e. Odors are dissipated by dilution, therefore their quality may change from source to receptor.

f. Odors leave no residual effects.

Determining Air Flow from Source

The fundamental requirement in an odor investigation is to establish the direction of flow of air masses from a source in order to establish responsibility or to determine relative contributions to the problem. This procedure is known as source tracking and is applied when the source of the nuisance is unknown. The approach involves determination of wind direction and velocity for the purpose of triangulating the source location.

Only two vectors are required for source triangulation. events. By convention, wind direction is always stated in terms of the direction Determining affected locations and prevailing wind directions establish these during separate nuisance from which the wind is blowing. Wind direction can be determined from flags, steam or smoke plumes, finger-wetting or with a small hand-held instrument.

The interview with the complainant should also attempt to establish wind direction at the time of the event. When the problem is recurring, the inspector should instruct complainants and other observers to maintain a record of occurrence time, duration, intensity and wind direction. If this is not possible, the investigator should attempt to estimate the time the contamination is likely to occur, so that a site-visit can be scheduled.

Wind Vector Measurement

Conducting wind vector measurements can make a conclusive determination of airflow movement. The procedure involves the release of a small balloon inflated to about six inches diameter with helium from a portable tank. The release takes place from a position approximately on the center line of the odor plume, downwind from the source. The balloon is released and its travel in the plume is tracked by sighting with a hand-held compass. By using a bright yellow color for the balloon, the tracking can be done at night with a flashlight. The wind vector is recorded and later plotted on the survey map. Odor observations are made downwind and upwind of suspected areas or sources, and the presence of odor is also indicated on the map. By repeating the tracking process with different wind directions, the source can be located by triangulation. It should be noted that this technique should not be employed in waterfowl areas or in any locations where the balloons might be ingested by wildlife.

Recording Odor Surveys

In complex cases, the following tracking results are recorded on a map, as shown in Figure 12-4:

a. Location of complainants and distances from possible sources.

b. Plant source layout showing principal types of equipment, which may be involved.

c. The number and frequency of complaints, as well as the duration and time of day.

d. Observations by inspectors at various points to fill in gaps in the data.

e. The tracked contaminant routes and triangulation vectors.

f. Wind roses or other indications of wind direction.

Relating Source Strength to Control Requirements

In correcting an odor problem, the contaminants responsible for an odor should be controlled so that threshold levels are never reached in the outdoor atmosphere of the community. Some industries incorrectly assume that they will have no odor problems, because they consider their own discharges to be unobjectionable or even pleasant. However, the presence of any odor, which persists and is not normally associated with the daily routine of living will, be a source of annoyance to the neighborhood. Complaint records show that this applies to such comparatively acceptable odors as those of baking bread and roasting coffee; therefore, it is wise to consider any odor as potentially objectionable.

Odor evaluations of source samples provide estimates of odor concentrations, which can serve as guidelines in the development of control methods. If a stack effluent is normally diluted by a factor of 1,000 before it arrives at a breathing level in the surrounding neighborhood, an discharge odor concentration of 1,000 odor units per cubic foot could be considered to be on the verge of acceptability, while an odor concentration of 10,000 units would require at least 90% control.

One application of odor measurement in improving neighborhood odors would be to survey all the operations in a plant and determine the odor emission rate from each. Listing such emissions together with estimates of costs for control can help management pick out the largest odor sources (rather than the largest stacks or largest volume discharges) and concentrate their efforts initially on those which are likely to provide the greatest improvement per dollar of expenditure.

Odor Control

The elimination of odors is the most important part of any odor problem. Air contaminants responsible for an odor should be controlled so that threshold concentrations are never reached in the outdoor atmosphere. This is accomplished by adopting any one of a combination of control devices or techniques, such as direct or catalytic incineration, adsorption on activated carbon or condensation. Such common-sense control methods as general sanitation, refrigeration of animal tissue and improved maintenance and operational procedures should also be applied where odors arise from plant housekeeping.

References

Adams, D.F., and S.O. Farwell, "Sampling and Analysis", Chapter 2 in **Air Pollution**, ed. A. Stern, Third edition, Volume VII, Academic Press, Orlando, 1986.

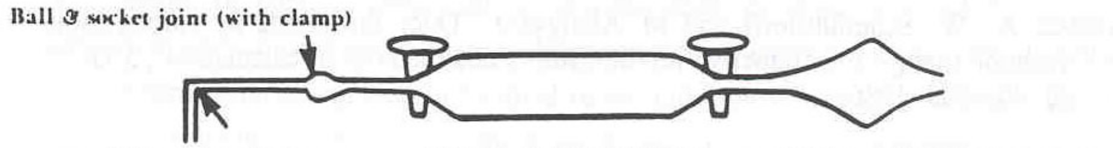
Dravnieks, A., W. Schmidtsdorff and M. Meilgaard, "Odor thresholds by forced-choice dynamic triangle olfactometry: reproducibility and methods of calculation", **JAPCA**, 36, 900-905 (1986).

Gruber, C.W., and P.M. Giblin, "Air Pollution Field Enforcement: Student Manual", EPA 450/2-80-075, March 1980.

Hesketh, H.E., and F.L. Cross, **Odor Control**, Technomic Publishing Co., Lancaster (Pennsylvania), 1989.

U.S. Environmental Protection Agency, Office of Research and Development, " Reference Guide to Odor Thresholds for Hazardous Air Pollutants Listed in the Clean Air Act Amendments of 1990" EPA/600/R-92/047 March 1992

Method A



Method B

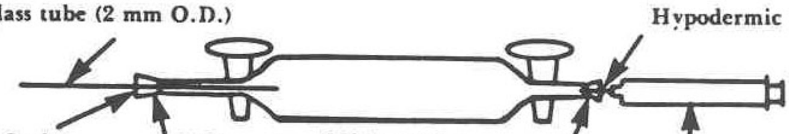


Figure 12-1. Schematic diagrams of odor sampling apparatus. Method A is used to collect samples low in moisture content, while Method B collects samples high in moisture content. The latter method permits primary dilution of odor sample in the field and minimizes condensation of vapors on the surface of the sample tube.

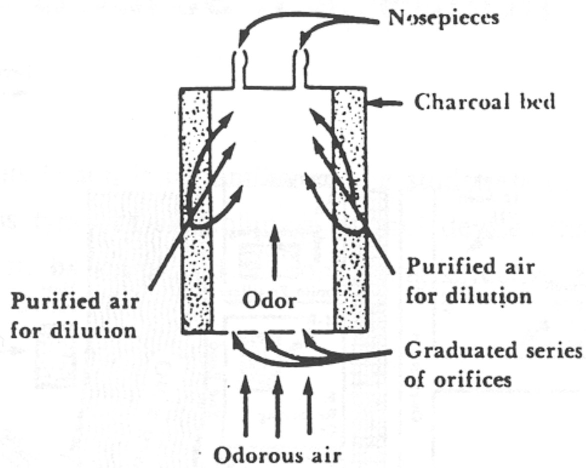


Figure 12-2. Schematic of scentometer. Odorous air passes through graduated orifices and mixes with air from the same source which is first purified by passing through activated charcoal beds. Dilution rates are fixed by the orifice selection.

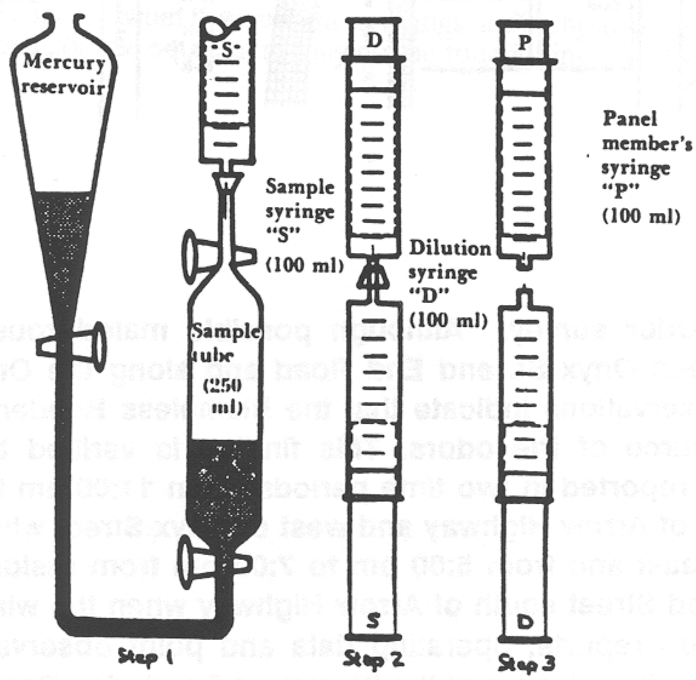


Figure 12-3. Equipment used for transferring and diluting odor samples.

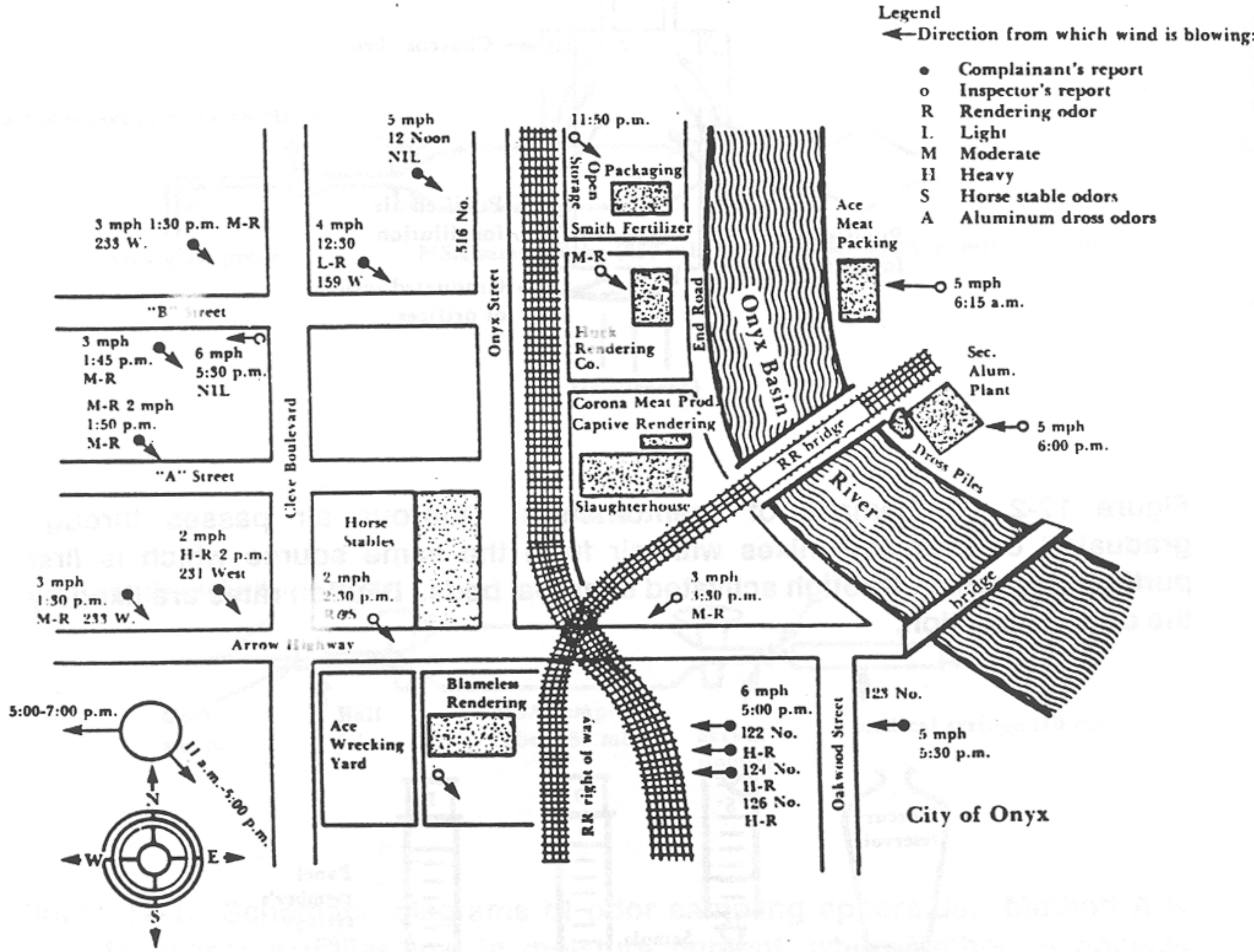


Figure 12-4. Odor survey. Although possible malodorous industries are centered between Onyx St. and End Road and along the Onyx Basin River, reports and observations indicate that the Blameless Rendering Company is the primary source of the odors. This finding is verified by the fact that complaints are reported in two time periods--from 11:00 am to 5:00 pm from residents north of Arrow Highway and west of Onyx Street when the wind was from the southeast and from 5:00 pm to 7:00 pm from residents in the area around Oakwood Street south of Arrow Highway when the wind was from the west. Inspection reports, operating data and point observations verify the existence of a public nuisance at the Blameless Rendering Company.

Chapter 13
Baseline Source Inspection Techniques

Goal

The purpose of this lesson is to familiarize the student with the air pollution control system, the various types of air pollution control devices that are available and the techniques that can be employed in conducting effective field inspections of this equipment.

Objectives

At the end of this lesson, the student should be able to:

1. Name the six components of an air pollution control system.
2. Recognize different types of air pollution control devices by outward appearance.
3. Generally describe how each air pollution control device functions.
4. State what form of contaminants each control device is typically employed to remove.
5. Recognize what instrument readings and physical signs indicate when control equipment may not be functioning effectively.

Introduction

Control of air pollution emissions usually involves a system that employs several components to accomplish its task. The system begins with the collection of contaminants from the area of generation and continues through ductwork and assorted system components until the cleaned gas stream is discharged through a vent or stack to the outdoor air. In this chapter, a brief description of the various components of the air pollution control system will be presented, along with a summary of recommended Level 2 inspection points.

Recall from Chapter 4 that Level 2 inspections involve an on-site evaluation of the control system, relying on plant instruments for the values of any inspection parameters. Since this is the most common inspection level employed, only its points will be summarized here. For a detailed consideration of all inspection levels, the student in referred to APTI Course 445, "Baseline Source Inspection Techniques".

Principles of the Baseline Method

During the period from 1970 to 1975, the majority of sources in the U.S. installed pollution control equipment to satisfy recently promulgated regulations. Most of these systems operated well initially; however, as they aged, operation and maintenance problems began to emerge. The baseline inspection method was developed to provide agency personnel with an aid to diagnosing these emerging problems. The ultimate goal is to be able to identify deteriorating performance before non-compliance occurs and restore collection efficiency to its original level.

The principles of the baseline inspection method are summarized as follows:

a. *Every source and every control device is unique:* Each control system should be approached initially as if it performs in a manner different from other similar systems on other similar sources. This is important, because substantial differences in performance and vulnerability to problems have been noted in a number of cases where identical control systems have been installed on identical or similar sources. With the baseline method, a symptom of potential problems is simply a shift in a measured or observed parameter from the value or condition it had when the source was known or assumed to be in compliance. It should be noted that one symptom is rarely used alone. Rather, a combination of symptoms is analyzed to determine if there are potential problems.

b. *On-site instruments are often unreliable or unavailable:* If the control device has operation and maintenance problems, it is very likely that the instruments are also not working properly. Also, particularly on smaller systems, a parameter of interest may not be measured. It is important that the inspector be aware of this possible limitation and be prepared to either use less than desirable data or to make the needed measurements with portable instruments.

c. *Counterflow inspection approach ensures that information of most value is obtained first:* In the counterflow approach, the inspection begins at the stack and proceeds toward the source in a direction counter to the gas flow. One of the main advantages of this is that the scope of the inspection can be limited to specific conditions, if any, which are symptoms of operating problems. Thus, process equipment would be inspected only if it had been determined that process changes were the likely cause of control system performance shifts. In many cases, this approach will minimize both the inspector's time and the inconvenience to operator personnel.

d. *Judgement of the inspector is the most important factor:* Effective inspection of air pollution control systems goes beyond simply filling out a checklist. Because of the diversity of control system designs and differences in the degree of maintenance, it is important that the inspection procedure not be rigid. Maintaining this flexibility requires the inspector to continually exercise judgement, both in determining how to proceed with the inspection and in interpreting the symptoms observed.

Components of the Control System

The components of an air pollution control system are as follows:

- Contaminant capture (hoods)
- Transport (ductwork)
- Gas stream cleaning (control devices)
- Air moving (fan)
- Instrumentation (controls and monitors)
- Other (gas cooling, chemical feeding, waste disposal, etc.)

These are usually divided into two groups: (1) the air pollution control device, and (2) its ancillary equipment.

A typical air pollution control system is shown in Figure 13-1. The entrance is a series of hoods located over operations which are the source of contamination. The captured contaminants are conveyed through a branched ductwork system to the control device, using dampers to control the flow from each hood. The fan draws the gas flow through the hoods, ductwork and control device and discharges it into a stack and on to the atmosphere. Other components indicated are waste disposal and operating controls.

Inspection of the Ancillary Components

Contaminant Capture

The objective of this system component is to effectively capture the contaminants being released from a source with minimum air flow into the system and minimum pressure loss on entry. Optimization of both air flow and pressure loss reduces fan horsepower and operating costs and the size and cost of the control device and its ancillary equipment.

Level 2 Inspection Points

a. *Capture efficiency:* visual evaluation of fugitive losses as indicated by escaping dust or refraction lines.

b. *Physical condition:* hood modifications or damage that could affect performance; evidence of corrosion.

c. *Fit of "swing-away" joints:* evaluation of gap distance between hood system and duct system on movable hoods.

d. *Hood position/cross-drafts:* location of hood relative to point of contaminant generation; effect of air currents on contaminant capture.

Transport

The duct system transports the contaminated gas stream between other components in the control system. The design objective is to select duct and fitting sizes that provide optimum conveying velocities while minimizing friction and turbulence losses.

Level 2 Inspection Points

a. *Physical condition:* indications of corrosion, erosion or physical damage; presence of fugitive emissions.

b. *Position of emergency dampers:* emergency by-pass dampers should be closed and not leaking.

c. *Position of balancing dampers:* a change in damper positions will change flowrates; mark dampers with felt pen to document position for later inspections.

d. *Condition of balancing dampers:* damper blades can erode, changing system balance; remove a few dampers to check their condition.

Air Moving

The purpose of the fan is to move the gas stream through the air pollution control system. To do this, the fan must be sized for the proper air flow and must be able to overcome acceleration and entrance losses at the hoods and friction losses in the ductwork, the control device and other system components.

The fan may be positioned upstream or downstream of the control device. A downstream fan position creates a negative pressure at the control device, drawing air in through any cracks or openings and minimizing leakage of contaminants. However, if the openings are excessive, in-leakage may diminish the required capture velocity at the source, allowing emissions to escape. When the fan is located upstream of the control device, a positive pressure is created that permits contaminants to escape through cracks or holes in the casing or connecting ductwork.

Level 2 Inspection Points

a. *Physical condition:* indications of corrosion.

b. *Vibration:* indications of balance problems due to material build-up or wheel erosion or corrosion; severely vibrating fans are a safety hazard.

c. *Belt squeal:* squealing belts under normal operation indicate a loss of air volume.

d. *Fan wheel build-up/corrosion:* internal inspection of non-operating fans.

e. *Condition of isolation sleeves:* check vibration isolation sleeves for holes.

f. *Rotation direction:* check rotation direction with direction marked on fan housing.

Instrumentation

Operating controls are important to the function of the air pollution control system and may directly affect its performance. For example, changing the timing cycle on a fabric filter cleaning system may cause pressure loss to increase, reducing the air flow from the fan and allowing emissions to escape at the source.

Level 2 Inspection Points

a. *Physical condition:* indications of excessive wear, obvious signs of failure or disconnected controls.

b. *Set-point values:* changes in set-point values for temperature, pH, rapping intensity, air pressure and other controllers may affect system performance.

c. *Timer settings:* check for changes in cleaning cycle, chemical delivery cycle and other timer settings.

d. *Emission monitors:* evaluate general condition and siting; have operator check zero and span values; review historical data.

Other Components

There can be many other components in an air pollution control system, including such items as chemical feed systems and catalyst regeneration units. A component found with all of the dry collection devices is a dust handling system. This component is responsible from removing the collected particles from the control device and conveying them to the final disposal site. Common to such systems are a collection hopper, a dust transfer valve and the piping or conveying equipment.

Many control systems capture gases that are too hot to introduce directly to the control device. In these systems, a component for cooling the gases will be found. This cooling may be accomplished by diluting the hot gases with cooler air, by evaporating water into the hot gas stream or by radiation and convection to the atmosphere.

Level 2 Inspection Points

Solids handling:

a. *Physical condition:* indications of hopper corrosion or physical damage; condition of level detectors, heaters, vibrators, insulation, etc.

b. *Discharge valve:* check for presence and operating status and indications of air leakage.

c. *Solids discharge rate:* rate of solids discharge should be reasonable.

Gas cooling:

a. *Physical condition:* indications of corrosion, erosion or physical damage; presence of fugitive emissions.

b. *Outlet temperature:* observe plant instruments to determine cooler effectiveness; if controller is used, compare to set-point value.

c. *Spray pattern/nozzle condition:* indications of effective atomization on evaporative coolers.

d. *Water flowrate:* observe plant flow meters or pressure gauges to evaluate changes in water flowrate on evaporative coolers.

Classification of Air Pollution Control Devices

All control devices function to accomplish one of the following:

a. Separate contaminants from a gas stream and then remove them without re-entrainment, either continuously or intermittently, to a disposal system.

b. Change the contaminant from offensive to inoffensive.

c. A combination of both a. and b.

These control devices can be classified according to the contaminants they are typically used to remove:

a. Particles only

- Settling chamber
- Cyclone
- Fabric filter
- Electrostatic precipitator

b. Particles, gases and vapors

- Wet collector
- Incinerator

c. Gases only

- Wet collector
- Adsorber
- Incinerator

d. Vapors only

- Condenser
- Incinerator

Inspection of Control Devices

Settling Chambers

Settling chambers are relatively unimportant as air pollution control devices because they are ineffective in efficiently separating all but the largest particles (>75 µm diameter). They are seldom used separately, but may be seen occasionally as a pre-separator ahead of a more efficient collector. Because of their relative unimportance, no further discussion of these collectors will be given.

Cyclones

In a cyclone the dirty gas stream is directed into a cylindrical shell, either through a tangential entry or through turning vanes. The result is a confined vortex in which centrifugal forces drive the entrained particles toward the outside wall. Particles successfully deposited slide down the wall and into a hopper, from which they are removed through a dust discharge valve.

Cyclones can be constructed in either single or multiple configurations. Single cyclones can be generally characterized as either high efficiency or high throughput (see Figure 13-2). High efficiency cyclones have a narrow inlet opening in order to attain high inlet velocity, a long body length relative to its diameter and a small outlet diameter/body diameter ratio. High throughput cyclones, which are inherently less efficient, have larger inlet openings, a shorter body length and larger gas exits.

Multicyclones have numerous small (typically 6-9 inch) diameter cyclone tubes in parallel inside a single housing (see Figure 13-3). Each cyclone is mounted into a lower "tube-sheet", which separates the in-coming dirty gas stream from the hopper level below. The outlet tube from each cyclone extends up through the in-coming dirty gas stream and into an upper tube-sheet that separates the dirty gas from the cleaned gas.

Cyclone efficiency is very sensitive to particle size, with performance deteriorating rapidly for particles less than about 2-5 μm diameter. When particle size distribution and gas flow rate are relatively constant, changes in pressure drop across a cyclone provide a good indicator of changes in collection efficiency.

Basic Level 2 Inspection Points

a. *Physical condition:* indications of corrosion, erosion or physical damage; open hatches; presence of fugitive emissions.

b. *Static pressure drop:* increases may indicate plugging; decreases may indicate erosion or corrosion; either situation decreases efficiency.

c. *Solids discharge valve:* check for continuous movement of valve and for continuous discharge of solids; check for air leakage.

Fabric Filters

Fabric filters remove particles by passing the contaminated gas stream through a woven or felted fabric, usually in a cylindrical configuration. Depending on the direction of gas flow, particles are deposited on either the inside or outside of the cylindrical "bag". Initially, such forces as impaction, diffusion and electrostatic attraction are primarily responsible for particle capture by the fabric fibers. However, as the dust coats the filter and increases in thickness, direct sieving begins to dominate.

As the thickness of the dust-cake increases so does the pressure lost in moving the gases across the filter. To keep pressure loss reasonable, it is necessary to periodically clean the fabric. The three most popular cleaning methods are shaking, reversing air flow direction and pulsing with compressed air.

A typical shaker-cleaning collector is shown in Figure 13-4. The dirty gas stream enters into the hopper area and then moves across a tube-sheet into the inside of the filter tubes. The gas stream passes through the filter, depositing the particle on the inside. When it is time to clean the fabric, the collector is isolated from air flow and the bag shaken by moving the supports from which the bags are hung. The dust drops into the hopper where it is removed through a dust discharge valve.

The reverse-air cleaning collector is nearly identical in appearance to the shaker, except the bags are hung from rigid supports. Cleaning is accomplished by isolating the collector from the dirty gas flow and introducing clean gas flow in the reverse direction.

This reverse flow dislodges the dust and it falls into the hopper. At this point the cleaning air is quite dirty, so it is ducted to an operating unit for cleaning. Thus, a reverse-air collector requires a minimum of two units.

Figure 13-5 shows a typical pulse-cleaning collector. Cylindrical bags are suspended from a tube-sheet located near the top of the collector, and the dirty gas flow is directed into the outside of the bags and up through the center to the clean gas discharge. Metal cages are placed inside the bags to prevent collapse. Cleaning is accomplished by directing a pulse of compressed air into the top of the bag and against the dirty gas flow. This pulse momentarily dislodges the dust from the outside of the bag and slowly works it down toward the hopper. Bags are usually cleaned a one row at a time without isolating the collector from the dirty gas flow.

Basic Level 2 Inspection Points

a. *Physical condition:* indications of corrosion, erosion or physical damage; open hatches or doors; presence of fugitive emissions.

b. *Static pressure drop:* increases may indicate bag cleaning problems or higher inlet concentrations; decreases may indicate excessive cleaning or lower inlet concentrations.

c. *Clean-side conditions:* check for presence of fresh dust deposits; observe bag tension and general condition (Note: The clean side should be observed from outside the collector. ***NEVER*** enter an air pollution control device while conducting an inspection.).

d. *Solids discharge valve:* check for continuous movement of valve and for continuous discharge of solids; check for air leakage.

Electrostatic Precipitators

Electrostatic precipitators remove particles from a contaminated gas stream by employing the principle of attraction of opposite charges. The particles are charged in a high voltage electric field created by a corona discharge electrode and are then attracted to a collection plate of opposite charge (see Figure 13-6). When the particles reach the collection plate they slowly lose their charge through conduction, ideally retaining just enough charge to hold the particles to the plate but not so much that it inhibits further deposition or makes removal difficult. Periodically, the plate is vibrated or rapped and the dust drops into the hopper.

The electric field is powered by direct current supplied from transformer-rectifier (T-R) sets mounted on the roof. Each T-R set serves one or two fields or electrical sections. Efficiency of collection is usually highest when the voltage is highest. Most industrial ESPs operate with a negative corona because of its stability under high voltage conditions. Peak performance is indicated by the beginning of sparking from electrode to plate.

The plates are generally rapped by hammer mechanisms mounted outside on top of the housing. In some designs the rappers are located inside the housing and can not be seen by the inspector. Also located on top of the housing will be vibrator units for keep the discharge electrodes clean.

The electrostatic precipitator looks very much like a fabric filter, i.e., a large box-shaped structure with hoppers beneath it. However, the ESP is distinguished by the rapping mechanisms and transformer-rectifier sets mounted on top of the housing and by inlets/outlet locations that are generally on the ends (see Figure 13-7).

Basic Level 2 Inspection Points

Because of the potential electrical hazard associated with an ESP, the inspector should confine the inspection to evaluation of visible emissions, evaluation of transmissometer data and evaluation of electrical data. If there has been no major change in the opacity and no major change in the electrical conditions, then it is assumed that there has been no major change in performance since the baseline period.

Wet Collectors

Wet collectors remove contaminants from a gas stream by transferring them to some scrubbing liquid. For particles larger than about 1 μm, the dominant separation mechanism is impaction onto liquid droplets or wetted targets. For sub-micron particles and gases, the dominant mechanism is diffusion to liquid surfaces. Because of incompatible requirements, wet collectors are generally designed to perform as either a particle or a gas collector. Simultaneous collection of both particles and gases is usually possible only when the gas has a very high affinity for the scrubbing liquid.

Contacting the contaminated gas stream with the scrubbing liquid is only the first stage of a wet collector. Because the contact phase usually results in liquid entrained in the gas stream, the second stage is some type of liquid-gas separator. Common entrainment separators include chevron baffles, mesh pads and single-pass cyclones. Contactors producing large droplets may only require a little low-velocity head-space to allow the droplets time to settle back into the unit.

The almost endless variety of wet collectors makes it difficult to include all types and varieties in one discussion. To illustrate the range of designs and performance levels, four types of scrubbers will be briefly described: (1) a spray tower, (2) a tray scrubber, (3) a countercurrent packed tower and (4) a venturi scrubber.

Spray tower

A simple spray tower is illustrated in Figure 13-8. The dirty gas stream enters at the bottom of the scrubber and flows upward at velocities between 2 and 10 feet per second. The liquid enters at the top of the unit through one or more spray headers, so that all of the gas stream is exposed to the sprayed liquid. A spray tower has only limited particle removal capacity, and is generally selected for applications where the particles are larger than about 5 µm. They can be effective gas absorbers if the contaminant has a moderate affinity for the liquid.

Tray scrubber

A tray scrubber (see Figure 13-9) can also be used for both particle and gas collection. The gas stream again enters at the bottom and passes upward through holes in the trays. The liquid enters at the top and cascades across one tray and then flows down to the next. An overflow weir is used to maintain a liquid level on each tray. Variations in tray design include the placing of assorted "targets" above each hole to enhance the scrubbing action. The tray scrubber is an effective collector of particles larger than about 1 µm and can be an effective gas absorber when the contaminant has a moderately low affinity for the liquid.

Packed tower

This type scrubber is used primarily for gas absorption because of the large surface area created as the liquid passes over the packing material. The beds can be either vertical or horizontal. The most efficient arrangement is the vertical countercurrent packed tower shown in Figure 13-10. The gas stream again enters at the bottom and passes upward through the packing. The liquid is sprayed from the top and flows downward in a thin film over the surface of the packing. The packed tower is an effective gas absorber when the contaminant has a low affinity for the liquid.

Venturi scrubber

A conventional venturi scrubber is shown in Figure 13-11. The dirty gas stream enters a converging section and is accelerated toward the throat by approximately a factor of ten. The liquid is injected into the scrubber just beyond the entrance to the throat, where it is shattered into droplets by the high velocity gas stream. Particles are collected primarily by being impacted into the slower moving drops. Following the contactor is usually a single-pass cyclone for entrainment separation. The venturi scrubber is an effective collector of particles down into the sub-micron range, comparable in performance to the fabric filter or ESP, and can be an effective gas absorber when the contaminant has a moderately high affinity for the liquid.

Basic Level 2 Inspection Points

a. *Physical condition:* indications of corrosion, erosion or physical damage.

b. *Static pressure drop:* increases may indicate plugging problems or excessive liquid rate (venturi only); decreases may indicate erosion or partial tray collapse or a reduction in liquid rate (venturi only).

c. *Inlet liquid pressure:* provides an indirect indication of the liquid flow rate and nozzle condition; increases may indicate nozzle pluggage and lower flow rates; decreases may indicate nozzle erosion and higher flow rates.

d. *Liquid turbidity and settling rate:* low settling rate indicates fine solids; high settling rate indicates coarse solids.

e. *Droplet re-entrainment:* droplet rainout or a mud-lip on the stack indicates a significant demister problem.

Adsorbers

Adsorbers remove gaseous contaminants from an air stream by transferring them to the surface of some high surface area solid adsorbent. In air pollution control systems, they are typically employed to remove volatile organic compounds using activated charcoal as the adsorbent. Adsorption is most effective when the system temperature is about 75°F and the compounds have molecular weights between about 45 and 200.

A typical multi-bed adsorption system is shown in Figure 13-12. Here, the left two beds are on line and contaminated gas is passing vertically down through each unit. As the system continues to operate, the on-line beds approach saturation with the contaminants and must be taken off line for cleaning to prevent breakthrough of the organic contaminant. This condition is represented in the right-hand unit.

The most popular cleaning method is to introduce low-pressure steam into the bottom of the bed to raise its temperature and cause the contaminants to desorb from the carbon. The mixed stream of organic vapor and steam coming from the bed is condensed and the solvent recovered by decanting or distillation. Following desorption, the bed is allowed to cool and dry before being put back on line.

Basic Level 2 Inspection Points

a. *Physical condition:* indications of corrosion or physical damage.

b. *Adsorption/desorption cycle times:* an increase in the interval between bed cleanings could mean breakthrough is occurring.

c. *Steam pressure and temperature during desorption:* a decrease in steam pressure/ temperature could indicate less than needed steam flow for regeneration.

Incinerators

Incinerators remove gaseous contaminants from an air stream by oxidizing them to compounds not considered to be contaminants. The two most common types of incinerators are:

a. Direct-fired or thermal units, which are refractory-lined chambers with a gas or oil burning apparatus plainly visible (see Figure 13-13).

b. Catalytic units, which have the appearance of a duct heater and are more highly instrumented (see Figure 13-14).

In both thermal and catalytic units, the principal parameter for indicating efficiency is temperature, the value of which is dictated by the characteristics of the contaminant to be oxidized. In thermal units, the minimum outlet temperature is considered to be 1300°F, with most systems operating in the 1500-1800°F range. Catalytic units are generally designed for a bed inlet temperature of 700-900°F.

Basic Level 2 Inspection Points

a. *Physical condition:* indications of corrosion or physical damage; indication of air infiltration.

b. *Outlet temperature:* decreased temperature may mean reduced VOC destruction efficiency.

c. *Temperature rise across catalyst bed:* decreased temperature rise may mean reduced VOC destruction efficiency.

Condensers

Condensers remove vaporous contaminants from a gas stream by cooling it and converting the vapor into a liquid. In some instances, control of volatile contaminants can be satisfactorily achieved entirely by condensation. However, most applications require additional control methods. In such cases, the use of a condenser reduces the concentration load on downstream control equipment. The two most common types of condensers are:

a. Contact or barometric condensers, where a direct spray contacts the vapors to cause condensation (see Figure 13-15). The liquid leaving the condenser contains the coolant plus the condensed vapors.

b. Surface condensers, such as the shell-and-tube heat exchanger (see Figure 13-16). This device consists of a shell into which the vapor stream flows. Inside the shell are numerous small tubes through which the coolant flows. Vapors contact the cool surface of the tubes, condense and are collected without contamination by the coolant.

Basic Level 2 Inspection Points

a. *Physical condition:* indications of corrosion or physical damage.

b. *Outlet temperature:* increased temperature may mean reduced condensation efficiency.

c. *Inlet liquid pressure:* provides an indirect indication of the liquid flow rate and nozzle condition; increases may indicate nozzle pluggage and lower coolant flow rates; decreases may indicate nozzle erosion and higher flow rates (contact-type only).

d. *Liquid turbidity and settling rate:* high settling rate indicates coarse solids that could plug nozzles (contact-type only).

e. *Droplet re-entrainment:* droplet rainout or a mud-lip on the stack indicates a significant demister problem.

References

Gruber, C.W., and P.M. Giblin, "Air Pollution Field Enforcement: Student Manual", EPA 450/2-80-075, March 1980.

Richards, J., "Air Pollution Source Field Inspection Notebook", Revision 2, USEPA, APTI, June 1988.

Segal, R., and J. Richards, "Inspection Techniques for Evaluation of Air Pollution Control Equipment", Volume II, EPA-340/1-85-022b, September 1985.

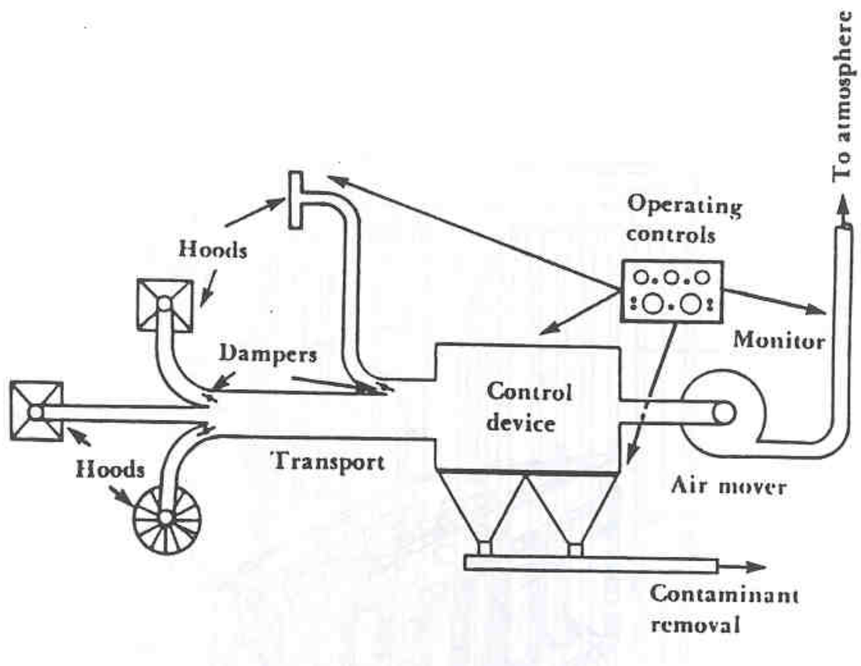


Figure 13-1. Typical air pollution control system

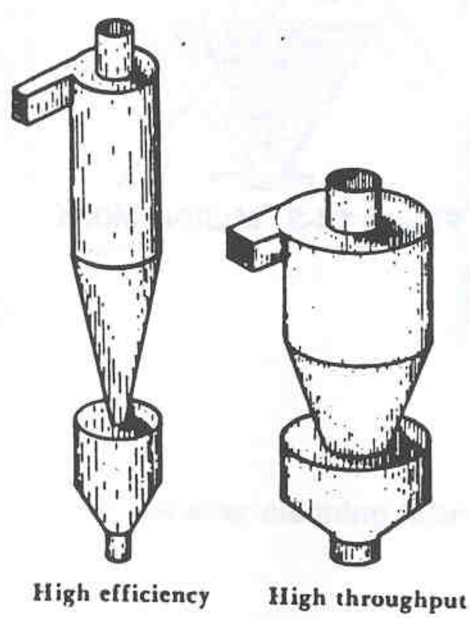


Figure 13-2. Single cyclone collectors

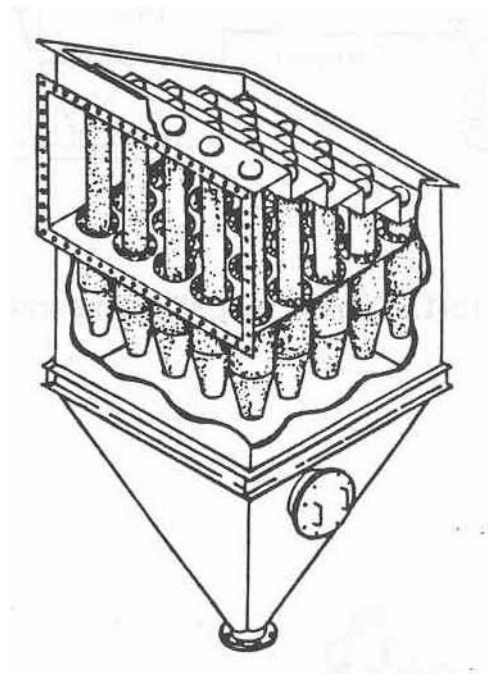


Figure 13-3. Multi-cyclone

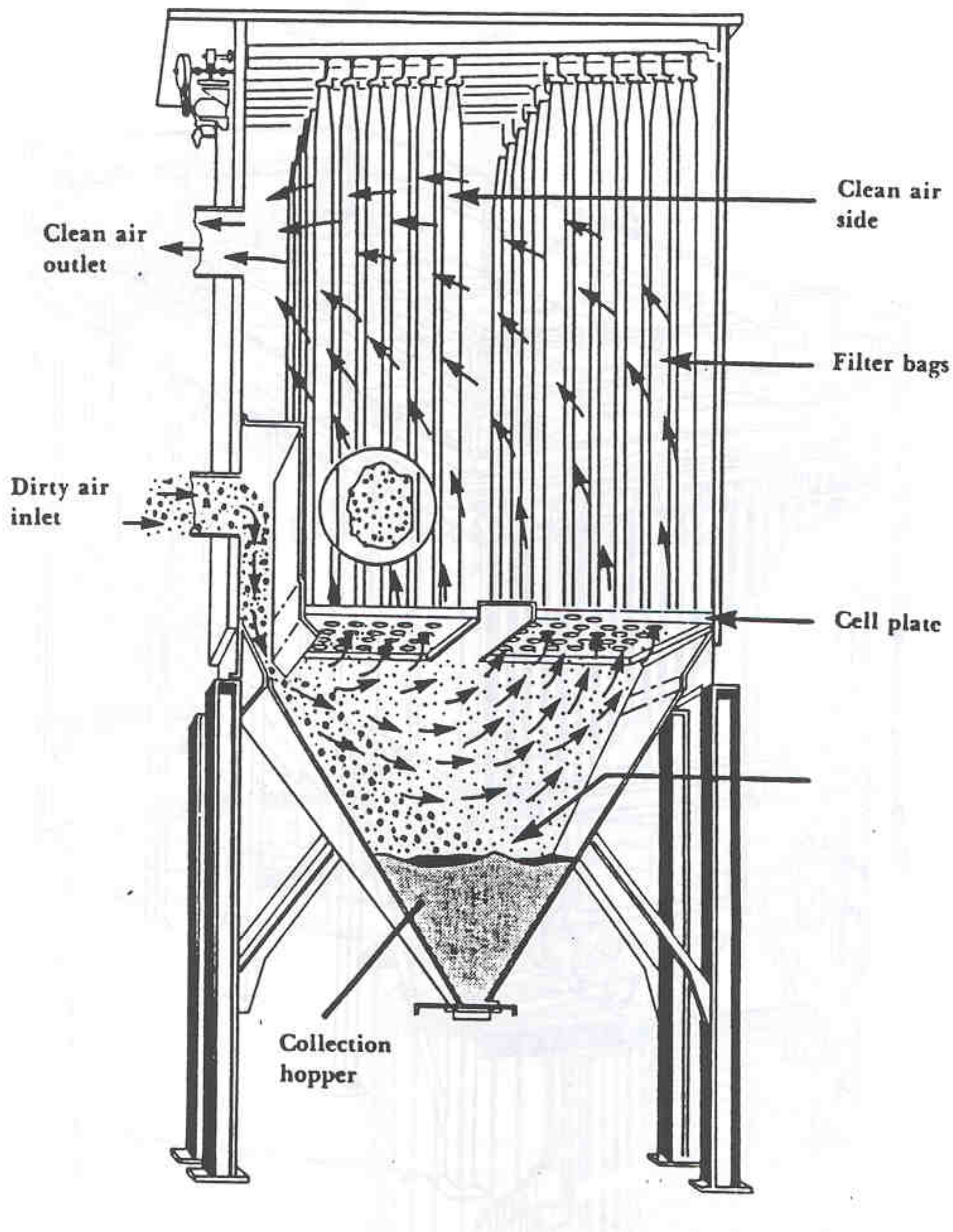


Figure 13-4. Shaker cleaning fabric filter

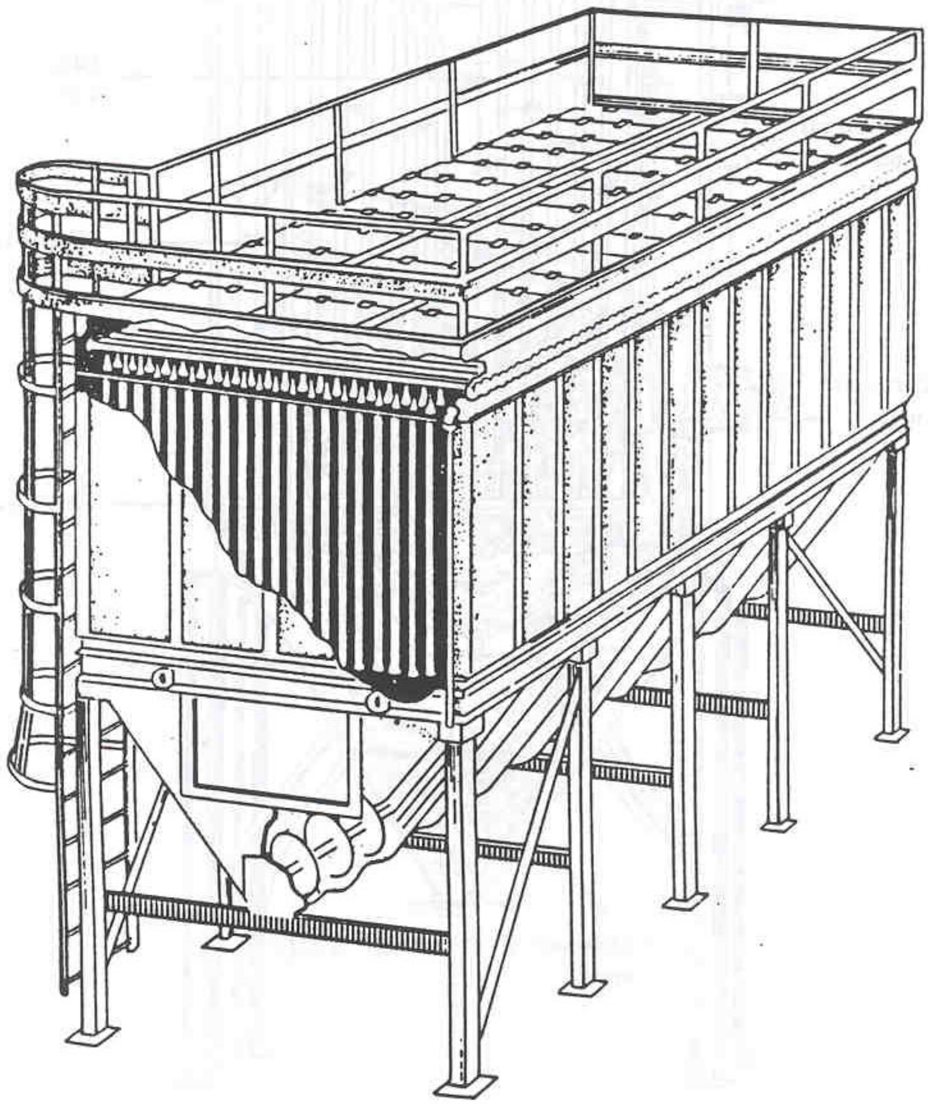


Figure 13-5. Pulse cleaning fabric filter

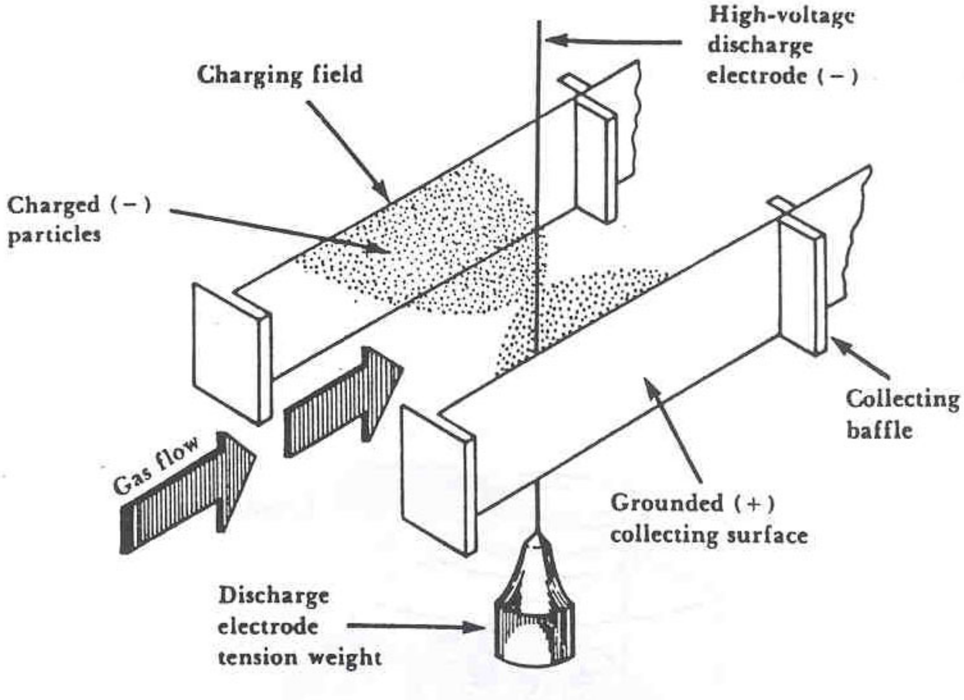


Figure 13-6. ESP collection schematic

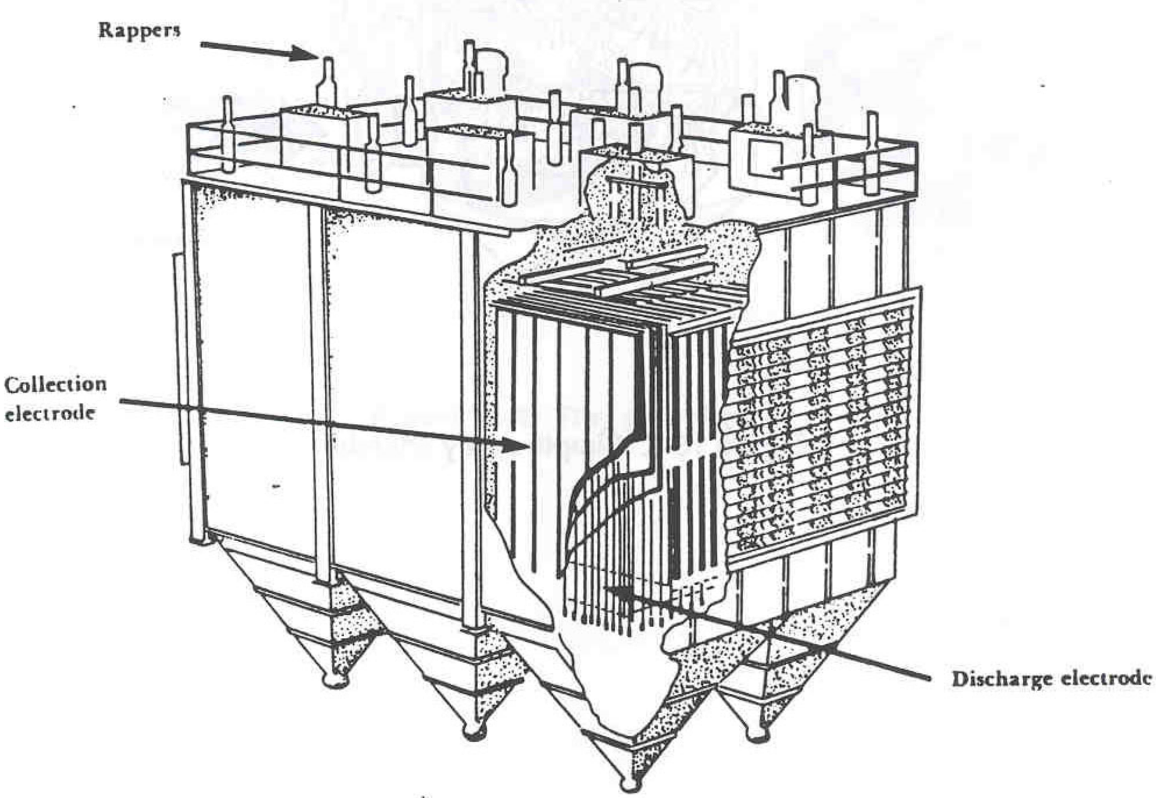


Figure 13-7. Electrostatic precipitator

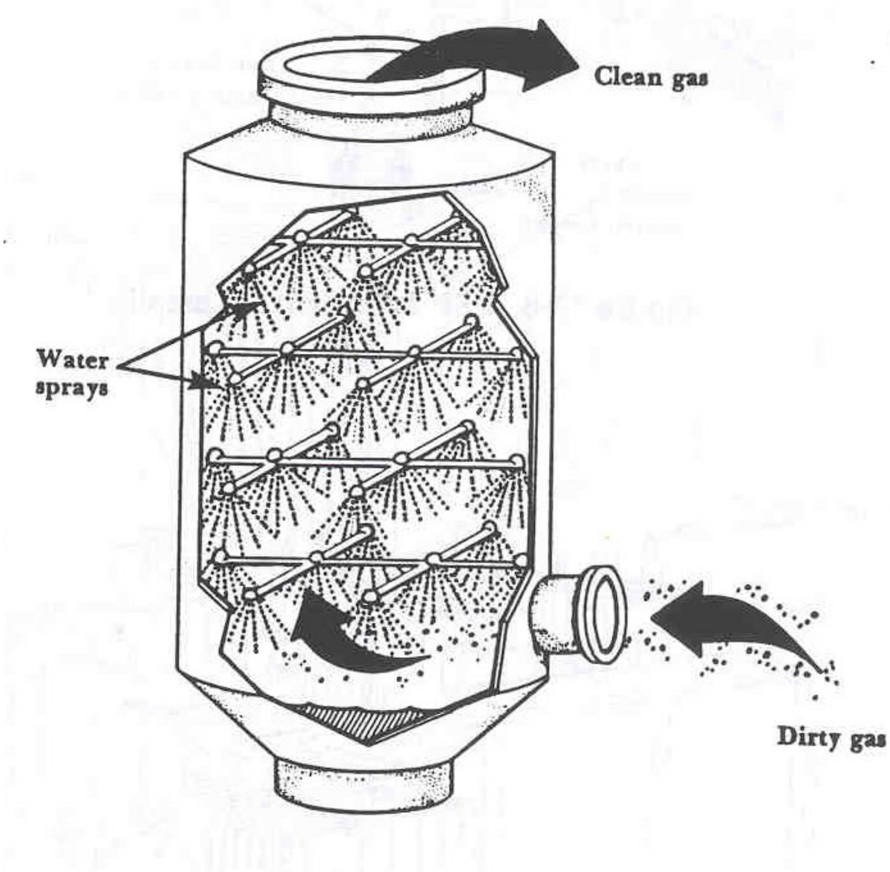


Figure 13-8. Simple spray chamber

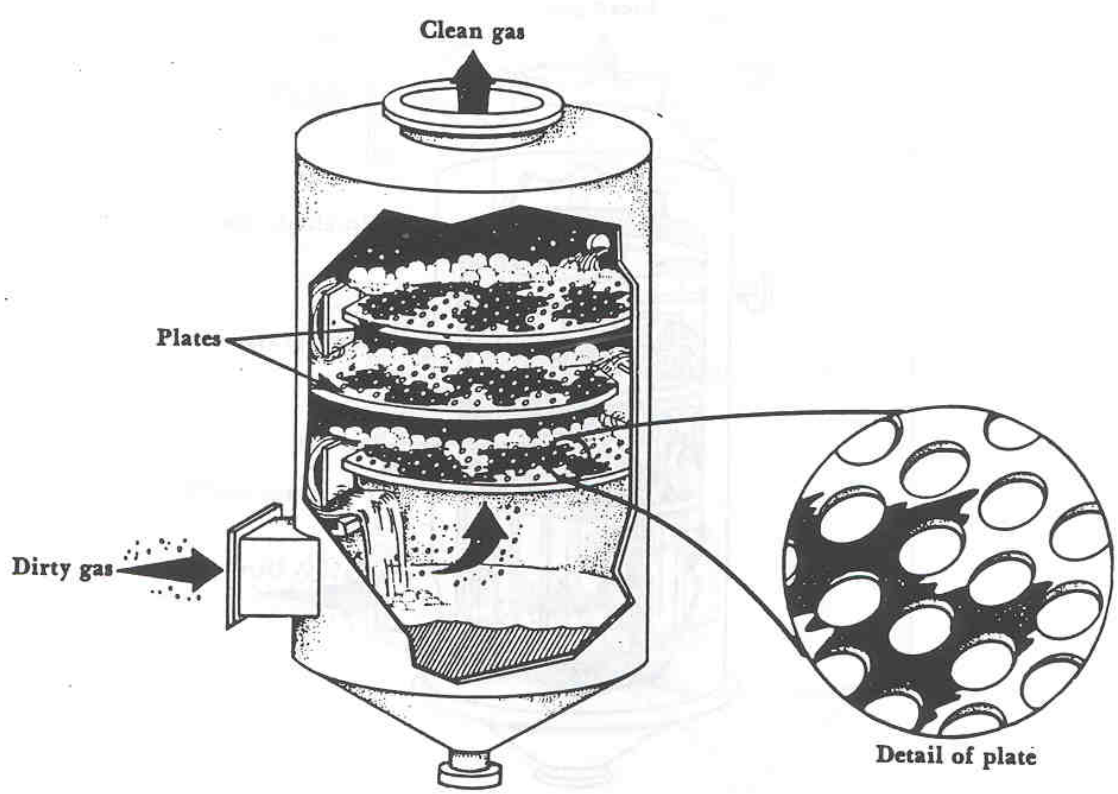


Figure 13-9. Tray scrubber

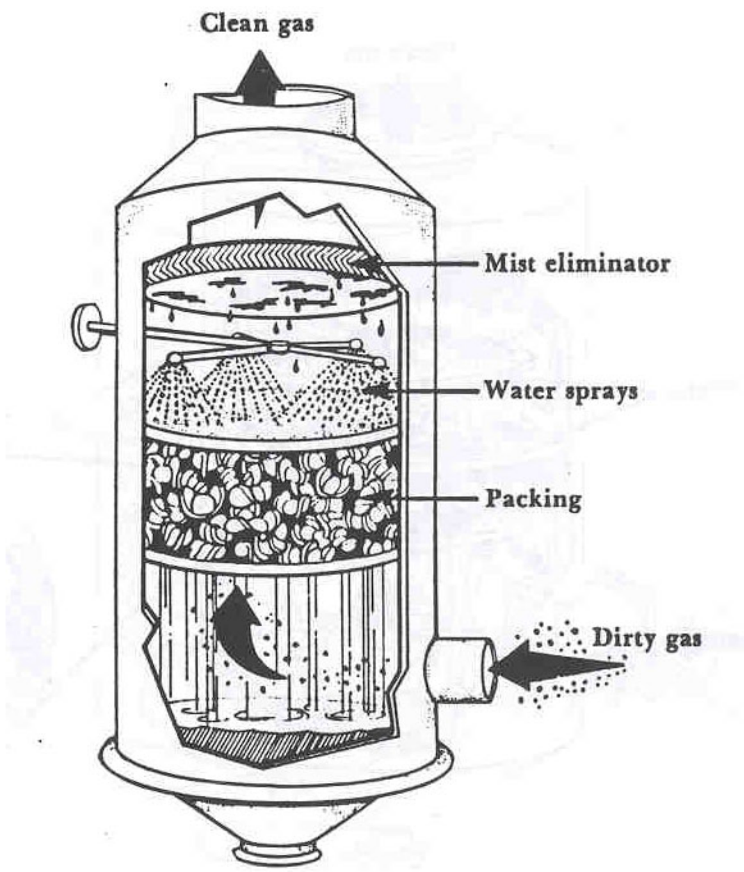


Figure 13-10. Countercurrent packed tower

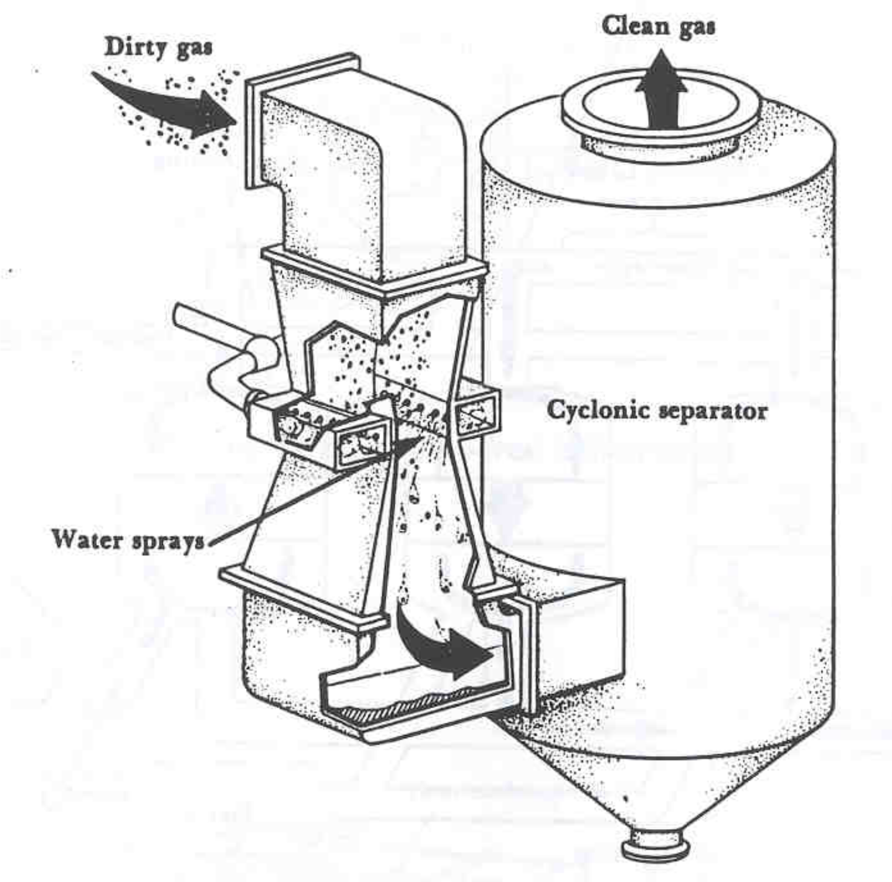


Figure 13-11. Conventional venturi scrubber

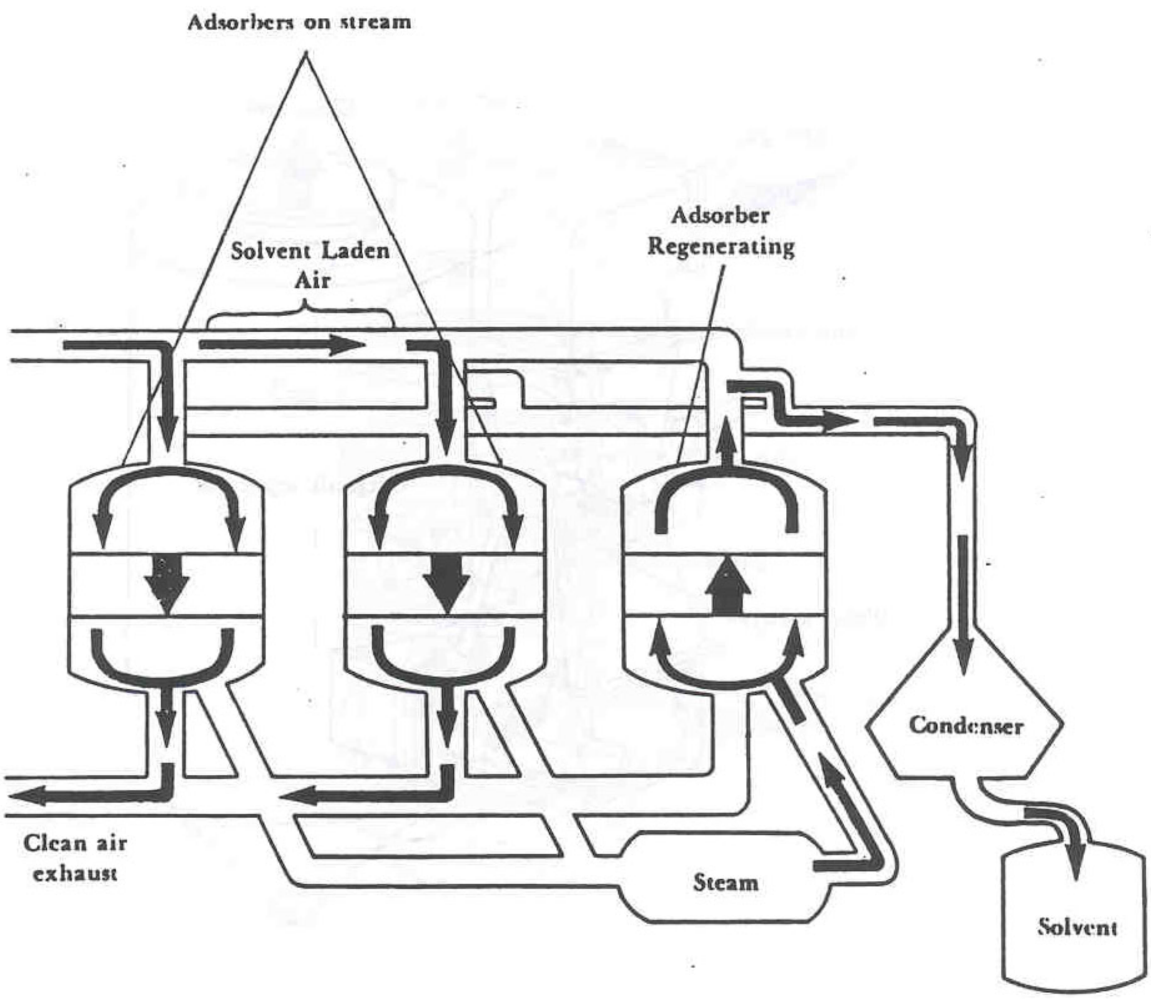


Figure 13-12. Activated carbon adsorber

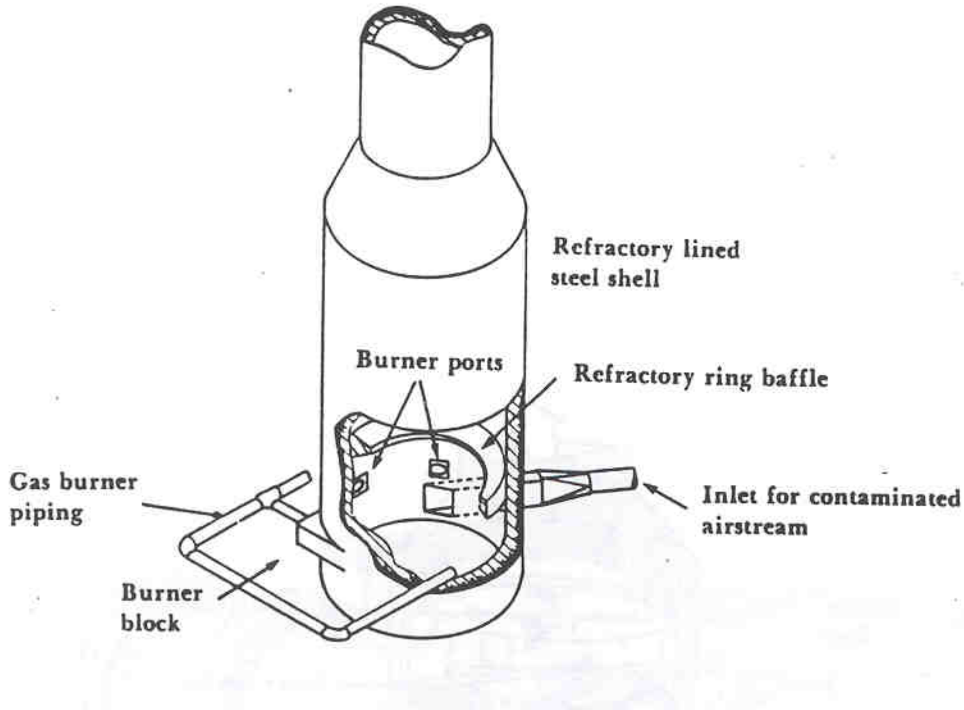


Figure 13-13. Direct-fired incinerator

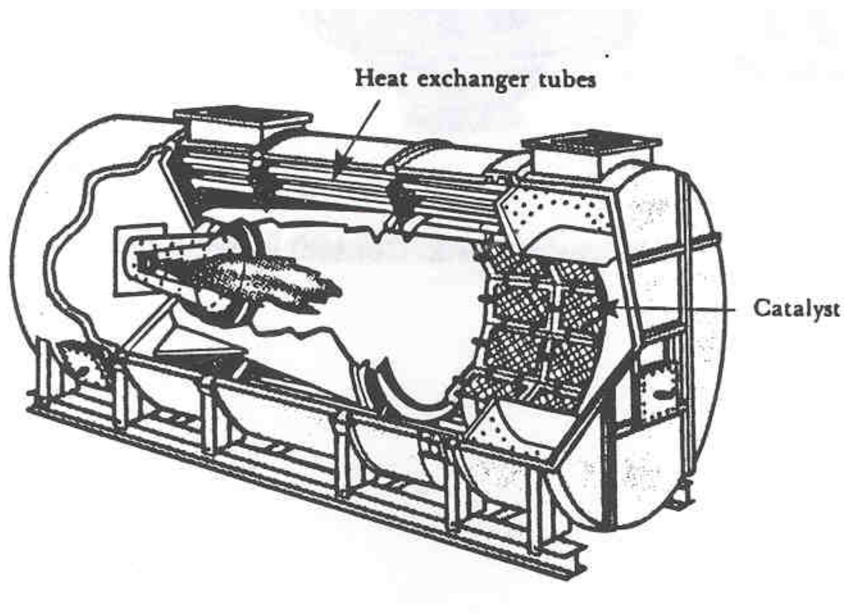


Figure 13-14. Catalytic incinerator

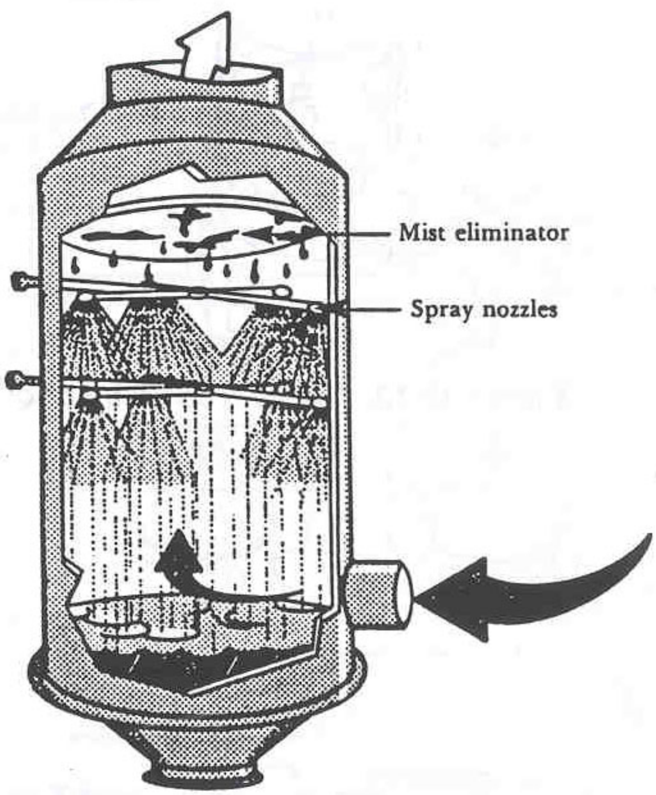


Figure 13-15. Contact condenser

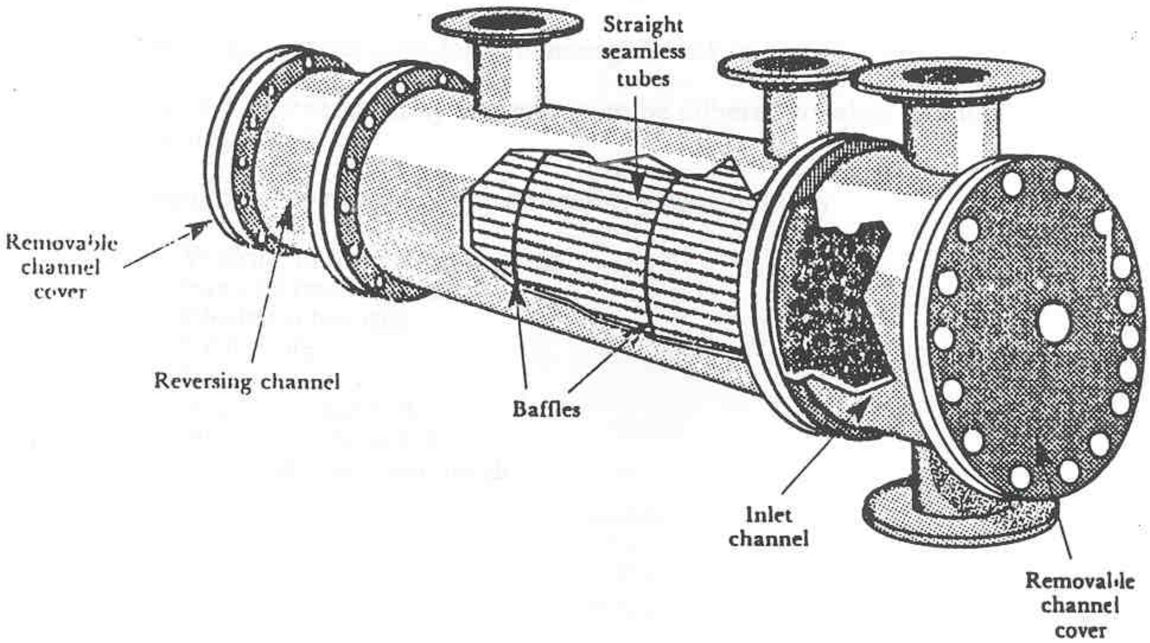


Figure 13-16. Surface condenser

Chapter 14
Inspection Safety

Goal

The purpose of this lesson is to describe means of minimizing risk through adherence to safety procedures.

Objectives

At the end of this lesson, the student should be able to:

1. State the general rules for minimizing the risk of potential hazards.

2. State the general safety procedures to be adhered to while conducting an inspection.

3. Minimize the risks to health and safety associated with:

    - Walking and climbing hazards
    - Eye and hearing hazards
    - Electrical hazards
    - Explosions
    - Burns
    - Inhalation hazards
    - Heat and cold stress
    - Skin absorbable chemicals

Introduction

The performance of any field inspection always involves a certain degree of risk. It is the objective of this lesson to briefly describe means of minimizing this risk through adherence to safety procedures. Procedures are presented for most common health and safety problems encountered by inspectors. Individuals requiring additional information are referred to APTI Course 446, "Inspection Procedures and Safety".

General Considerations

The inspection of any industrial facility inherently involves a large number of potential health and safety problems which occur frequently. Therefore, the inspector must be constantly alert in order to avoid potentially hazardous situations.

Inhalation hazards are often created by leaks of pollutant laden gases out of worn expansion joints, cracked welds and corroded shells of process equipment. The sudden downdraft from nearby stacks and vents can also lead to acute exposures. Partially confined areas can allow high concentrations of toxic materials to accumulate, even when the leak rates are comparatively small. Most of the high pollutant concentrations occur by accident and without the knowledge of plant personnel. The highly variable conditions make any exposure monitoring data highly questionable. These problems complicate the selection of the proper respirator for these conditions.

The elevated and isolated locations of many types of process equipment also increases the safety risk. It may be necessary to climb permanent or portable ladders to reach the equipment. In some cases, the equipment can only be reached by crossing roofs or elevated walkways. Since these portions of the plant are not regular work areas, even the plant personnel may not be aware of some of the potential problems involved with the ladders and roof areas. Frequently cables, hoses and debris are found along the elevated platforms and roofs since plant personnel do not remove this material. Injuries which occur in these portions of the plant can be very serious. Rescue of injured personnel is difficult and time consuming due again to the isolated and elevated locations of the control equipment.

Due to the numerous potential hazards, it is very important that each innspector adhere to established safety policies and procedures. It is also necessary that the inspector recognize unusual and extreme conditions which warrant additional or extreme safety precautions.

To minimize the risk of potential hazards, each inspector should follow the general rules summarized below:

a. The work should be halted immediately when the inspector suffers any non-specific symptoms of exposure. The area should be approaced again only after the proper personal protective equipment has been obtained.

b. The work should be conducted at a controlled pace.

c. If the work cannot be accomplished safely, it should be postponed until the appropriate steps are taken to permit safe inspection.

d. Nothing should be done which risks the health and safety of the inspector or plant personnel or which risks the condition of plant equipment.

e. All agency and plant safety requirements must be satisfied at all times.

General Safety Procedures

The following general procedures should be adhered to while conducting an inspection:

a. *Personal protective equipment:* inspectors should bring personal protective equipment necessary to conduct the inspection of the facility. All personal protective equipment should be in good working order and the inspector using it should be trained in its use and limitations.

b. *Unaccompanied inspections:* the inspector should request the accompanyment of a responsible plant representative at all times. The plant representative can identify areas known to be unsafe and can warn the inspector about intermittent plant operations which can result in health and safety risks.

c. *Warning codes and sirens:* the inspector should learn the warning codes and sirens used at the plant to indicate emergencies. The inspector and plant representative should move to a safe location as rapidly as possible after hearing the warning sirens and report to the appropriate authorities so that no attempt is made to "rescue" them from the affected area.

d. *Personnel rescue:* if an inspector observes another individual who has suffered an accident, help must be summoned immediately. Attempting to rescue the person can jeopardize the rescuer unless the proper procedures are used. Rescue should be attempted only if the proper equipment is available to ensure the safety of the rescuer.

e. *Inclement weather conditions:* except in the case of public health emergencies, field activities should be interrupted or postponed whenever severe weather conditions present a significant safety risk to the inspector. The specific criteria for interrupting or postponing the field activities should be determined by each office. As a general guideline, work should be delayed whenever the effective ambient temperature is less that -20°F or greater than 100°F, when the wind speed is greater than 25 mph and whenever there is sleet or freezing rain.

Walking and Climbing Hazards

Inspectors should wear hard hats at all facilities being inspected. These hats provide protection against collision with overhead beams and protruding obstacles and also provide limited protection against falling objects. Inspectors should also wear safety shoes approved for the specific type of facility being inspected and gloves whenever the inspection will involve climbing of ladders or handling of hot surfaces.

Portions of the facility with potentially slippery surfaces should be avoided to the extent possible. Inspectors should not use temporary walkways such as planks and horizontal ladders. Also, before walking on elevated catwalks, the inspector should confirm, to the extent possible, that the supports are intact and have not corroded or rotted.

Accumulation of solids and snow can easily exceed the rated load bearing capacity of roofs. Also, portions of the roof can be made of materials with only limited load bearing capability. For the above reasons, all roofs and other elevated, horizontal surfaces should be approached cautiously. It is recommended that inspectors follow plant personnel in such areas and that they remain on defined walkways.

The foot rungs should be grasped while climbing any ladder, even when the rungs are wet or muddy. Under no circumstances should an inspector attempt to climb a ladder covered with ice or snow. Both hands must always be free for climbing ladders.

Only portable or fixed ladders in good physical condition should be used. Portable ladders should be inclined on an angle to minimize the chances of slippage or toppling and must extend above the surface being reached by a minimum of 3 feet. The cage (if present) must have an opening ranging from 18 to 24 inches at the top. The cage should not be severely distorted since this would prevent easy movement inside. The ladder must have at least 9 inches clearance between it and where it is attached, to allow secure placement of the feet on the rungs, and it should extend at least 3 feet above the platform or surface being reached. Finally, guard rails should never be used for climbing.

While walking through the plant, the inspector must be alert for protruding obstacles. Often these are difficult to spot in dimly lit portions of plants. Loose clothing should not be worn when conducting an inspection since this can result in entrapment in rotating equipment. Inspectors must be cautious when in the vicinity of all rotating equipment since it is often impossible to see the components moving at high speed. Equipment which operates intermittently, such as hoists, should never be touched since this equipment often starts automatically and without warning.

Inspectors should stay at least 75 feet from stationary rail cars at sidings since these are sometimes coupled to remote-controlled engines run by an operator without a complete view of the siding areas. Inspectors should not stand on coal piles and other material stockpiles since it is possible to become entrapped in the conveying equipment which is often underneath these piles.

Eye and Hearing Protection

Because of the possibility of contacting hazardous chemicals or gases, contact lenses should not be used during inspections. Instead, inspection personnel should use prescription safety glasses with side shields while performing field activities. Splash goggles should be used in addition to the safety glasses whenever there is potential exposure to acid mist or liquid chemicals.

Inspectors should use hearing protection whenever required by plant policies and whenever it is difficult to hear another person talking in a normal tone of voice at a distance of 2 feet. To the extent possible, time spent in areas of the plant with high noise levels should be minimized.

Electrical Hazards

The inspector should not use line powered equipment or instrumentation not served by an approved ground fault interrupter. Prior to inspecting any facility, the inspector must ask responsible plant personnel to indentify any high voltage cables in the area to be inspected. It is important to find any lines which could be inadvertently touched while walking through the plant.

Explosions

Inspectors should never take battery-powered portable equipment, such as non-explosion-proof flashlights, into portions of the plant where there are potentially explosive dusts or vapors. The equipment can be a source of ignition. Also, smoking materials, including but not limited to matches and lighters, should never be taken into any facility. Many areas of plants visited by inspectors can have explosive dusts and vapors. Finally, the inspection should be terminated immediately whenever a severely vibrating fan is encountered. When a fan disintegrates, shrapnel can be sent over a large area resulting in very serious injuries. Plant personnel should be notified immediately if this problem is detected.

Burns

The areas immediately around hot ducts should be avoided to the extent possible. Also, uninsulated hot roofs should be avoided. In cases where such is required, the proper footwear must be worn. When climbing up to potentially hot roofs, gloves should be worn and the roof should not be touched.

Inhalation hazards

To the extent possible, inspectors should avoid areas which allow the accumulation of airborne pollutants. The appropriate respirators should be selected in accordance with the procedures discussed during safety training provided by the agency. Furthermore, the respirator must not be worn whenever any condition would prevent a good seal. The most common reason for an improperly fitted respirator is facial hair. The protection factor limits of each respirator must be understood and used only for the specific contaminants listed and only for the concentration range listed. Since monitoring data are rarely available, the inspector must excercise some judgement when selecting the appropriate respirator. Selection of the type of respirator should never be done by smell or taste perception since some of the most toxic pollutants cannot be detected at high concentrations.

Inspectors should use only a self-contained breathing apparatus or an air-line respirator when entering areas believed to be oxygen deficient. Each individual using respirator protection must be trained in its proper fitting, use, maintenance and storage.

The respirator must be inspected before and after each use (disposable respirators excluded). Equipment used only for emergencies should be inspected at least monthly. A record should be kept by date with the results of all inspections. All respirators must be cleaned and disinfected after each use. All filter and cartridges must be replaced whenever necessary. Replacement of other that disposable parts and any repair should be done only by personnel with adequate training and test equipment to ensure the equipment will function properly after the work is accomplished. Only certified parts supplied by the manufacturer for the product being repaired should be used. The respirators should be stored in atmospheres that will protect them from dust, sunlight, extreme heat or cold and damaging chemicals.

Individualized eyeglasses mounted to the face piece of full face mask respirators should be used whenever such respirators are necessary for the field duties assigned. Also, contact lenses should not be worn while wearing respirators. Inspectors with perforated ear drums, or who have not demonstrated by means of regular physical examination that they are capable of withstanding the additional physical stress imposed by respirators, should not wear them. Since respirators are necessary for field activities, such individuals should not perform field duties. Finally, inspectors should not chew gum or tobacco while wearing a respirator.

Heat Stress

Each inspector working in moderate and hot climates should drink copious amount of water and carry drinking water in the vehicle used. The inspection should be interrupted immediately whenever an inspector experiences the symptoms of heat exhaustion, including but not limited to fatique, nausea, vomiting, headache, dizziness, clammy skin and rapid pulse. The affected individual should rest in a cool place which is not less that 75°F and seek medical care as soon as possible. Continuing the field activities during the onset of heat exhaustion can lead to heat stroke, a very serious condition requiring immediate medical help. Also, the inspection should be interrupted immediately whenever an inspector experiences heat cramps. The affected individual should find a cool place to rest and drink water containing 0.1% by weight salt (1 teaspoon per 5 quarts of water).

Cold Stress

Field inspectors should avoid portions of the plant exposed to high wind conditions or wet areas when the ambient temperature is low. Clothing for inspections conducted during cold weather must be selected to provide the appropriate degree of protection and to reduce the chances of excessive perspiration accumulation. Clothing should generally be layered to trap heat and to provide the flexibility to adjust to both outside and inside conditions while conducting the inspection. Steel-toed shoes should not be worn whenever the ambient temperature is low. All shoes worn must be water tight.

Skin Absorbable Chemicals

Inspection personnel should consult published reference materials concerning the selection and use of protective clothing (including gloves) whenever working with or near chemicals which are readily absorbed by the skin. A partial list of such chemicals is provided in the "OSHA Pocket Guide to Occupational Hazards". Inspectors should also exercise extreme caution when sampling liquids containing skin absorbable chemicals. Under no circumstances should the inspector allow direct contact between such liquids and the skin.

References

Cowerd, C., "Inspection Manual for PM-10 Emissions from Paved/Unpaved Roads and Storage Piles", EPA 340/1-89-007, October 1989.

Exercise No. 1
Off-Site Surveillance

Inspector John Hubbard, who has been with his agency for 6 months, is responding to an office complaint reporting visible emissions from an industrial facility located at 111 South Cook Road in Utopia, Illinois. The reported company is Johnson Storage Company. A review of office records does not show any listing of this facility at the reported address. As inspector Hubbard nears the reported location from the south, he observes a stack emitting an attached black smoke plume, near a two story warehouse building. He is soon able to park his car at 8:15 A.M., approximately 75 feet east of the source of the plume in order to position himself to read the visible emissions. Using his watch and stopwatch he begins to record his obervations on the attached form. Hubbard notes a large sign painted on the side of the building reading "Johnson Storage Company".

The source turns out to be a small multi-chamber incinerator with a 1 ft diameter by 15 ft high steel stack fitted with a wire-screen spark arrestor. The incinerator is located in the rear of a warehouse-style building that faces west. The wind is from the north at about 5 miles per hour and the sky is overcast. The incinerator is unattended during the entire observation. If fact, no one is present in the yard and the premises appear to be abandoned. Hubbard notices two 55-gallon oil drums near the incinerator, but from his location he cannot see the contents.

REGULATION Title 35 . PROHIBITIONS

Section 212.123: Control of Visible Air Contaminants from Stationary Sources

Emission Limitations:

(a) No person shall cause or allow the emission of smoke or other particulate matter, with an opacity greater than 30 percent, into the atmosphere from any emission unit, except as provided in subsection (b) below.

(b) The emission of smoke or other particulate matter from any such emission unit may have an opacity greater than 30 percent, but not greater than 60% for a period or periods aggregating 8 minutes in any 60 minute period.

1. Complete the Visible Emission Observation Form using the data given in the narrative report.

2. Enter the information known at this point in time on the VEO form and the Notice of Violation Form

3. Decide on the on-site inspection strategy.

4. State three important pieces of information, which should be obtained during the on-site inspection.

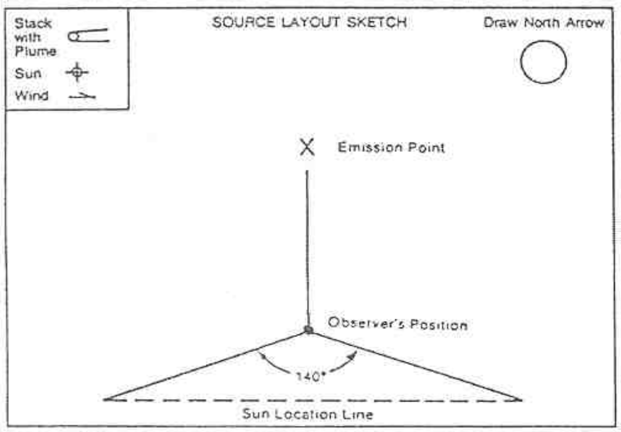
VISIBLE EMISSION OBSERVATION FORM

No.

Field	Entry
COMPANY NAME	
STREET ADDRESS	111 South Cook Road
CITY	Utopia
STATE	IL
ZIP	
PHONE (KEY CONTACT)	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	
OPERATING MODE	
CONTROL EQUIPMENT	
OPERATING MODE	
DESCRIBE EMISSION POINT	
HEIGHT ABOVE GROUND LEVEL	
HEIGHT RELATIVE TO OBSERVER	Start End
DISTANCE FROM OBSERVER	Start End
DIRECTION FROM OBSERVER	Start End
DESCRIBE EMISSIONS	Start End
EMISSION COLOR	Start End
IF WATER DROPLET PLUME	Attached ☐ Detached ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	Start End
DESCRIBE PLUME BACKGROUND	Start End
BACKGROUND COLOR	Start End
SKY CONDITIONS	Start End
WIND SPEED	Start End
WIND DIRECTION	Start End
AMBIENT TEMP	Start End
WET BULB TEMP	
RH, percent	

SOURCE LAYOUT SKETCH

Draw North Arrow



ADDITIONAL INFORMATION

OBSERVATION DATE: 9/30/99 | START TIME: | END TIME:

MIN \ SEC	0	15	30	45	COMMENTS
1	70	70	70	70	
2	70	70	65	65	
3	65	65	65	65	
4	65	65	60	60	
5	70	70	70	70	
6	70	65	65	60	
7	65	65	60	65	
8	60	60	60	60	
9	60	55	55	50	
10	40	45	45	50	
11	45	40	40	40	
12	35	35	35	30	
13	30	30	25	25	
14	20	20	20	20	
15	10	10	5	5	
16	5	0	0	0	
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					

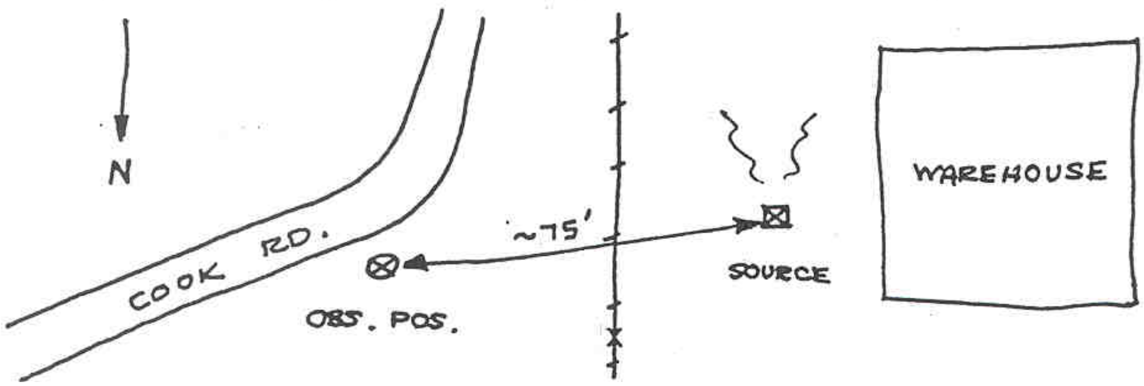
OBSERVER'S NAME (PRINT): John Hubbard

OBSERVER'S SIGNATURE: | DATE: 9/30/99

ORGANIZATION:

CERTIFIED BY: Illinois EPA | DATE: 9/1/99

CONTINUED ON VEO FORM NUMBER



Henderson County Air Pollution Control Agency
Chicago, Illinois

Violation Notice No.173

Location of Violation____

Owners Name____**Phone #**____________

Address____**City & State**_______________

Premises Used For____

Name of Person Contacted____

An Inspection of the Subject premises on____
(Day of Week, Date, Month, Year)

at_________**(A.M.; P.M) discloses**____

____

____

____

in violation of Title # ____________Section _________of the Henderson County Air Pollution Control Ordinance.

This notice was personally to;

Name____

Address____

Title____

By_________________________________**Date**______________**19**___**,Badge**________
(Inspector's Name)

Take notice you are hereby ordered to take immediate action towards correcting the violation described above.

Failure to comply with or refuse to comply with or resist enforcement of any of the provisions of this ordinance shall subject you to a fine of not more than one thousand dollars($1000.00) for each day a violation continues to exist and shall constitute a separate offense.

Exercise No. 2
On-Site Inspection

After completing his pre-entry surveillance, Hubbard drives to the front of the plant, parks his car and enters the premises. Inside, he meets a receptionist, identifies himself and his agency, and asks to see the owner of the company. She replies that the owners are not present, since the home office of the company is in Chicago, and asks what it is he wants. Hubbard replies that the incinerator appears to be in violation. Thereupon, the receptionist directs him to see the bookkeeper, Mr. Peterson.

After a quick introduction, Hubbard informs Mr. Peterson that he has observed smoke in excess of allowable limits and that he is in violation of Henderson County Regulation Title 35 Section 212.123. He then asks to see the incinerator. Mr. Peterson replies, "I didn't know we were in any kind of violation. I don't see how that could be--we have the necessary permit to operate. As I understand it, that's supposed to be a smokeless incinerator".

As they walk through the plant to the rear, Hubbard notices that the first floor is comparatively empty, except for some apparently new equipment in the rear of the plant. There appear to be five tanks, two of which have bus bars, drains, etc., and a degreasing unit. Part of the concrete flooring has been broken up as if to make way for new plumbing, and ventilation system parts, including hooding, ductwork, and a fan and motor, are located near the tanks.

The inspector asks Mr. Peterson what business the company is engaged in. Mr. Peterson replies, "Hard chrome plating--we're the Hartley Division of the Compton Metals Company". In further conversation, Hubbard learns that the company moved to this location from Tennessee just three months ago.

They arrive at the incinerator at 9:09 am. No visible emissions are observed. Mr. Peterson exclaims, "See, it's not smoking!". Hubbard explains that he observed a violation before he entered the plant and asks who lit the incinerator. "I did", Peterson replies, "Mr. Allen, our Plant Manager, asked me to clean out the debris left from the previous tenant. I've been doing all sorts or things since we are short on help". On further questioning, Mr. Peterson disclosed that he had charged two 55-gallon drums of paint cans, styrofoam packing materials, creosoted wood timbers, rubber and plastic materials, cardboard and paper wastes, rubber and plastic gasket materials, and a dead rat into the incinerator.

Hubbard inspects the interior of the incinerator and observes evidence of paint cans and rubber and plastic residue. He also observes the following:

- A permit, No. P-5934, posted on the side of the incinerator and made out to Johnson Storage Company authorizes the operation of one two-chamber incinerator, rated at 75 lb/hr and equipped with a manual secondary natural gas burner rated at 150,000 Btu/hr. The incinerator is to be used for Type "O" waste only, and the secondary burner must be in operation throughout the burning period.
- The secondary burner is not in operation.
- All air-port doors are closed.
- Refractory and stack appear to be in good condition.
- The stack has two sampling ports.

After completing his notes at the incinerator, Hubbard and Peterson walk back through the building. As they go through the office area, Hubbard sees a man at a desk in what appears to be an executive office. He inquires, "Is that Mr. Allen?". Peterson says it is but that Mr. Allen is terribly busy getting the plant going. Hubbard accepts that and does not ask to see him.

Hubbard completes the Notice of Violation, gives it to Peterson and reminds him of the necessary permits that must be obtained. Peterson says that engineers from Chicago will be at the site next week and he will inform them of the permit requirements. Hubbard returns to the office and writes his inspection report.

---

1. List at least five important errors pertaining to the principle of good on-site inspection and investigative practice.

2. List the potential violations observed.

3. Complete the Notice of Violation from Exercise No. 1.

4. Correct Hubbard's report of his investigation of the VE violation to make it more concise and complete.

FIELD ENFORCEMENT OFFICER'S REPORT

On September 30, 19__, while answering a complaint in my sector, I saw heavy black smoke in the distance. Carrying out my training instructions, I proceeded to an observation point and recorded excessive smoke from 8:15 am to 8:31 am, as documented on my emission evaluation form.

I entered the plant at about 8:35 am. I identified myself and the purpose of my visit to the receptionist who referred me to Mr. Peterson, the bookkeeper. I again identified myself and the purpose of my visit to Mr. Peterson who informed me that the premises are now owned and occupied by the Hartley Division of Compton Metals whse corporate offices are in Chicago. The new owners began occupancy about three months ago.

I advised Mr. Peterson of the violation and asked him who operates the incinerator. Mr. Peterson stated, "I lit the incinerator. Mr. Allen, the Plant Manager, asked me to clean up debris left by the previous owner. I've been doing this sort of thing since we are short of help".

In company with Mr. Peterson, I went to the incinerator site. Mr. Peterson pointed to the operating permit issued to Johnson Moving and Storage Company and posted on the side of the incinerator. The non-valid permit identifies the incinerator as a two-chamber unit rated at 75 lb/hr and equipped with a manual secondary gas burner which was not in operation. The incinerator was approved for Type O waste only. Inspection of the incinerator interior showed a slightly smouldering pile about two ft. in diameter by one ft. high containing paint cans, rubber and plastic residue. Mr. Peterson stated that he charged two 55-gallon drums of paint cans, styrofoam packing materials, cardboard and paper wastes, creosoted wood timbers, rubber and plastic materials in the incinerator.

While passing through the plant building, I noted four pieces of equipment which would require an installation permit sitting on the floor in various stages of construction. A separate report is filed on this matter.

I completed the Notice of Violation for the emission violation which Mr. Peterson accepted. Mr. Peterson stated, "We will comply with your instruction". I left the premises at 9:50 am.

John H. Hubbard
Inspector

Exercise No. 3
Complaint Handling

The following is a case history of an odor complaint from its inception to the final resolution of the problem. We will preface this exercise by stating that the only legal mechanism available to this agency is an ordinance that forbids air pollution and defines it as "The presence in the outdoor atmosphere of any air contaminant which is or may be inimical to health, safety or welfare; or which may be injurious to human, plant or animal life or property; or which unreasonably interferes with the comfortable enjoyment of life or property".

Cathy Grant has been with the agency just over four months. She has completed her basic orientation and has had several training courses. She has, however, had little practical field experience. Due to rapid expansion of the agency and a shortage of personnel, Grant has been shoved into the field and told to do the best that she can.

On July 6, Mr. Rust of Orangeland called the regional office and complained that he and his wife had nearly become ill on the previous evening as a result of malodorous emissions from a paint plant, the Alcoat Company, located near their home. Grant was assigned to the investigation.

Grant immediately went to the agency's files to determine whether there had been any previous complaints concerning operations of the Alcoat Company. Her search indicated that a similar complaint from a resident in the Orangeland area had been received approximately one week earlier. However, due to a shortage of personnel, no one had yet investigated that complaint.

The agency's files also showed that the Alcoat Company had received a permit to construct a coating plant in the complaint area approximately eighteen months previously. The permit file indicated that the company would utilize catalytic incineration units to control the emission of solvent vapors from their paint coating and baking lines. The plant construction has been completed and the plant had been operating for approximately four months. Another inspection checked the plant prior to the beginning of operation. That report indicated that the plant was operating satisfactorily and that there were no odors apparent in the vicinity of the plant at that time. The inspector has noted, nevertheless, that a faint odor could be detected just outside the plant.

Grant next visited the complainant at his home. She observed that the Orangeland development consisted of approximately one hundred homes located on about 150 acres of land. Adjacent to the development was a small industrial park which apparently contained several manufacturing plants. As she approached the Rust residence, Grant was not able to detect any odors. Mr. Grant was not at home, so she discussed the complaint with Mrs. Rust. Mrs. Rust told Grant that they first became aware of the odors approximately two weeks earlier and that the odor episodes had occurred frequently since that time. Mrs. Rust further stated that several of her neighbors had also complained to her about the odors and offered to supply their names and addresses. Mrs. Rust pointed out the Alcoat plant to Grant. She noted that the plant was located about six hundred yards from the residential area.

After leaving Mrs. Rust's residence, Grant drove directly to the Alcoat plant. As she approached the plant, she noted that it had five stacks. Three of the stacks had no visible emissions, but two were emitting white vapor plumes. She parked and entered the plant.

Inside, Grant was greeted by the receptionist. She identified herself and asked to see the plant manager. The receptionist placed a call and then told Grant that the plant manager was not available; however, the plant engineer, Ms. Erb, would see her. Grant met Ms. Erb, again identified herself, recorded Ms. Erb's full name and position title, and advised her of the nature of the problem and of the agency rules and regulations pertaining to such a problem.

Ms. Erb told Grant that, to the best of her knowledge, the plant and its associated air pollution control equipment was operating satisfactorily and there were no problems. She did indicate, however, that she, herself, had noted a slight odor as she drove by a metal-plating company about one mile south of her plant. Ms. Erb also stated that some of her workers had informed her that several of the Orangeland resident were having trouble with their septic tanks and that might be the source of the odors.

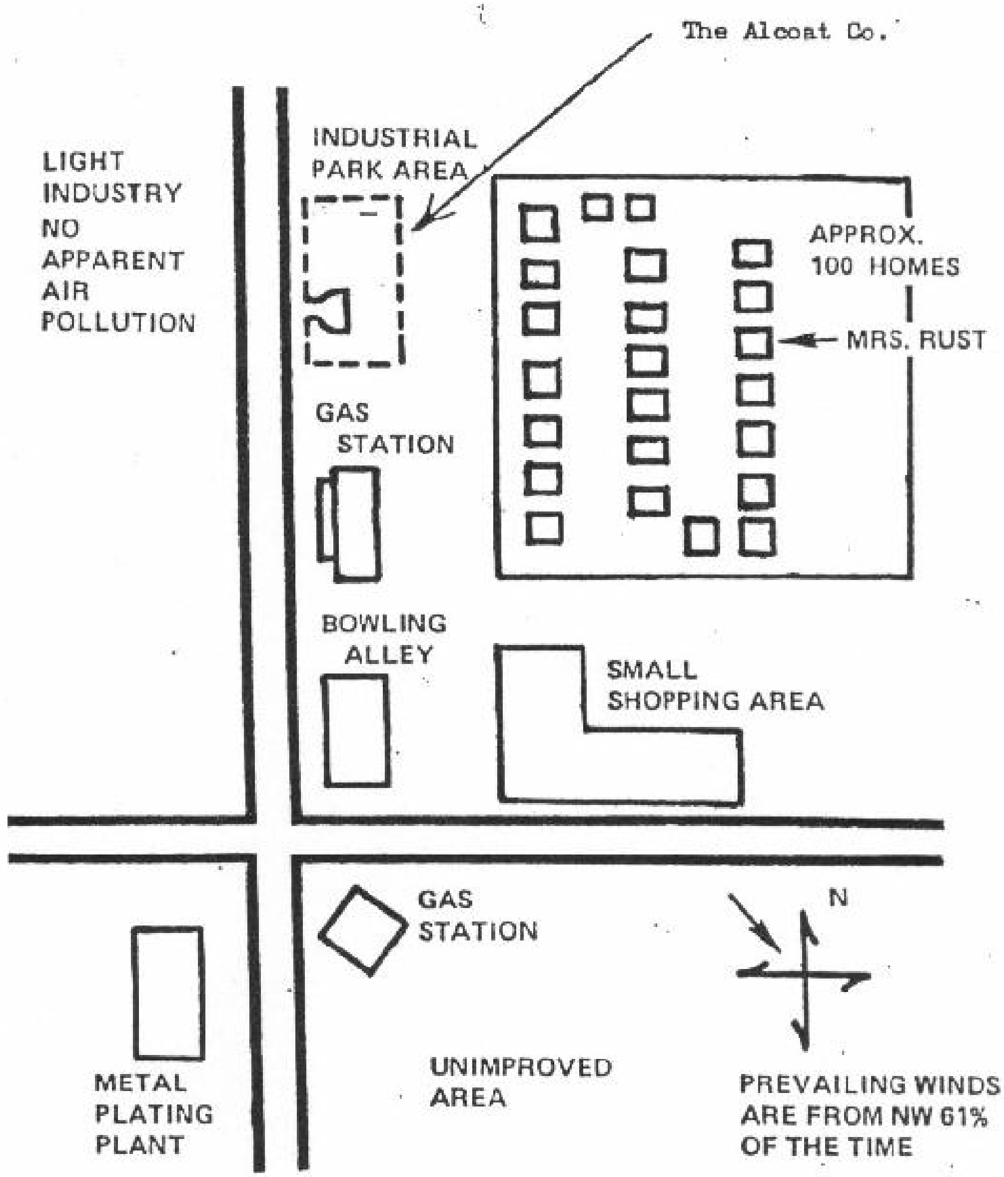
Ms. Erb offered to show Grant the plant and took her through the manufacturing facility. Grant observed that the company coated strips of metal with paint, The paint was baked on the strips and then quenched, after which the metal was re-coiled for shipment to fabricating plants. The baking ovens were each vented to separate catalytic incinerators, and the quenching operations each had a separate stack. There was also a small oil-fired boiler. Grant could detect strong solvent odors in the plant, but Ms. Erb informed her that this was to be expected in the immediate vicinity of so much fresh paint.

After the plant inspection and a further brief conversation with Ms. Erb, Grant left. On her way back to the office, she passed the metal-plating plant mentioned by Ms. Erb but could not detect any odors as she drove by.

On returning to the office, Grant prepared a report which detailed her investigation. She concluded that, possibly, the Rusts were mistaken and that she could find no problem that would warrant further action by the agency. Grant thought that would be the end of the case, but it wasn't. Over the next several days, fourteen additional complaints concerning odorous emissions in the Orangeland area were received. The complaints were brought to the attention of Grant's supervisor, who reviewed her investigative report. The supervisor noted several errors in the investigative techniques and discussed these with Grant.

1. Assuming that Ms. Grant neither did nor saw anything more than that stated in the preceding material, prepare a critique of her investigative technique.

2. Assuming that the investigation indicated that the Alcoat Company was indeed the source of the odors, explain how you would go about establishing a bona fide air pollution case. Remember that there are no specific odor control regulations and that the burden of proof in establishing air pollution as defined in the agency's ordinance rests with the agency. An odor problem of this type is effectively a public nuisance, and the manner of establishing the existence of the problem would be similar to that used to establish the existence of a public nuisance.


The Alcoat Co.
INDUSTRIAL
PARK AREA
LIGHT
INDUSTRY
NO
APPARENT
AIR
POLLUTION
APPROX.
100 HOMES
MRS. RUST
GAS
STATION
BOWLING
ALLEY
SMALL
SHOPPING AREA
GAS
STATION
N
METAL
PLATING
PLANT
UNIMPROVED
AREA
PREVAILING WINDS
ARE FROM NW 61%
OF THE TIME

SCALE: 1" = 500'

Exercise No. 4
Source Inspection

In this exercise, you will view a video tape showing the inspection of a dry-type cement plant. Note any deficiencies in the procedures employed or in the information collected, paying particular attention to safety-related issues. Information is included below to familiarize you with the process, its emission points and important permit parameters A form for recording your comments and containing reproductions of the instrument readings is also attached.

Process Description

Portland cement takes its name from the fine building stone quarried on the isle of Portland, England, which it resembles when made into concrete. The more than 30 raw materials used to make the cement can be divided into four basic components: lime (calcareous), silica (siliceous), alumina (argillaceous) and iron (ferriferous). About 3200 pounds of raw materials are required to produce 1 ton of cement, with approximately 35 percent of the raw material weight lost as carbon dioxide and water vapor. The raw materials undergo separate crushing after the quarrying operation and are proportioned, ground and blended using either the wet or dry process.

In the dry process, the moisture content of the raw material is reduced to less than 1 percent either before or during the grinding operation. The dried materials are pulverized into a powder and fed directly into a rotary kiln. The kiln is a slightly inclined (½ to ¾ inch/foot) horizontal steel cylinder, with a refractory brick lining, that rotates about the longitudinal axis. The pulverized raw materials are fed into the upper end and travel slowly to the lower end. The kiln is fired from the lower end so that the hot gases pass upward and through the raw materials. As the material travels through the heated kiln, drying, decarbonating and calcining are accomplished, finally heating to fusion temperature (about 2,700°F) and forming clinker. The clinker is cooled, mixed with about 5 percent gypsum and ground to final product fineness. The cement is then stored for later packaging and shipment.

With the wet process, a slurry is made by adding water to the initial grinding operation. Proportioning may take place before or after the grinding step. After the ground materials are mixed, the excess water is removed and final adjustments are made to obtain the desired composition. The final mixture is fed to the kiln as a slurry of 30 to 40 percent moisture or as a wet filtrate of about 20 percent moisture. The firing, cooling, addition of gypsum and storage steps are the same as for the dry process.

Emissions and Controls

Particulate matter is the primary emission in the manufacture of portland cement. Emissions also include the usual combustion products from the fuel used to supply heat for the kiln and drying operations, including oxides of nitrogen and sulfur. Sources of dust at a cement plant include quarrying and crushing, raw material storage, grinding and blending (dry process only), clinker production, finish grinding and packaging. The largest source of emissions is the kiln operation, which may be considered to have three units: the feed system, the fuel-firing system and the clinker cooling and handling system. The most desirable method of disposing of the collected dust is injection into the burning zone of the kiln. However, if the alkali content of the material is too high, some of the dust is discarded or leached before being returned to the kiln. Additional dust sources include raw material storage piles, conveyors, storage silos and loading and unloading facilities. Depending on the source, the conditions of the exhaust stream and the applicable regulations, plants use cyclones, electrostatic precipitators, fabric filters or combinations of these devices to control emissions, typically achieving removal efficiencies greater than 99 percent.

Sulfur dioxide may be generated from sulfur compounds in the ores, as well as from combustion of the fuel. However, the alkaline nature of the cement provides for sorption of SO_2 into the product. Typical overall control inherent in the process is estimated at 57 percent and may be greater if a fabric filter is used. Actual control, of course, will vary according to the alkali and sulfur content of the raw materials and fuel.

Selected Permit Information

Raw Materials		
Name	Max. Rate (lb/hr)	Avg. Rate (lb/hr)
Limestone	66,300	66,300
Cement Rock	20,000	20,000
Clay	3,000	3,000
Iron Ore	10,000	10,000
Coal	15,000	15,000

Fabric Filters		
Parameter	Kiln	Clinker Cooler
Air volume	63,000 acfm	57,200 acfm
Fabric area	8,500 ft^2	7,000 ft^2
Fabric type	Fiberglass	Nomex
Cleaning Method	Reverse air	Pulse-jet
Inlet temperature	325°F	350°F
Outlet temperature	285°F	290°F

Inspection Notes

Plant perimeter:

Control room instrument readings (refer to drawings at end of form) (Inspection points 1A, 1B and 1C):

Discharge end of kiln (Inspection point 2A):

Clinker cooler enclosure (Inspection point 3A):

Dust return spout and conveyor (Inspection point 3B):

Clinker cooler baghouse (Inspection point 4A):

Bag cleaning compressor (Inspection point 4B):

Clinker cooler baghouse fan and motor (Inspection point 4C):

Clinker cooler baghouse stack (Inspection point 4D):

Multi-cyclone preheater (Inspection point 2B):

Kln baghouse enclosure and stack (Inspection point 5A):

Area below kiln baghouse (Inspection point 5B):

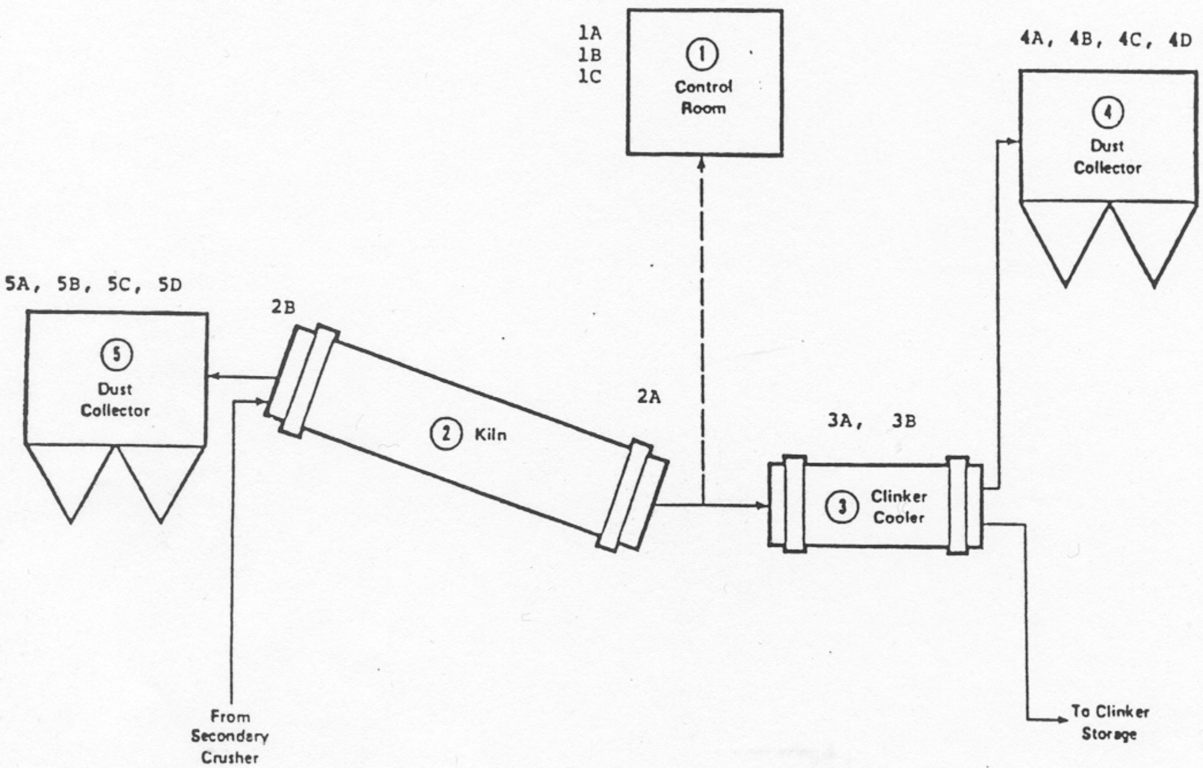
Kiln baghouse manometers (refer to drawings at end of form) (Inspection point 5C):

Kiln baghouse hoppers and screw conveyor (Inspection point 5D):

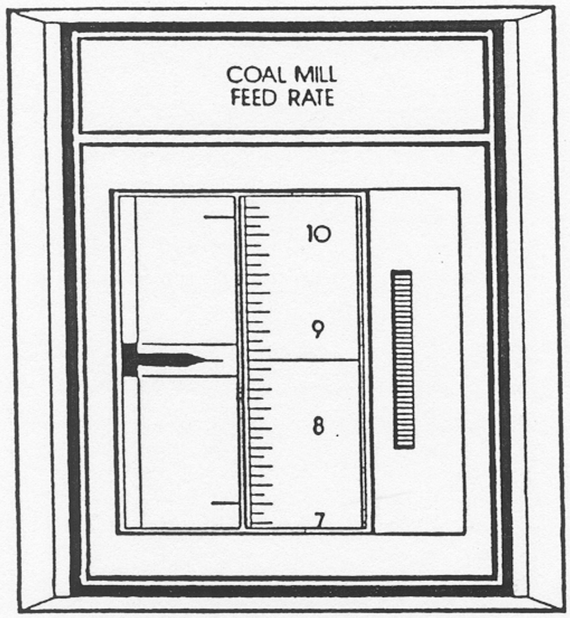
Kiln baghouse dust return system (Inspection point 5D):

Kiln baghouse fan and motor (Inspection point 5E):

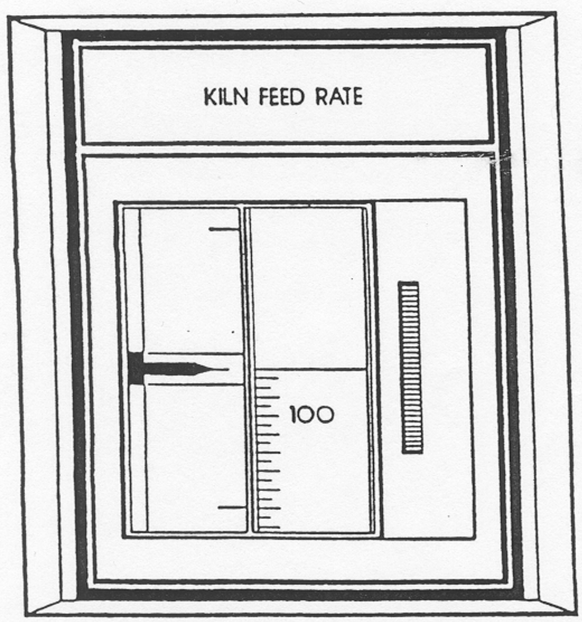
Plant yard:



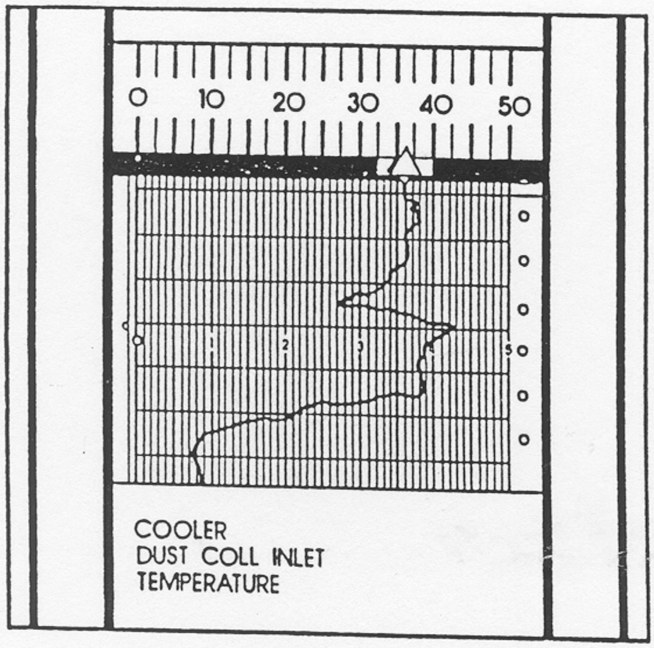
Plant Inspection Sequence



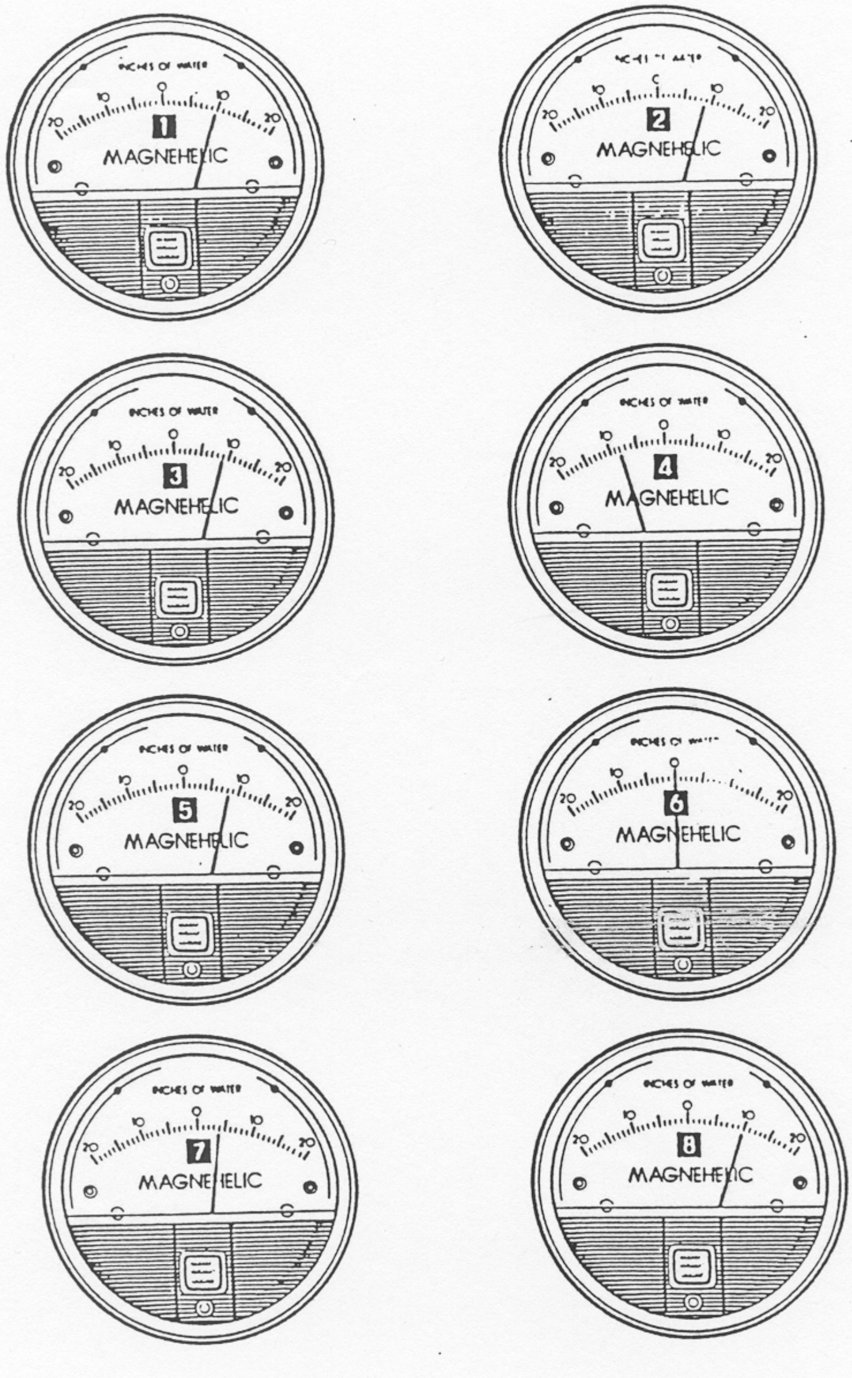
Coal Mill Feed Rate (1000s lbs/hr)



Kiln Feed Rate (1000s lbs/hr)



Clinker Cooler Inlet Temperature



Kiln Baghouse Compartment Pressure Drops

Kiln Baghouse System Pressure Drop

Exercise No. 5
Trial Testimony and Depositions
Solution

There is no student handout for this exercise. The instructor should remind the students that testimony from the witness stand and depositions are one and the same, with the exceptions that a judge (the Court) is not present during a deposition to rule on any disputes between the plaintiff(s) and the defendant(s) as to the method of questioning or the questions asked. Any objections by participating attorneys are recorded, and rulings will be requested later from the judge (the Court) at the time any deposition is offered for the record in open court.

A witness, in this case the inspector, should treat preparation for testimony in a deposition with the same care and attention as would be undertaken for an appearance on the witness stand. Since the students have already viewed the film(s) relating to Court proceedings, they should recall how the representatives of the regulatory agency handled themselves during direct and cross examination. During a deposition, the procedures are very similar to those followed in a courtroom--the witness is sworn, a court record is made and opposing lawyers are present for cross examination and objections.

Questions for the deposition/trial testimony will be based on Exercise No. 1, "Off-Site Surveillance", and Exercise No. 2, "On-Site Surveillance". The students should review the facts and their performance on these two exercises. After time for review, the instructor should select a student to provide deposition testimony. The student providing testimony can be changed any time to give others experience and to demonstrate different styles to the class.

After the witness is sworn, the deposition should begin. This portion of the course should be conducted by someone trained in the legal profession or with a strong legal bent. The questions and interactions should flow naturally, attempting to simulate the real experience to the extent possible. The following questions are suggested for general guidance:

1. Please state your name and address for the Court.

2. What is your current occupation?

3. How long have you been employed in your current capacity?

4. Have you held other employment such as that in which you are currently engaged, and, if so, for how long?

5. Does your current type of work require any special skills or training? If so, explain what skills or training are required.

6. What special training, if any, have you had to qualify you for your current occupation?

7. Where were you on the date of the alleged violation by the Hartley Division of the Compton Metals Company?

8. Describe how you first approached the facility and why you were there.

9. What was the weather like on that date?

10. And the time when you first arrived on site?

11. From what direction did you approach the plant?

12. Where did you park?

13. Now, let's talk first about what you saw from outside the plant. Was there a wind blowing or was it a still day?

14. What was the estimated wind speed?

15. From what direction was the wind blowing?

16. Was there a steady wind speed or was it blowing intermittently?

17. What did you see as the source of the alleged plume?

18. How far were you from the source of the alleged plume when you identified it?

19. Was there any special apparatus attached to the stack?

20. How tall was the stack?

21. Tell the Court the exact direction to the stack from the spot where you were standing when you began your observations.

22. Did you see anyone on the premises?

23. Did you notice anything else on the premises?

24. Now, would you describe to the Court just exactly how you observed and recorded the "Henderson County Air Pollution Control Agency Visible Emissions Evaluation", Plaintiffs Exhibit #1?

25. You earlier stated to the Court what special skills or training were required for a person with your occupation. Would you describe for the Court exactly how you were trained to observe and record visible emissions?

26. Did you follow the exact procedure you were trained to follow?

27. What kind of watch did you use for timing the alleged emissions?

28. Have you ever had that watch calibrated to assure that it keeps accurate time?

29. Did you see any steam or evidence of water in the alleged plume?

30. What was the background against which you were viewing the alleged plume?

31. Was the day cloudy or sunny?

32. Were you viewing the plume against the background of the clouds or some background at a lower level?

33. Do you carry personal identification issued by your employer that clearly identifies you as an employee of the agency and states your occupation?

34. When you entered the premises did you present your personal identification to the receptionist?

35. Did you present your identification to Mr. Peterson?

36. Did you see or talk with a Mr. Allen?

37. Do you know who Mr. Allen is?

38. Was there any reason for not seeing or talking with Mr. Allen?

39. When the business of Hartley was stated as hard-chrome plating, did you inquire as to the nature of the waste which might be generated by this firm?

40. What is a Type O waste?

41. Was the material allegedly burned in the incinerator Type O waste?

42. What type of waste was incinerated during the period of your observation of the incinerator stack?

43. Based on your training and experience, what kind of permit would be required for the waste Mr. Peterson allegedly burned in the incinerator?

44. Did you include in your report every violation you observed, consistent with your training and experience in your present occupation? If you didn't, why not?

45. Did you inquire of Mr. Peterson or of anyone else on the premises whether Hartley had made application for any kind of permit for air emissions from the site?

46. Did you inquire whether Hartley would use the incinerator for disposal of any of its waste when it did begin operations?

47. Did you ever ask to see the "necessary permit to operate" to which Mr. Peterson referred in response to your statement that the company was in violation of Henderson County APCD Rule 50?

48. If you didn't ask, is it possible that Hartley had a permit or had at least applied for one?

49. Did you ever provide Mr. Peterson, Mr. Allen or anyone else associated with Hartley a copy of your report?

50. Do you know whether anyone at the home office in Chicago has ever seen the Notice of Violation or your report?