APTI 452

Chapter 1

REVIEW EXERCISES

Multiple Choice

1. Which of the following catastrophic air pollution events was **NOT** an air pollution episode that resulted from a severe temperature inversion?

a. Belgium (Meuse River Valley)
b. London, England
c. Poza Rica, Mexico
d. Donora, Pennsylvania
e. Bopal,India

2. Each of the following factors has directly influenced the policy objectives of air pollution control programs, **except** _____.

a. air pollution episodes
b. changes in society and the economy
c. improvements in science
d. atmospheric dispersion of pollutants
e. environmental activism

3. The state of Oregon is significant to the air pollution control program history because in 1952 it _____.

a. pioneered studies in human health and the environmental effects of smog
b. promulgated the first state emission standards for HAPs
c. established the first state air pollution control agency
d. led the United States in the growth of state air toxics programs
e. advanced the first citizen lawsuit against an industrial polluter

4. The U.S. Environmental Protection Agency was formed in _____.

a. 1955
b. 1963
c. 1967
d. 1970
e. 1977

5. Which of the following was **not** a significant achievement of the Clean Air Act Amendment of 1990?

a. Completely overhauled the hazardous air pollution program.
b. Added an extensive operating permit program for major sources.
c. Significantly strengthened enforcement provisions of the CAA.
d. Placed regulations on ozone-destroying chemicals.
e. Discouraged market-based incentives for meeting NAAQS.

6. Who was the first historic figure to regulate the use of coal burning”?

a. King James I (1228)
b. King Edward I (1273)
c. King Richard III (1377)
d. King Henry V (1413)
e. King James II (1442)

7. Which of the following substances is a federally regulated criteria pollutant?

a. Asbestos
b. Lead
c. Radon
d. Mercury
e. Benzene

8. The basic structure of our nation’s present air quality management program was established by which of the following acts?

a. Air Pollution Control Act (1955)
b. Clean Air Act (1963)
c. Air Quality Act (1967)
d. Clean Air Act Amendment (1970)
e. Clean Air Act Amendment (1977)

Matching

A. Air Pollution Episodes

_____ **9.** (1930) Meuse River Valley

_____ **10.** (1948) Donora, Pennsylvania

_____ **11.** (1952) London, England

a. Twenty people died and almost 7,000 became sick due to a four-day fog of SO_2 that surrounded a small mill town.

b. Two hundred people died due to pneumonia, influenza, and cardiac arrest. Excess deaths continued several weeks after the episode caused by an epidemic of influenza.

c. Sixty-three people died due to high concentrations of SO_2 in the atmosphere in a severe temperature inversion.

_____ **12.** (1953) New York City

d. A Union Carbide plant accidentally released methyl isocyanate gas into the atmosphere that killed 2,800 people and injured over 200,000.

_____ **13.** (1984) Bhopal, India

e. The most acute air pollution episode in recorded history in which over 4,000 people died of bronchitis.

B. Legislative Landmarks

_____ **14.** (1955) Air Pollution Control Act

f. Established the Air Quality Control Regions (AQCRs) designed to issue air-quality criteria and control techniques for states.

_____ **15.** (1963) Clean Air Act

g. Added the Prevention of Significant Deterioration Program (PSD) and the nonattainment provisions**.**

_____ **16.** (1967) Air Quality Act

h. Initiated federal funding for air pollution research and provided technical assistance to the states; lawmakers restricted federal authority to preserve state and local autonomy.

_____ **17.** (1970) CAA Amendments

i. Created a tough, new industrial permitting program, overhauled the hazardous air pollution program, and expanded federal authority over noncompliance of NAAQS.

_____ **18.** (1977) CAA Amendment

j. Initiated the first federal oversight of state air pollution action and established grants for states to expand air pollution control programs.

_____ **19.** (1990) CAA Amendments

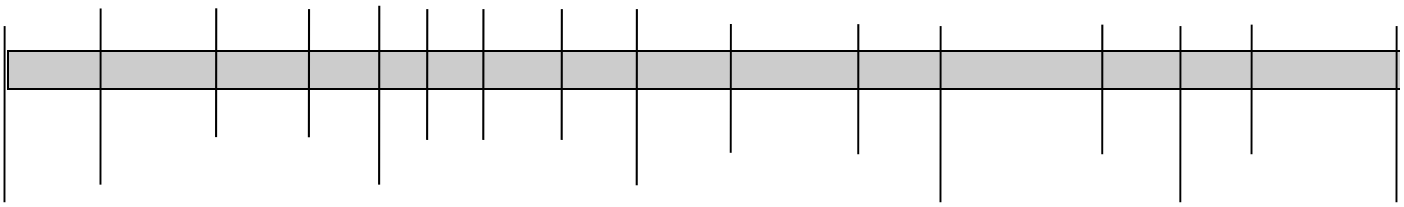
k. Established a uniform NAAQS and provided federal enforcement authority in air pollution emergencies and interstate clean air violations.

Historical Time Line

Directions: Record the events that took place in the space provided.

Control Program History

1930 1940 1950 1960 1970 1980 1990 2000 2005 2010 2014



(1930) _____

(1940) _____

(1947) _____

(1949) _____

(1950) _____

(1952) _____

(1953) _____

(1955) _____

(1963) _____

(1967) _____

(1970) _____

(1977) _____

(1980) _____

(1984) _____

(1990) _____

(1993) _____

(1994) _____

(1996)_____

(1999)_____

(2004)_____

(2005) _____

(2006) _____

(2009)_____

(2011) _____

(2012) _____

(2013) _____

(2014) _____

Chapter 2

REVIEW EXERCISES

Multiple Choice

1. The human health effect that best describes carbon monoxide (CO) poisoning is _____.

a. accumulation of toxins in the bones and soft tissue resulting in renal failure
b. increased airway resistance resulting in bronchial constrictions
c. interference with the body's ability to supply oxygen to tissue resulting in cardiovascular disease
d. inflammation of the lungs resulting in emphysema or fibrosis
e. development of phagocyte cells resulting in chronic bronchitis

2. Each of the following is a direct effect of air pollution on the respiratory system, **except** _____.

a. pulmonary emphysema
b. lung cancer
c. pneumoconiosis
d. chest pain
e. blood poisoning

3. Which of the following is a part of the risk assessment process?

a. Hazard identification
b. Dose-response data
c. Exposure assessment
d. Risk characterization
e. All of the above

4. _____ accounts for most of the total SO_2 emissions.

a. Petroleum refining
b. Sulfuric Acid Manufacturing
c. Fuel combustion
d. Smelting

Matching

Directions: *Match the environmental effect that best applies to the categories listed and record the letter in the space provided. Each category may be used more than one time.*

C. Environmental Effects of Air Pollution

_____	**5.**	Acidification of lakes and streams	a. Ecosystem Damage
_____	**6.**	Pristine vistas and national parks irreparably altered	b. Global Warming
_____	**7.**	Soiled buildings, clothing, and automobiles.	c. Property Damage
_____	**8.**	Melting snow and ice at both poles	d. Quality of Life
_____	**9.**	Cracked and split rubber products, nylon, and polymer plastics	
_____	**10.**	Damage to vegetation, forests, and crops	
_____	**11.**	Variations in annual and seasonal precipitation patterns	
_____	**12.**	Reduction in open-air visibility	

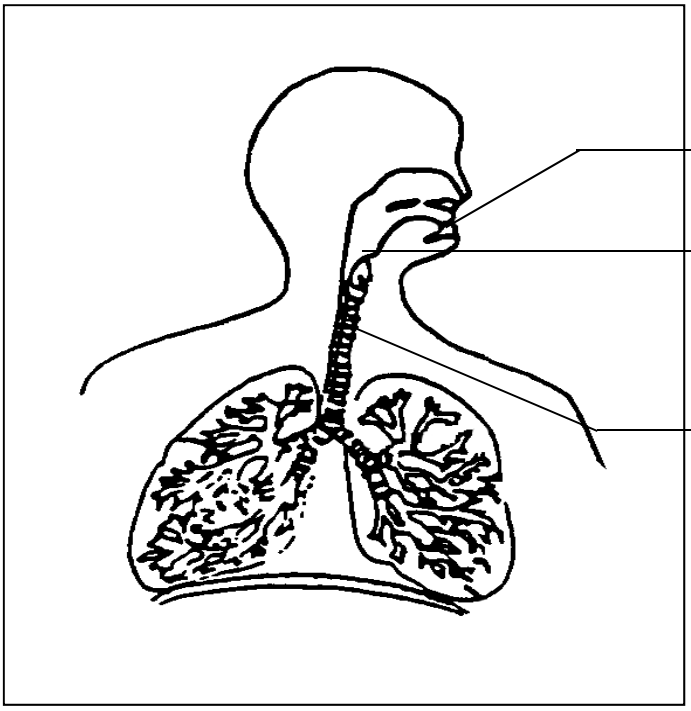
D. Human Health Effects of Air Pollution

_____	**13.**	Respiratory System	e. Particulate Matter (PM)
_____	**14.**	Reduced Lung Elasticity	f. Lead (Pb)
_____	**15.**	Lower Respiratory System	g. Sulfur Dioxide (SO_2)
_____	**16.**	Circulatory System	h. Carbon Monoxide (CO)
_____	**17.**	Lowered Resistance to Infection	i. Nitrogen Dioxide (NO_2)
_____	**18.**	Organs and Soft Tissue	j. Ozone

Diagramming

Directions: Diagram the following parts of the human body.

A. Upper Respiratory System



19.

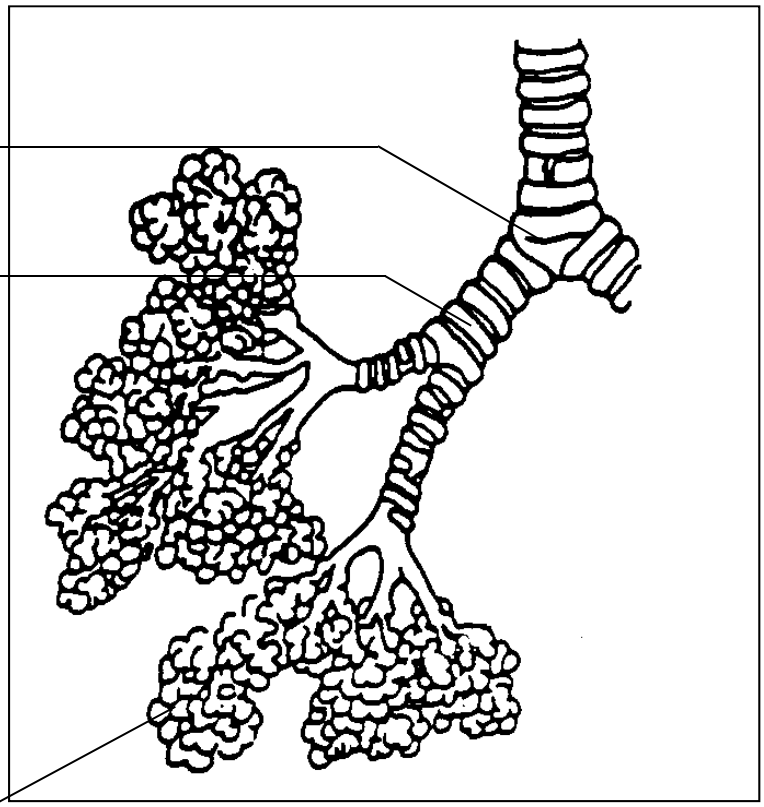
20.

21.

B. Lower Respiratory System

22.

23.



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Chapter 3
REVIEW EXERCISES
Multiple Choice

Directions: Read each question and choose the best answer.

1. As wind speed increases, the volume of air dispersed from a pollutant source over a specified period of time

a. increases.
b. decreases.
c. results in superadiabatic conditions.
d. results in isothermal conditions.
e. remains unchanged.

2. The three dimensional movement of the wind created by an uneven earth surface is called wind

a. speed.
b. direction.
c. turbulence.
d. circulation.
e. mixing.

3. Which topographical feature stores the most heat?
a. Lakes
b. Cultivated Fields
c. Mountains
d. Valleys
e. Draws

4. A _____ occurs in stable atmospheric conditions; is generally produced on clear nights with little or light wind; and may spread horizontally but has little vertical air mixing.

a. looping plume
b. coning plume
c. fanning plume
d. lofting plume
e. fumigating plume

5. A _____ occurs in unstable atmospheric conditions; is generally produced on clear sunny days with light winds; and can draw pollution to ground level near the pollutant source.

a. looping plume
b. coning plume
c. fanning plume
d. lofting plume
e. fumigating plume

Matching

Directions: *Match the figure with the term that best defines the plume type and record the answer in the space provided.*

E. Environmental Effects of Air Pollution

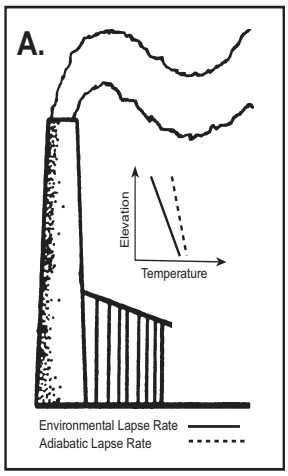
_____ 6. *Looping plume*

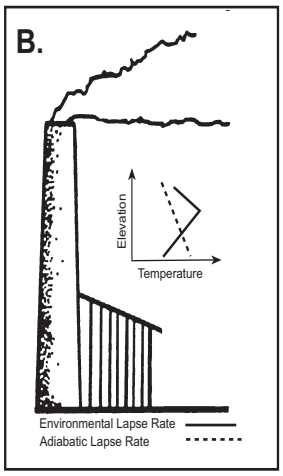
_____ 7. *Coning plume*

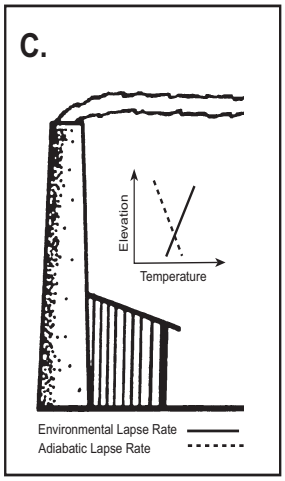
_____ 8. *Fanning plume*

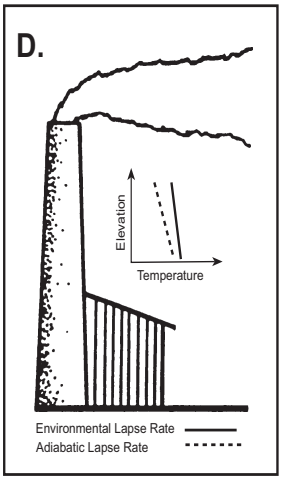
_____ 9. *Lofting plume*

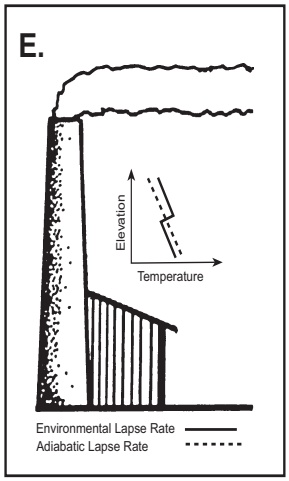
_____ 10. *Fumigating plume*

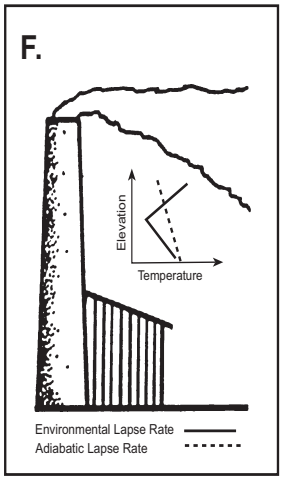












Chapter 4
Indoor Air Pollution
REVIEW EXERCISES

Multiple Choice

Directions: Read each question and choose the best answer.

1. Indoor air pollution has become a matter of great concern because the average person spends _____ of their time indoors.

a. 90% (22 hrs./day)
b. 70% (17 hrs./day)
c. 50% (12 hrs./day)
d. 30% (7 hrs./day)
e. 10% (2 hrs./day)

2. A radioactive gas – found on the Periodic Table of Elements – that is a by-product of uranium decay and is found in nearly all soils is _____.

a. potassium (K)
b. plutonium (Pu)
c. radium (Ra)
d. uranium isotopes (U)
e. radon (Rn)

3. Each of the following are ways to control indoor air pollution **except** _____.

a. eliminate the source
b. install carbon monoxide (CO) detectors
c. modify the source
d. ventilate and dilute the air
e. filter the air

4. The most common method of controlling indoor air pollution today is to _____.

a. Identify and eliminate the source
b. install carbon monoxide (CO) detectors
c. modify the source
d. ventilate and dilute the air
e. filter the air

5. The leading cause of "Sick Building" Syndrome is _____.

a. inadequate ventilation
b. poor maintenance
c. excess levels of radium
d. spread of biological contaminants
e. ingestion of respirable particles

6. Sources of indoor organic chemicals may be which of the following _____.

a. paints, varnishes and solvents
b. cleaning, degreasing and hobby products
c. gasoline
d. all of the above
e. only a & c

7. Biological contaminants include all of the following **except** _____.

a. bacteria
b. molds
c. animal dander
d. carbon monoxide
e. pollen

8. Preliminary estimates suggest that building-related illnesses result in direct medical costs in excess of _____.

a. $ 1 million
b. $ 1 billion
c. $ 4.7 billion
d. $ 10 million
e. $ 10 billion

9. Indoor levels of many pollutants may be_____ times higher indoors than outdoors.

a. 5
b. 10
c. 15
d. 20
e. 25

10. Pontiac fever, Legionnaire's disease, and Humidifier fever have all been found to be examples of _____.

a. "Sick Building" Syndrome
b. Asbestosis
c. Pulmonary edema
d. Mesothelioma
e. respiratory xyhemoglobin

B. Data Interpretation

Directions: Match each example with its source of indoor air pollution. Each source may be selected more than once.

Selected Sources of Indoor Air Contaminants

_____ **11.** Insulation

_____ **12.** Glue

_____ **13.** Arachnid Excretia

_____ **14.** Tobacco Products

_____ **15.** Office Equipment

_____ **16.** Oil Furnace

_____ **17.** Interior Grade Plywood

_____ **18.** Kerosene Heaters

_____ **19.** House Dust

_____ **20.** Foam Insulation

_____ **21.** Siding

_____ **22.** Dry Cleaned Clothing

_____ **23.** Furniture

_____ **24.** Furniture Polish

a. Biological Contaminants

b. CO, SO_2, NO_2

c. Formaldehyde

d. Asbestos

e. Respirable Particulates

f. Organic chemicals

Chapter 5

REVIEW EXERCISES

Multiple Choice

Directions: Read each question and choose the best answer

1. The Clean Air Act does **not** regulate _____.

a. emissions that enter the inside air
b. fugitive emissions that are released to the atmosphere
c. emissions from a chimney released directly to atmosphere
d. emissions from a factory that is vented to atmosphere
e. emissions from a school that is vented to atmosphere

2. Which of the following is **not** a criteria pollutant with a NAAQS?

a. Ozone
b. PM-10
c. Asbestos
d. Carbon monoxide
e. Lead

3. Which of the following must be considered when establishing a NAAQS?

a. Protection of the average person
b. Cost to implement
c. Availability of control equipment
d. Enforcement procedures
e. Protection of the most sensitive person

4. Nonattainment classifications of ozone and carbon monoxide are determined by their _____.

a. design values
b. highest ambient air concentrations in the last year only
c. emissions inventories
d. likelihood of compliance
e. enforcement procedures

5. The CAA requires that a state implementation plan (SIP) be reviewed and approved by EPA. If the state fails to produce an acceptable SIP, then _____.

a. a federal implementation plan will be developed
b. a state can be fined
c. a similar state strategy will be implemented
d. no new sources of pollution will be allowed in state
e. enforcement procedures will be implemented against the state

6. Which of the following areas apply to New Source Performance Standards (NSPS)?

a. Nonattainment areas
b. Attainment areas
c. Unclassifiable areas
d. All of the above
e. None of the above

7. The legislation that created provisions for the Prevention of Significant Deterioration (PSD)
was the _____.

a. Clean Air Act (1963)
b. Air Quality Act (1967)
c. Clean Air Act Amendment (1970)
d. Clean Air Act Amendment (1977)
e. Clean Air Act Amendment (1990)

8. A nonattainment permit does **not** require which of the following:

a. Best available control technology (BACT)
b. Lowest achievable emission rate (LAER)
c. Complete compliance of owners other sources in same state
d. Offset emissions
e. None of the above

9. Which of the following must be taken into consideration when establishing a maximum achievable control technology (MACT) standard?

a. Health impact on the most sensitive person
b. Technology based standard considering costs of achieving emission reduction
c. Only the health effects on people
d. Ample margin of safety to protect the protect the public health
e. None of the above

10. Which of the following programs is regulated by the CAA?

a. Acid rain
b. Manmade visibility in certain Class I areas
c. Stratospheric ozone
d. Automobile emissions
e. All of the above

Chapter 6

Review Exercises

Multiple Choice

Directions: Read each question and choose the best answer.

1. The federal regulation that governs Ambient Air Quality Surveillance methods is _____.

a. 40 CFR 50
b. 30 CFR 71
c. 40 CFR 53
d. 50 CFR 25
e. 40 CFR 58

2. The purpose of an ambient air quality-monitoring program include all of the following, **except** _____.

a. to determine compliance with standards
b. to activate emergency control procedures
c. to develop long-term control strategies
d. to establish air quality control regions (AQCRs)
e. to observe pollution trends

3. Which of the following substances is **not** a federally regulated criteria pollutant?

a. SO_2
b. NO_2
c. VOCs
d. O_3
e. CO

4. Each of the following is an example of an ambient air quality monitoring station, **except** _____.

a. State and Local Air Monitoring Stations (SLAMS)
b. Regional Air Monitoring Stations (RAMS)
c. National Air Monitoring Stations (NAMS)
d. Special Purpose Monitoring Stations (SPMS)
e. Photochemical Assessment Monitoring Stations (PAMS)

5. Which of the following is **not** an element of an effective quality assurance and quality control program?

a. Preventative Maintenance
b. Sample Collection
c. Sample Analysis
d. Data Reporting
e. Compliance and Enforcement

6. The most commonly used non-continuous method of gas collection and sampling is through the use of _____.

a. bubblers or impingers
b. electrostatic precipitation
c. impaction
d. filtration
e. gravitational settling

7. A technique used to collect and sample particulate matter is _____.

a. cryogenic analysis
b. absorption
c. adsorption
d. condensation
e. filtration

8. A device used to sample particulate matter in which pollutants are drawn through a glass fiber filter using a vacuum motor to draw the air is a _____.

a. electrostatic precipitator
b. Hi-vol. sampler
c. paper tape sampler
d. surface condenser
e. Venturi scrubber

9. A sampling technique used to collect ambient air gases with a collection tube containing solid surfaces such as carbon, silica gel or molecular sieves is called _____.

a. filtration
b. adsorption
c. condensation
d. impaction
e. absorption

10. A principle of particulate matter collection and sampling in which particles are drawn through a device, but deflected from their original path is called _____.

a. filtration
b. electrostatic precipitation
c. gravitational settling
d. impaction
e. thermostatic precipitation

Matching

Directions: Match each sampling technique with the proper description.

Sampling Techniques

A. Static sampling
B. Grab sampling
C. Intermittent sampling
D. Continuous sampling
E. Absorption
F. Adsorption

_____ **11.** The preferred method of sampling particulate matter and acid rain in which contaminants are collected on a periodic basis, typically over longer averaging times (i.e., 24 hours).

_____ **12.** Collection of contaminants by diffusion of gas, sedimentation of particles, or impaction on a sticky surface.

_____ **13.** The preferred method of sampling used by monitoring programs to obtain real-time sampling averages of contaminants.

_____ **14.** A sampling method used to collect organic gases on a solid surface such as carbon, silica gel, or a molecular sieve.

_____ **15.** A method of collection in which a small volume of air is quickly captured in an evacuated bottle, gas syringe, or synthetic bag.

_____ **16.** A sampling technique in which gas is drawn through a liquid reagent and removed from the air stream as it becomes dissolved into the liquid.

Table Interpretation

Directions: Review the National Ambient Air Quality Standards (NAAQS) table shown below. Fill in the missing information.

Pollutant	Averaging Time	Primary Standard	Secondary Standard
Carbon Monoxide (CO)	**22.**	10 mg/m^3 (9 ppm)	**23.**
Nitrogen Dioxide (NO^2)	**24.**	100 μg/m^3 (0.053 ppm)	none
25.	Annual Arith. Average	80 μg/m^3 (0.03 ppm)	none
	24-hour	365 μg/m^3 (0.14 ppm)	none
	26.	none	**27.**
PM_{10} (≤ 10μm)	**28.**	none	**29.**
	24-hour	**30.**	
$PM_{2.5}$ (≤ 2.5μm)	Annual Arithmetic Mean	**31.**	15 μg/m^3
	32.	35 μg/m^3	same
Ozone (O_3)	**33.**	147 μg/m^3 (0.8 ppm)	same
34.	Rolling 3-mo. average	**35.**	same

36. Explain the difference between the primary and secondary standards used to control national pollutant levels.

_____

_____

_____

Chapter 7

REVIEW EXERCISES

Multiple Choice

Directions: Read each question and choose the best answer.

1. Federal Reference Methods 1-8 were originally promulgated in _____.

a. 1967
b. 1971
c. 1979
d. 1981
e. 1990

2. The most effective means of capturing condensable gaseous pollutants during stationary source sampling is through _____.

a. electrostatic precipitation
b. filtration
c. condensation
d. centrifugal force
e. thermal precipitation

3. In order to obtain a representative collection an isokinetic sample must be drawn into the sampling device at a _____.

a. velocity greater than the gas stream
b. velocity less than the gas stream
c. volume greater than the gas stream
d. velocity equal to the gas stream

4. Sampling velocities that are greater than the isokinetic rate result in the collection of _____.

a. smaller number of small particles than those found in the gas stream
b. smaller volumes than those found in the gas stream
c. larger number of small particles than those found in the sampled gas stream
d. the same proportional volumes as those found in the gas stream
e. the number of particles equal to those found in the gas stream

5. Sampling velocities that are less than the isokinetic rate results in the collection of _____.

a. a smaller number of small particles than those found in the gas stream
b. smaller volumes than those found in the gas stream
c. a larger number of large particles than those found in the gas stream
d. larger volumes than those found in the gas stream
e. the number of particles equal to those found in the gas stream

6. Misalignment of the sample probe results in a measurement error that could cause _____.

a. smaller particle to not be included in the collected sample
b. smaller volumes of gas
c. some larger particles to not be included in the collected sample
d. larger volumes of gas to be collected
e. equal volumes of gas

7. The _____ nozzle tapered from the outside inward results in the least disruption of the gas flow streamline.

a. square-edged
b. blunt-edged
c. curved-edged
d. sharp-edged
e. fork-edged

8. Nozzles designed without sharp and tapered edges, or those that are dented _____.

a. are allowed for use in a Method 5 sampling train
b. collect all particles better than other nozzles
c. collect small particles better than other nozzles
d. collect smaller volumes of sample gas than other nozzles
e. should not be used for particle sampling.

9. Industry does **not** use the results of stationary source testing to _____.

a. evaluate process economics
b. control operational costs
c. evaluate existing control device efficiency
d. design new emission control equipment
e. impose fines and penalties for non-compliance

10. Compliance Assurance Monitoring (CAM) reporting and record keeping are found in _____ of the 1990 Clean Air Act.

a. Title VII
b. Title V
c. Title VIII
d. Title VI
e. Title III

Matching

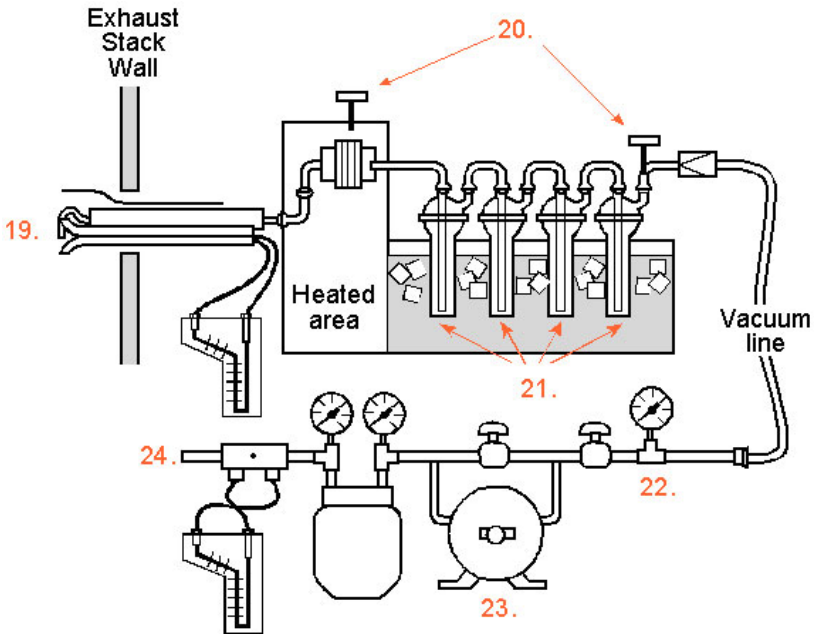
Directions: Match the Federal Reference Method with the item description.

Federal Reference Methods

_____	**11.** Reference Method 1	**a.**	Gas Flow Rate
_____	**12.** Reference Method 2	**b.**	Nitrogen Oxides
_____	**13.** Reference Method 3	**c.**	Sampling Point Locations
_____	**14.** Reference Method 4	**d.**	Particulate Matter
_____	**15.** Reference Method 5	**e.**	Gas Molecular Weight
_____	**16.** Reference Method 6	**f.**	Sulfur Dioxide
_____	**17.** Reference Method 7	**g.**	Sulfuric Acid Mist and Sulfur Dioxide
_____	**18.** Reference Method 8	**h.**	Gas Moisture Content

Particulate Emission Sampling Train

Directions: Use the diagram below to identify specific equipment components.



19. _____ **20.** _____

21. _____ **22.** _____

23. _____ 24. _____.

Chapter 8

REVIEW EXERCISES

Multiple Choice

Directions: Read each question and choose the best answer

1. The cornerstone of emission estimation and assessment activities is _____.
   a. Locating and Estimating Series (L& E S) for hazardous air pollutants
   b. AP-42
   c. NAAQS
   d. Clean Air Act (1963)
   e. State Implementation Plans (SIPs)

2. The purpose of a Historical Trend Emissions Inventory is to _____.
   a. track emissions by source category over time
   b. provide a detailed inventory of individual sources for a specific year
   c. provide an episodic inventory with detailed spatial, temporal, and species resolution
   d. estimate future emissions by source category
   e. track actual vs. projected emissions reductions for a specific area over a specified period of time

3. The purpose of a Projection Emissions Inventory is to _____.
   a. track emissions by source category over time
   b. provide a detailed inventory of individual sources for a specific year
   c. provide an episodic inventory with detailed spatial, temporal, and species resolution
   d. estimate future emissions by source category
   e. track actual vs. projected emissions reductions for a specific area over a specified period of time

4. The annual reporting requirements threshold amount for all criteria pollutants, except lead and carbon monoxide is _____.
   a. 5 tons/year
   b. 10 tons/year
   c. 100 tons/year
   d. 1000 tons/year
   e. 25 tons/year

5. The following are all essential elements of an emissions inventory, **except** _____.

   a. geographic area criteria
   b. spatial and temporal characteristics
   c. source specific data
   d. data handling techniques
   e. enforcement strategies

6. A listing of average emission rates that can be expected from individual source processes under specific operating parameters is a(n) _____.

   a. Emission Inventory
   b. Emission Factor
   c. Emission Estimation
   d. Emission Averaging
   e. Modal Inventory

7. A listing and description of air pollutant emitting sources is a(n) _____.

   a. Emission Inventory
   b. Emission Factor
   c. Emission Estimation
   d. Emission Averaging
   e. Modal Inventory

Matching

Directions: Match each of the following pollutant sources with the proper terminology.

Pollutant Source Identification

A. Point Source
B. Area Source
C. Mobile Source

_____	**8.**	Commercial/Institutional Heating	_____	**19.**	Ferry Transports
_____	**9.**	Power Plants	_____	**20.**	Evaporative Losses
_____	**10.**	Aircraft	_____	**21.**	Municipal Incinerators
_____	**11.**	Industrial Processing Plants	_____	**22.**	Fugitive Emissions
_____	**12.**	Channel Vessels	_____	**23.**	Barges
_____	**13.**	On-Site Incineration	_____	**24.**	Bus Transport
_____	**14.**	Solid Waste Disposal Plants	_____	**25.**	Motor Vehicles
_____	**15.**	Open Burning	_____	**26.**	Coast Guard Patrol Ships
_____	**16.**	Residential Heating	_____	**27.**	Port Vessels
_____	**17.**	Industrial Fuel Combustion	_____	**28.**	Rail Yard Locomotives
_____	**18.**	Tractor Trailer Transport (Highway)	_____	**29.**	Tug Boats

Chapter 9

REVIEW EXERCISES

Multiple Choice

Directions: Read each question and choose the best answer

1. The following are all principles used to control particulate matter, **except** _____.

a. gravity
b. centrifugal force
c. infrared analysis
d. diffusion
e. electrostatic attraction

2. Which of the following control devices might be effectively used to control coarse particulate matter (> 50 microns)?

a. Electrostatic Precipitation Collection Plates
b. Baffle Chambers
c. Baghouse
d. Venturi Scrubber
e. Electrostatic Precipitation Electrodes

3. Settling Chambers use _____ to remove pollutants from gas exhaust.

a. electrostatic precipitation
b. diffusion
c. fabric filters
d. centrifugal force
e. gravity

4. The three Ts of combustion are commonly referred to as _____.

a. time , temperature, and type of fuel
b. temperature, type of fuel, and turbulence
c. time, turbulence, and temperature
d. type of fuel, turbulence, and time
e. None of the above

Matching

Directions: *Match each of the following advantages and disadvantages with the proper control technology.*

Control Technology

A. Electrostatic Precipitators
B. Fabric Filters

_____ **5.** Is highly efficient (>99%) for collecting all types of dust and high to low flow rates.

_____ **6.** Expensive to purchase and maintain and limited by space.

_____ **7.** Ability to treat large volumes of gas economically.

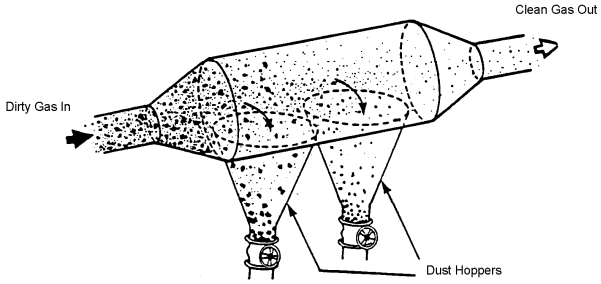
_____ **8.** Limited to dry environments.

Control Technology Identification

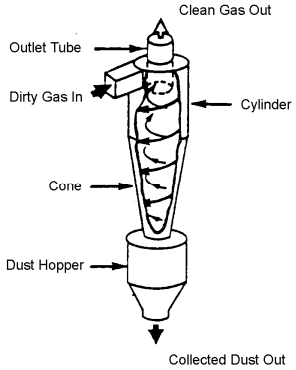
Directions: Match the control technology with the device that is displayed and answer the questions in the spaces provided.

A. Electrostatic Precipitator
B. Catalytic Incinerator
C. Contact Condenser
D. Carbon Adsorber
E. Cyclone Collector
F. Elevated Flare System
G. Packed Column Absorber System
H. Fabric Filter
I. Thermal Incinerator
J. Adsorption System
K. Settling Chamber
L. Venturi Scrubber

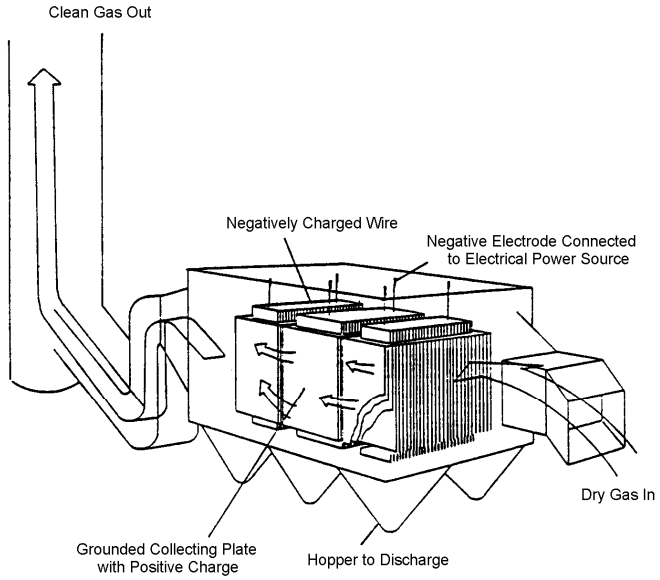
9. _____



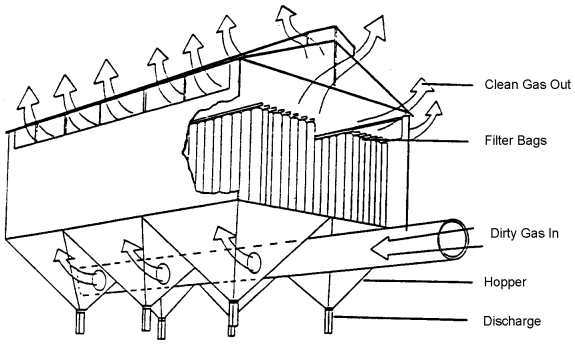
10. _____



11. _____



12. _____



Chapter 10

REVIEW EXERCISES

Multiple Choice

Directions: Read each question and choose the best answer.

1. The following are all principles used to control gaseous emissions, **except** _____.

a. impaction
b. condensation
c. absorption
d. adsorption
e. combustion

2. Which of the following control devices might be effectively used to control gaseous emissions?

a. Fabric filters
b. Absorption spray tower
c. Impingement plate scrubber
d. Process boiler
e. Multiple cyclone

3. Absorbers collect gaseous pollutants by _____.

a. trapping them in a carbon reagent
b. transferring them from the gas stream into the liquid reagent
c. freezing or condensing the pollutant into a more solid substance
d. heating the pollutant to hasten disposal through combustion
e. catalytic means that consumes the pollutant

4. Contact condensers are _____.

a. used to control nitrogen oxide emissions
b. control devices in which coolants come in direct contact with vapors
c. sometimes referred to as shell and tube heat exchangers
d. control devices that are always used before adsorbers for VOC control
e. allow exhaust gases and coolant to exit separately

Matching

Directions: *Match each of the following advantages and disadvantages with the proper control technology.*

Control Technology

A. Scrubbers
B. Surface and Shell Condensers
C. Adsorbers

_____ **5.** Can be used for condensable gases and vapors.

_____ **6.** Collects both gas and particles while neutralizing corrosive gases.

_____ **7.** For collecting a mixture of volatile organic gases.

_____ **8.** Effectively collects various organic gases found in the electronic and petrochemical operations.

_____ **9.** Effluents can create water pollution problems.

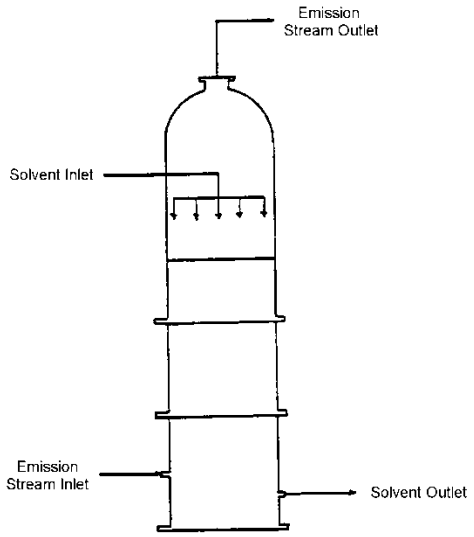
_____ **10.** Effectively collects a wide variety of organic gases and is typically used by the computer industry.

Control Technology Identification

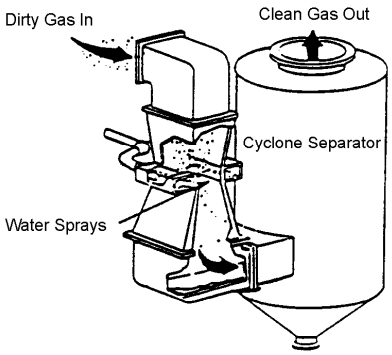
Directions: Match the control technology with the device that is displayed and answer the questions in the spaces provided.

A. Electrostatic Precipitator
B. Catalytic Incinerator
C. Contact Condenser
D. Carbon Adsorber
E. Cyclone Collector
F. Elevated Flare System
G. Packed Column Absorber System
H. Fabric Filter
I. Thermal Incinerator
J. Adsorption System
K. Settling Chamber
L. Venturi Scrubber

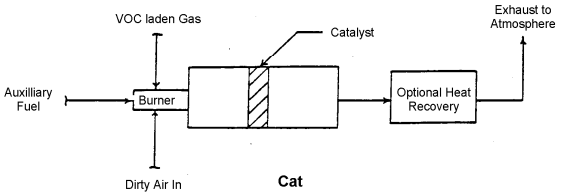
11. _____



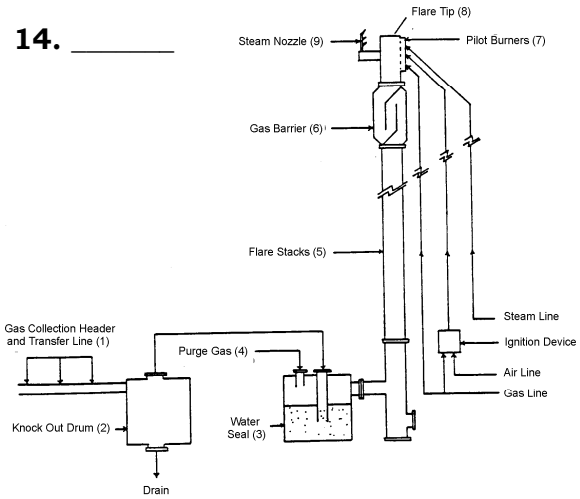
12. _____



13. _____



14. _____



Chapter 11

Review Exercises

Multiple Choice

Directions: Read each question and choose the best answer.

1. Which of the following accounts for approximately 90-92% of all motor vehicle emissions?

a. Exhaust from combustion
b. Crankcase blowby gases
c. Carburetor emissions
d. Evaporative fuel loss (fuel tank)
e. Fugitive emissions (carburetor)

2. Automobile hydrocarbon emissions were first identified as a major source of air pollution in a study conducted by the California Institute of Technology in _____.

a. 1936
b. 1948
c. 1952
d. 1961
e. 1963

3. The most significant pollutants contained in the emissions of automobile vehicle exhaust are _____.

a. carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2)
b. carbon monoxide (CO), lead (Pb), particulate matter (PM_{10})
c. carbon monoxide (CO), sulfur dioxide (SO_2), acid deposition
d. carbon monoxide (CO), lead (Pb), nitrogen oxides (NO_X)
e. carbon monoxide (CO), nitrogen oxides (NO_X), non-methane VOCs

4. The following are effective emission control devices, **except** _____.

a. Positive Crankcase Ventilation (PCV) valves
b. Exhaust Gas Recycle (EGR)
c. Evaporative Emissions Canister
d. Camshaft and Piston Valves
e. Catalytic Converter

5. What test equipment is currently used to measure vehicle emissions?

a. Exhaust Gas Recirculation (EGR) set
b. IM240 test equipment
c. Dual Catalytic Conversion sensors
d. CNG-4 test set
e. AN/ALQ-151(V) NMHC Probe

6. Ozone pollution control continues to be a problem despite extraordinary improvements in vehicle emissions and cleaner fuel sources because _____.

e. NMHCs are an ozone-depleting compound
f. fewer people use high occupancy vehicle (HOV) lanes or public transportation
g. significant increases in passenger miles offset gains
h. regulatory measures have been relaxed by recent legislation
e. damage to the ozone layer may be irreparable

7. What engine-operating factor is most responsible for the emission of CO?

e. Incomplete fuel combustion
f. Crankcase emissions
g. Evaporative losses
h. Lean air/fuel mixtures
e. High compression ratio

8. The following gases are produced during the combustion cycle, **except** _____.

a. Unburned hydrocarbons (NMHCs)
b. Carbon monoxide
c. Nitrogen oxides
d. Carbon dioxide (CO_2)
e. Lead (Pb)

9. In 1990, mobile source emissions accounted for about _____ of the hazardous air pollutants emitted in urban area of the U.S.

a. 80 percent
b. 50 percent
c. 20 percent
d. 35 percent
e. 75 percent

10. Lead alkalis were added to gasoline in order to _____.

a. avoid the additional cost of refining high-octane fuels
b. significantly improve fuel volatility, anti-knock and carbon deposit-forming tendencies
c. boost octane ratings to enhance ignition and burn rates
d. increase the amount of fuel produced by a given quantity of crude oil
e. produce premium-grade leaded gasoline for significantly less money

Matching

Directions: Match each of the following mobile source control measures with the proper description.

Control Measures for Vehicle Emissions

_____ **11.** Thermactor system

_____ **12.** Engine modifications

_____ **13.** Lower compression ratios

_____ **14.** Recirculate exhaust gas

_____ **15.** Delayed spark timing

_____ **16.** Alternative fuels

_____ **17.** Dual or three-way catalytic systems

a. A method in which chamber temperatures and NOx Emissions are reduced.

b. A method of changing the ignition process so that ignition occurs in the compression stroke, reducing the temperatures produced and decreasing the production of NOx.

c. A method of reducing NOX emissions by relocating the HC-CO oxidation catalyst downstream from the NOx reduction catalyst.

d. A method of controlling NMHCs and CO in which air is pumped into the exhaust manifold. The air-rich environment permits a more complete combustion of volatile gases.

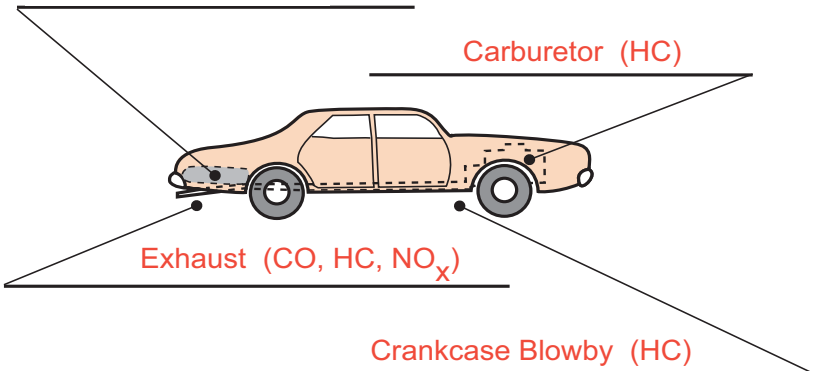
e. Electric cells, oxygenated additives, and compressed or liquefied gases are a few of the means used to to reduce vehicle emissions.

f. Changes in air-fuel mixtures, ignition timing, and catalytic converters are some of the ways to effectively reduce vehicle emissions.

g. The most effective way to reduce NOx emissions is to recirculate controlled amounts of exhaust gas through the intake manifold.

Emissions and Emission Sources

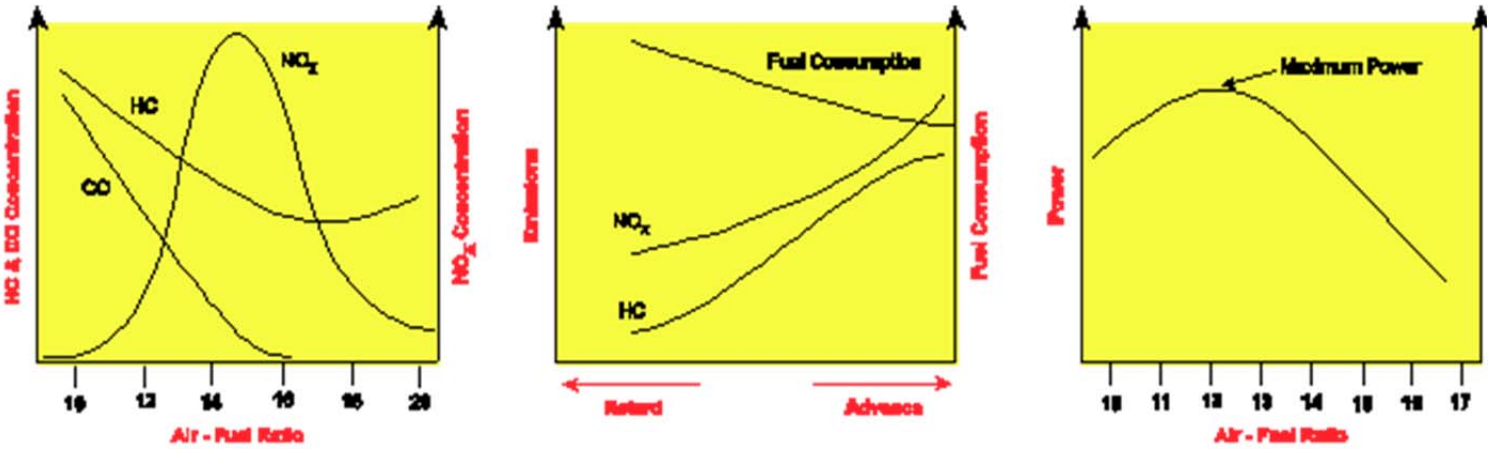
Directions: In the spaces provided, identify (1) the fugitive emission and (2) the emission source for the following light duty motor vehicle.



(Source: Godish, Thad. *Air Quality*. Lewis: New York, 1997, p. 288.)

Air – Fuel Ratio Interpretation

Directions: Review the following data and circle the correct answer to the questions provided.



(Source: Godish, Thad, *Air Quality*, Lewis: New York, 1997, p. 289, 292, 297.)

18. Nitrogen oxide emissions [**increase** / **decrease**] as fuel consumption rises.

19. Carbon monoxide emissions are at their [**highest** / **lowest**] when air-fuel ratios become lean.

20. Based on the evidence, HC, CO, and NO_X emissions are at their lowest with an air-fuel ratio of _____; as motor vehicle power is [**increasing** / **decreasing**].

Chapter 12 REVIEW EXERCISES

Multiple Choice

Directions: Read each question and choose the best answer.

1. The purpose of pollution prevention is to _____.

a. develop cost effective ways to replace expensive control technology
b. better understand on-site pollution recovery methods and recycling techniques
c. install measures aimed to prevent pollution before it is created
d. provide strategic direction for institutionalizing prevention programs
e. reduce air, water, and solid waste through improved control devices

2. An example of pollution prevention techniques would include all of the following, **except** _____.

a. changes in industrial processing
b. Improved add-on control technology
c. additional automation
d. changes to operational settings
e. equipment, piping, or other facility layout and design modifications

3. Which of the following *is* **not** a legislative authority for pollution prevention?

a. CAA
b. OSHA
c. FIFRA
d. SARA
e. LEPC

4. The least desirable pollution prevention strategy is _____.

a. source reduction
b. incineration
c. recycling
d. waste treatment
e. disposal

5. The method or equipment best used to dispose of solid waste is _____.

a. anaerobic digestion
b. rotary kiln incinerator
c. electrostatic precipitators
d. oxidation
e. wet scrubbers

6. Which legislation regulates the release of 126 chemicals into water, including VOCs such as benzene, chloroform, and vinyl chloride?

   a. *National Emission Standards for Hazardous Air Pollutants* (NESHAPs)
   b. *Clean Water Act*
   c. *Resource Conservation and Recovery Act* (RCRA)
   d. *Superfund Amendments and Reauthorization Act* (SARA) Title III; Section 313
   e. *Superfund Amendments and Reauthorization Act* (SARA) Title III; Section 302

7. Which legislation regulates more than 400 discarded commercial chemical products destined for treatment of disposal on land?

   a. *National Emission Standards for Hazardous Air Pollutants* (NESHAPs)
   b. *Clean Water Act*
   c. *Resource Conservation and Recovery Act* (RCRA)
   d. *Superfund Amendments and Reauthorization Act* (SARA) Title III; Section 313
   e. *Superfund Amendments and Reauthorization Act* (SARA) Title III; Section 302

8. Which legislation regulates six specific chemicals (i.e., asbestos, beryllium, mercury, vinyl chloride, benzene, and arsenic) released into the air?

   a. *National Emission Standards for Hazardous Air Pollutants* (NESHAPs)
   b. *Clean Water Act*
   c. *Resource Conservation and Recovery Act* (RCRA)
   d. SARA Title III; Section 313
   e. SARA Title III; Section 302

Matching

Directions: Match each of the following Pollution Prevention strategies and legislative landmarks with the proper description.

_____ **10.** *Clean Air Act* (CAA)

_____ **11.** Disposal

_____ **12.** *Pollution Prevention Act*

_____ **13.** *Resource Conservation and Recovery Act* (RCRA)

_____ **14.** Recycling

_____ **15.** Source Reduction

_____ **16.** Treatment

a. The primary method of Pollution Prevention, employed to reduce pollution at the moment it is generated. Two of the most important ways to accomplish this is through material substitution or source control.

b. A P2 strategy that includes techniques such as land farming, deep-well objection, land filling, and ocean dumping.

c. Created the U.S. EPA's Office of Pollution Prevention and required manufacturing facilities to develop pollution prevention and recycling programs.

d. A way to render extremely toxic pollutants harmless by significantly altering their composition and toxicity.

e. The first legislation to raise the issue of Pollution Prevention and define it as a national policy objective.

f. Launched pollution prevention programs designed to control emissions from specific pollutants for specific industries (NESHAPs).

g. The second most important means of accomplishing pollution prevention in which raw materials are transformed to extend their life and usefulness.

Chapter 13
REVIEW EXERCISES

Multiple Choice

Directions: Read each question and choose the best answer.

1. Which of the following types of law puts restraints on government actions?

a. Common law
b. Municipal law
c. Constitutional law
d. State law
e. Administrative law

2. Activity that is controlled through governmental agencies and which delegate's authority through enabling legislation is _____.

a. common law
b. municipal law
c. constitutional law
d. state law
e. administrative law

3. An important feature of Common law is that it is _____.

a. not enacted by a legislature
b. written law issued from an officially recognized source
a. usually more detailed and protective of individual rights than constitutional law.
c. a body of laws and procedures drawn from technical expertise, knowledge, and daily work requirements
d. unwritten law that emphasizes the separation of government power

4. The daily Federal Register contains _____.

a. Congressional resolutions
b. Common law citations
c. presidential documents
d. state administrative laws and procedures
e. codified judicial rulings

5. In the following federal citation, 40 CFR 50.8, the number '50' represents the _____.

a. title
b. chapter
c. subchapter
d. part
e. section

6. Under Common law, a claim of _____ implied an unreasonable interference with a person's use of his property.

a. nuisance
b. trespass
c. reprise
d. attainder
e. tort

7. The Common law principle of _____ applied when a landowner was denied exclusive use of his property.

a. nuisance
b. trespass
c. reprise
d. negligence
e. tort

8. The 4th Amendment limits which of the following governmental activities?

a. Public Hearings
b. Notice
c. Entry of a Facility
d. Self-Incrimination
e. Equal Protection of the Laws

9. The 14th Amendment does **<u>not</u>** contain which of the following doctrines?

a. Equal Protection
b. Procedural Due Process
c. Self-Incrimination
d. Substantive Due Process
e. None of the above

10. Laws passed by a state agency are called_____.

a. regulations
b. statutes
c. ordinances
d. none of the above
e. any of the above

Matching

Directions: Match each of the following legal terms with the proper description.

Legal Terminology

_____ **11.** Common Law

_____ **12.** Constitutional Law

_____ **13.** State Law

_____ **14.** Administrative Law

_____ **15.** Slip Law

_____ **16.** Code of Federal Regulations

_____ **17.** Federal Register Act (1935)

a. Passes rules and regulations and is governed by It's enabling act.

b. Established the right of a person to use property as deemed necessary.

c. A uniform system of handling agency regulations that require filing, public inspection, and publication.

d. List the rights of its citizens and puts limitations on Governmental actions.

e. An official codification of the various rules and regulations that govern administrative agencies of the government.

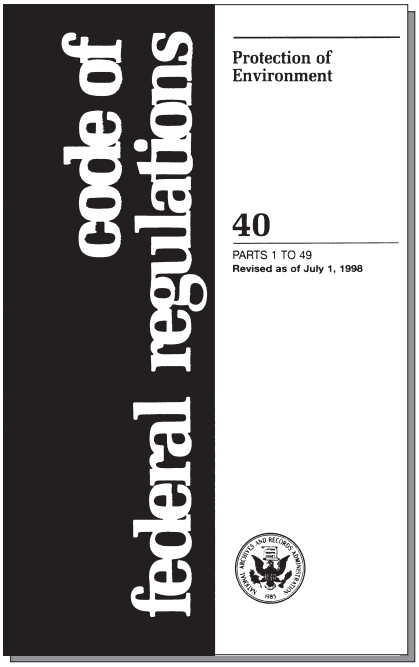
f. A form of law that is generally more protective of Individual rights and is composed of specific laws and enabling acts.

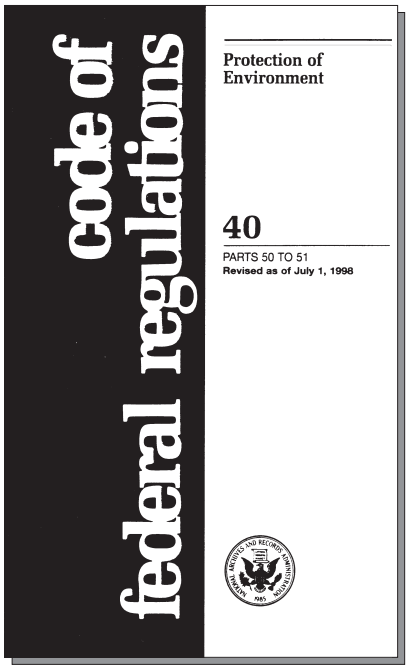
g. A type of law that is passed by Congress and published as a chronological record of a session of Congress.

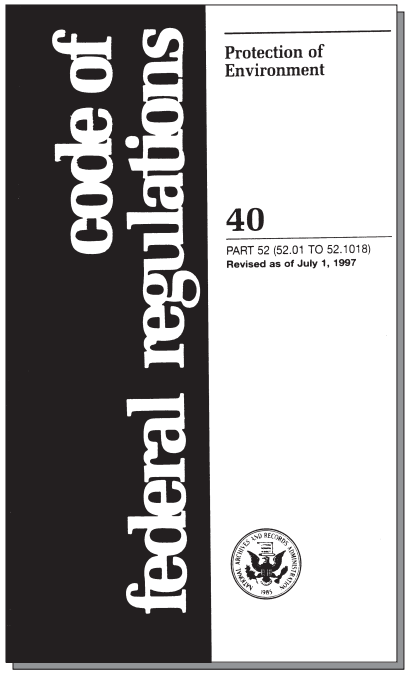
Code of Federal Regulations

Directions: Review the following information and complete the research questions in the space provided.

The *Code of Federal Regulations (CFR)* is an annually revised codification of the general and permanent rules as published in the *Federal Register* by the executive departments and agencies of the United States Government. The following exercise provides a step-by-step explanation of how to use the Code of Federal Regulations.







Step 1: CFR Title List

Consult the list of CFR Titles and select the one that most directly applies to the specific governmental agency or area of required research. The full text of the *CFR* contains amendments published in the *Federal Register*

List of CFR Titles

1. General Provisions
2. [Reserved]
3. The President
4. Accounts
5. Administrative Personnel
6. Economic Stabilization
7. Agriculture
8. Aliens and Nationality
9. Animals and Animal Products
10. Energy
11. Federal Elections
12. Banks and Banking
13. Business Credit and Assistance
14. Aeronautics and Space
15. Commerce and Foreign Trade
16. Commercial Practices
17. Commodity and Securities Exchanges
18. Conservation of Power and Water Resources
19. Customs Duties
20. Employees' Benefits
21. Food and Drugs
22. Foreign Relations
23. Highways
24. Housing and Urban Development
25. Indians
26. Internal Revenue
27. Alcohol, Tobacco Products and Firearms
28. Judicial Administration
29. Labor
30. Mineral Resources
31. Money and Finance: Treasury
32. National Defense
32A. National Defense, Appendix
33. Navigation and Navigable Waters
34. Education
35. Panama Canal
36. Parks, Forests, and Public Property
37. Patents, Trademarks, and Copyrights
38. Pensions, Bonuses, and Veterans' Relief
39. Postal Service
40. Protection of Environment
41. Public Contracts and Property Management
42. Public Health
43. Public Lands: Interior
44. Emergency Management and Assistance
45. Public Welfare
46. Shipping
47. Telecommunication
48. [Reserved]
49. Transportation
50. Wildlife and Fisheries

*Reserved for Federal Acquisition Regulations

Step 2: CFR Explanation

An explanation of the *Code* is displayed in the front of each volume. Of particular importance is a paragraph entitled "How to Use the Code of Federal Regulations." Each volume of the *CFR* is revised at least once each calendar year and issued on a quarterly basis as indicated below. The appropriate revision date is clearly printed on the front cover of each volume and the color of the cover changes with each new revision for easy reference.

Explanation

The Code of Federal Regulations is a codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government. The Code is divided into 50 titles which represent broad areas subject to Federal regulation. Each title is divided into chapters which usually bear the name of the issuing agency. Each chapter is further subdivided into parts covering specific regulatory areas.

Each volume of the Code is revised at least once each calendar year and issued on a quarterly basis approximately as follows:

Title 1 through Title 16.....as of January 1
Title 17 through Title 27.....as of April 1
Title 28 through Title 41.....as of July 1
Title 42 through Title 50.....as of October 1

The appropriate revision date is printed on the cover of each volume.

LEGAL STATUS

The contents of the Federal Register are required to be judicially noticed (44 U.S.C. 1507). The Code of Federal Regulations is prima facie evidence of the text of the original documents (44 U.S.C. 1510).

HOW TO USE THE CODE OF FEDERAL REGULATIONS

The Code of Federal Regulations is kept up to date by the individual issues of the Federal Register. These two publications must be used together to determine the latest version of any given rule.

To determine whether a Code volume has been amended since its revision date (in this case, July 1, 2000), consult the "List of CFR Sections Affected (LSA)," which is issued monthly, and the "Cumulative List of Parts Affected," which appears in the Reader Aids section of the daily Federal Register. These two lists will identify the Federal Register page number of the latest amendment of any given rule.

EFFECTIVE AND EXPIRATION DATES

Each volume of the Code contains amendments published in the Federal Register since the last revision of that volume of the Code. Source citations for the regulations are referred to by volume number and page number of the Federal Register and date of publication. Publication dates and effective dates are usually not the same and care must be exercised by the user in determining the actual effective date. In instances where the effective date is beyond the cutoff date for the Code a note has been inserted to reflect the future effective date. In those instances where a regulation published in the Federal Register states a date certain for expiration, an appropriate note will be inserted following the text.

OMB CONTROL NUMBERS

The Paperwork Reduction Act of 1980 (Pub. L. 96–511) requires Federal agencies to display an OMB control number with their information collection request.

THIS TITLE

Title 40—PROTECTION OF ENVIRONMENT is composed of twenty-three volumes. The parts in these volumes are arranged in the following order: parts 1–49, parts 50–51, parts 52.01–52.1018, part 52.1019–end, parts 53–59, part 60, parts 61–62, 63, parts 64–71, parts 72–80, parts 81–85, part 86, parts 87–135, parts 136–149, p 150–189, parts 190–259, parts 260–265, parts 266–299, parts 300–399, parts 400–424, p 425–699, parts 700–789, and part 790 to end. The contents of these volumes repre all current regulations codified under this title of the CFR as of July 1,

Chapter I—Environmental Protection Agency appears in all twenty-two umes. A Pesticide Tolerance Commodity/Chemical Index appears in parts 189. A Toxic Substances Chemical—CAS Number Index appears in parts 700–789 and part 790 to end. Redesignation Tables appear in the volumes containing parts 50–51, parts 150–189, and parts 700–789. Regulations issued by the Council on Environmental Quality appear in the volume containing part 790 to end.

The OMB control numbers for title 40 appear in §9.1 of this chapter. For the convenience of the user, §9.1 appears in the Finding Aids section of the volumes containing part 50 to the end.

For this volume, Kenneth R. Payne was Chief Editor. The Code of Federal Regulations publication program is under the direction of Frances D. McDonald, assisted by Alomha S. Morris.

Step 3: Title Explanation

The Title explanation contains a brief description of each volume as well as important bibliographic

CHAPTER I—ENVIRONMENTAL PROTECTION AGENCY

EDITORIAL NOTE: Subchapter C—Air Programs is continued in volumes 40 CFR parts 50–51, part 52 (52.01–52.1018), part 52 (52.1019–End), parts 53–59, part 60, parts 61–62, part 63 (63.1–63.1199), part 63 (63.1200–End), parts 64–71, parts 72–80, parts 81–85, part 86, and parts 87–135.

SUBCHAPTER C—AIR PROGRAMS

Part		*Page*
50	National primary and secondary ambient air quality standards	5
51	Requirements for preparation, adoption, and submittal of implementation plans	129

Step 4: Table of Contents

The Table of Contents for each Title shows the assignment of chapters to agencies and may also include cross-reference information.

Step 5: Parts and Sections

Finally, the Table of Contents is divided into subchapters and parts that will direct the researcher to specific sections

List of CFR Titles, Chapters, Subchapters, and Parts

TITLE 40—PROTECTION OF ENVIRONMEN

Chapter I—Environmental Protection Agency (Parts

SUBCHAPTER A—GENERAL

Part

1 Statement of organization and general information.
2 Public information.
4 Uniform relocation assistance and real property acquisition for Federal and federally assisted programs.
6 Procedures for implementing the requirements of the Council on Environmental Quality on the National Environmental Policy Act.
7 Nondiscrimination in programs receiving Federal assistance from the Environmental Protection Agency.
8 Environmental impact assessment of nongovernmental activities in Antarctica.
9 OMB approvals under the Paperwork Reduction Act.
10 Administrative claims under Federal Tort Claims Act.
11 Security classification regulations pursuant to Executive Order 11652.
12 Nondiscrimination on the basis of handicap in programs or activities conducted by the Environmental Protection Agency.
13 Claims collection standards.
14 Employee personal property
16 Implementation of Privacy A
17 Implementation of the Equa ings.
19 Adjustment of civil monetar
20 Certification of facilities.
21 Small business.
22 Consolidated rules of practic alties and the revocation o
23 Judicial review under EPA—
24 Rules governing issuance of tive action orders.
25 Public participation in prog Act, the Safe Drinking Wat
26 Protection of human subject
27 Program fraud civil remedies
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SUBCHAPTER B—GRANTS AND OTH

30 Grants and agreements with non-profit organizations.
31 Uniform administrative req State and local governmen
32 Governmentwide debarment requirements for drug-free ineligibility of facilities in
34 New restrictions on lobbying
35 State and local assistance.
40 Research and demonstration
45 Training assistance.
46 Fellowships.
47 National Environmental Edu

List of CFR Titles, Chapters, Subchapters, and Parts

TITLE 40—PROTECTION OF ENVIRONMENT—Continued

SUBCHAPTER C—AIR PROGRAMS

50 National primary and secondary ambient air quality standards.
51 Requirements for preparation, adoption, and submittal of implementation plans.
52 Approval and promulgation of implementation plans.
53 Registration policies and interpretations.
54 Prior notice of citizen suits.
55 Outer Continental Shelf air regulations.
56 Regional consistency.
57 Primary nonferrous smelter orders.
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60 Standards of performance for new stationary sources.
61 National emission standards for hazardous air pollutants.
62 State registration of pesticide products.
63 National emission standards for hazardous air pollutants for source categories.
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66 Assessment and collection of noncompliance penalties by EPA.
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68 Chemical accident prevention provisions.
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72 Permits regulation.
73 Sulfur dioxide allowance system.
74 Sulfur dioxide opt-ins.
75 Continuous emission monitoring.
76 Acid rain nitrogen oxides emission reduction program.
77 Excess emissions.
78 Appeal procedures for acid rain program.
79 Registration of fuels and fuel additives.
80 Regulation of fuels and fuel additives.
81 Designation of areas for air quality planning purposes.
82 Protection of stratospheric ozone.
85 Control of air pollution from motor vehicles and motor vehicle engines.
86 Control of air pollution from new and in-use motor vehicles and new and in-use motor vehicle engines: Certification and test procedures.
87 Control of air pollution from aircraft and aircraft engines.
88 Clean-fuel vehicles.
89 Control of emissions from new and in-use nonroad engines.
90 Control of emissions from nonroad spark-ignition engines.
91 Control of emissions from marine spark-ignition engines.
93 Determining conformity of Federal actions to State or Federal implementation plans.
95 Mandatory patent licenses.

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Step 6: Regulation Sections

may be submitted one quarter prior to the end of the budget period.

§40.160–2 Financial status report.

A financial status report must be prepared and submitted within 90 days after completion of the budget and project periods in accordance with §30.635–3.

[42 FR 56057, Oct. 20, 1977]

§40.160–3 Reporting of inventions.

As provided in appendix B of 40 CFR part 30, immediate and full reporting of all inventions to the Environmental Protection Agency is required. In addition:

(a) An annual invention statement is required with each continuation application.

(b) A final invention report is required within 90 days after completion of the project period.

(c) When a principal investigator changes institutions or ceases to direct a project, an invention statement must be promptly submitted with a listing of all inventions during his administra-

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useful life of more than 1 year.

§40.160–5 Final report.

The grantee shall submit a draft of the final report for review no later than 90 days prior to the end of the approved project period. The report shall document project activities over the entire period of grant support and shall describe the grantee's achievements with respect to stated project purposes and objectives. The report shall set forth in complete detail all technical aspects of the projects, both negative and positive, grantee's findings, con-

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port shall include EPA comment when required by the grants officer. Prior to the end of the project period, one reproducible copy suitable for printing and such other copies as may be stipulated in the grant agreement shall be transmitted to the grants officer.

§40.165 Continuation grants.

To be eligible for a continuation grant within the approved project period, the grantee must:

(a) Have demonstrated satisfactory performance during all previous budget periods; and

(b) Submit no later than 90 days prior to the en
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PART 45—TRAINING ASSISTANCE

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45.105 Authority.
45.110 Objectives.
45.115 Definitions.
45.120 Applicant eligibility.
45.125 Application requirements.
45.130 Evaluation of applications.
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45.140 Budget and project period.
45.145 Allocability and allowability of costs.
45.150 Reports.
45.155 Continuation assistance.
APPENDIX A TO PART 45—ENVIRONMENTAL PROTECTION AGENCY TRAINING PROGRAMS

AUTHORITY: Sec. 103 of the Clean Air Act, as amended (42 U.S.C. 7403), secs. 104(g), 109, and 111 of the Clean Water Act, as amended (33 U.S.C. 1254(g), 1259, and 1261), secs. 7007 and 8001 of the Solid Waste Disposal Act, as amended (42 U.S.C. 6977 and 6981); sec. 1442 of the Safe Drinking Water Act, as amended (42 U.S.C. 300j–1).

SOURCE: 49 FR 41004, Oct. 18, 1984, unless otherwise noted.

§45.100 Purpose and scope.

This part establishes the policies and procedures for the award of training assistance by the Environmental Protection Agency (EPA). The provisions of this part supplement EPA's "General

Table of Contents

Each section has a table of contents that lists the part number on the

Authority Citation

The authority citation following the Table of Contents is provided, and kept current, by the appropriate

Source Note

The Office of the Federal Register supplies the source note. This note tells where the codified material was last published in the *Federal Register* and is listed in full by volume, page, and date. The source

SUBCHAPTER C—AIR PROGRAMS

PART 50—NATIONAL PRIMARY AND SECONDARY AMBIENT AIR QUALITY STANDARDS

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50.1 Definitions.
50.2 Scope.
50.3 Reference conditions.
50.4 National primary ambient air quality standards for sulfur oxides (sulfur dioxide).
50.5 National secondary ambient air quality standard for sulfur oxides (sulfur dioxide).
50.6 National primary and secondary ambient air quality standards for PM_{10}.
50.7 National primary and secondary ambient air quality standards for particulate matter.
50.8 National primary ambient air quality standards for carbon monoxide.
50.9 National 1-hour primary and secondary ambient air quality standards for ozone.
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APPENDIX D TO PART 50—MEASUREMENT PRINCIPLE AND CALIBRATION PROCEDURE FOR THE MEASUREMENT OF OZONE IN THE ATMOSPHERE
APPENDIX E TO PART 50 [RESERVED]
APPENDIX F TO PART 50—MEASUREMENT PRINCIPLE AND CALIBRATION PROCEDURE FOR THE MEASUREMENT OF NITROGEN DIOXIDE IN THE ATMOSPHERE (GAS PHASE CHEMILUMINESCENCE)
APPENDIX G TO PART 50—REFERENCE METHOD FOR THE DETERMINATION OF LEAD IN SUSPENDED PARTICULATE MATTER COLLECTED FROM AMBIENT AIR
APPENDIX H TO PART 50—INTERPRETATION OF THE 1-HOUR PRIMARY AND SECONDARY NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE
APPENDIX I TO PART 50—INTERPRETATION OF THE 8-HOUR PRIMARY AND SECONDARY NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE
APPENDIX J TO PART 50—REFERENCE METHOD FOR THE DETERMINATION OF PARTICULATE MATTER AS PM_{10} IN THE ATMOSPHERE
APPENDIX K TO PART 50—INTERPRETATION OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR PARTICULATE MATTER
APPENDIX L TO PART 50—REFERENCE METHOD FOR THE DETERMINATION OF FINE PARTICULATE MATTER AS $PM_{2.5}$ IN THE ATMOSPHERE
APPENDIX M TO PART 50—REFERENCE METHOD FOR THE DETERMINATION OF PARTICULATE MATTER AS PM_{10} IN THE ATMOSPHERE
APPENDIX N TO PART 50—INTERPRETATION OF THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR PARTICULATE MATTER

AUTHORITY: 42 U.S.C. 7401, *et seq.*

SOURCE: 36 FR 22384, Nov. 25, 1971, unless otherwise noted.

§ 50.1 Definitions.

(a) As used in this part, all terms not defined herein shall have the meaning given them by the Act.

(b) *Act* means the Clean Air Act, as amended (42 U.S.C. 1857–18571, as amended by Pub. L. 91–604).

(c) *Agency* means the Environmental Protection Agency.

(d) *Administrator* means the Administrator of the Environmental Protection Agency.

(e) *Ambient air* means that portion of the atmosphere, external to buildings, to which the general public has access.

(f) *Reference method* means a method of sampling and analyzing the ambient air for an air pollutant that is specified as a reference method in an appendix to this part, or a method that has been designated as a reference method in accordance with part 53 of this chapter; it does not include a method for which a reference method designation has been cancelled in accordance with § 53.11 or § 53.16 of this chapter.

(g) *Equivalent method* means a method of sampling and analyzing the ambient air for an air pollutant that has been designated as an equivalent method in accordance with part 53 of this chapter; it does not include a method for which an equivalent method designation has

been cancelled in accordance with § 53.11 or § 53.16 of this chapter.

(h) *Traceable* means that a local standard has been compared and certified either directly or via not more than one intermediate standard, to a primary standard such as a National Bureau of Standards Standard Reference Material (NBS SRM), or a USEPA/NBS-approved Certified Reference Material (CRM).

(i) *Indian country* is as defined in 18 U.S.C. 1151.

[36 FR 22384, Nov. 25, 1971, as amended at 41 FR 11253, Mar. 17, 1976; 48 FR 2529, Jan. 20, 1983; 63 FR 7274, Feb. 12, 1998]

§ 50.2 Scope.

(a) National primary and secondary ambient air quality standards under section 109 of the Act are set forth in this part.

(b) National primary ambient air quality standards define levels of air quality which the Administrator judges are necessary, with an adequate margin of safety, to protect the public health. National secondary ambient air quality standards define levels of air quality which the Administrator judges necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Such standards are subject to revision, and additional primary and secondary standards may be promulgated as the Administrator deems necessary to protect the public health and welfare.

(c) The promulgation of national primary and secondary ambient air quality standards shall not be considered in any manner to allow significant deterioration of existing air quality in any portion of any State or Indian country.

(d) The proposal, promulgation, or revision of national primary and secondary ambient air quality standards shall not prohibit any State or Indian country from establishing ambient air quality standards for that State or area under a tribal CAA program or any portion thereof which are more stringent than the national standards.

[36 FR 22384, Nov. 25, 1971, as amended at 63 FR 7274, Feb. 12, 1998]

§ 50.3 Reference conditions.

All measurements of air quality that are expressed as mass per unit volume (e.g., micrograms per cubic meter) other than for the particulate matter (PM_{10} and $PM_{2.5}$) standards contained in § 50.7 shall be corrected to a reference temperature of 25 °C and a reference pressure of 760 millimeters of mercury (1,013.2 millibars). Measurements of PM_{10} and $PM_{2.5}$ for purposes of comparison to the standards contained in § 50.7 shall be reported based on actual ambient air volume measured at the actual ambient temperature and pressure at the monitoring site during the measurement period.

[62 FR 38711, July 18, 1997]

§ 50.4 National primary ambient air quality standards for sulfur oxides (sulfur dioxide).

(a) The level of the annual standard is 0.030 parts per million (ppm), not to be exceeded in a calendar year. The annual arithmetic mean shall be rounded to three decimal places (fractional parts equal to or greater than 0.0005 ppm shall be rounded up).

(b) The level of the 24-hour standard is 0.14 parts per million (ppm), not to be exceeded more than once per calendar year. The 24-hour averages shall be determined from successive non-overlapping 24-hour blocks starting at midnight each calendar day and shall be rounded to two decimal places (fractional parts equal to or greater than 0.005 ppm shall be rounded up).

(c) Sulfur oxides shall be measured in the ambient air as sulfur dioxide by the reference method described in appendix A to this part or by an equivalent method designated in accordance with part 53 of this chapter.

(d) To demonstrate attainment, the annual arithmetic mean and the second-highest 24-hour averages must be based upon hourly data that are at least 75 percent complete in each calendar quarter. A 24-hour block average shall be considered valid if at least 75 percent of the hourly averages for the 24-hour period are available. In the event that only 18, 19, 20, 21, 22, or 23 hourly averages are available, the 24-hour block average shall be computed as the sum of the available hourly

averages using 18, 19, etc. as the divisor. If fewer than 18 hourly averages are available, but the 24-hour average would exceed the level of the standard when zeros are substituted for the missing values, subject to the rounding rule of paragraph (b) of this section, then this shall be considered a valid 24-hour average. In this case, the 24-hour block average shall be computed as the sum of the available hourly averages divided by 24.

[61 FR 25579, May 22, 1996]

§50.5 National secondary ambient air quality standard for sulfur oxides (sulfur dioxide).

(a) The level of the 3-hour standard is 0.5 parts per million (ppm), not to be exceeded more than once per calendar year. The 3-hour averages shall be determined from successive nonoverlapping 3-hour blocks starting at midnight each calendar day and shall be rounded to 1 decimal place (fractional parts equal to or greater than 0.05 ppm shall be rounded up).

(b) Sulfur oxides shall be measured in the ambient air as sulfur dioxide by the reference method described in appendix A of this part or by an equivalent method designated in accordance with part 53 of this chapter.

(c) To demonstrate attainment, the second-highest 3-hour average must be based upon hourly data that are at least 75 percent complete in each calendar quarter. A 3-hour block average shall be considered valid only if all three hourly averages for the 3-hour period are available. If only one or two hourly averages are available, but the 3-hour average would exceed the level of the standard when zeros are substituted for the missing values, subject to the rounding rule of paragraph (a) of this section, then this shall be considered a valid 3-hour average. In all cases, the 3-hour block average shall be computed as the sum of the hourly averages divided by 3.

[61 FR 25580, May 22, 1996]

§50.6 National primary and secondary ambient air quality standards for PM_{10}.

(a) The level of the national primary and secondary 24-hour ambient air quality standards for particulate matter is 150 micrograms per cubic meter ($\mu g/m^3$), 24-hour average concentration. The standards are attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$, as determined in accordance with appendix K to this part, is equal to or less than one.

(b) The level of the national primary and secondary annual standards for particulate matter is 50 micrograms per cubic meter ($\mu g/m^3$), annual arithmetic mean. The standards are attained when the expected annual arithmetic mean concentration, as determined in accordance with appendix K to this part, is less than or equal to 50 $\mu g/m^3$.

(c) For the purpose of determining attainment of the primary and secondary standards, particulate matter shall be measured in the ambient air as PM_{10} (particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers) by:

(1) A reference method based on appendix J and designated in accordance with part 53 of this chapter, or

(2) An equivalent method designated in accordance with part 53 of this chapter.

(d) The PM_{10} standards set forth in this section will no longer apply to an area not attaining these standards as of September 16, 1997, once EPA takes final action to promulgate a rule pursuant to section 172(e) of the Clean Air Act, as amended (42 U.S.C. 7472(e)) applicable to the area. The PM_{10} standards set forth in this section will no longer apply to an area attaining these standards as of September 16, 1997, once EPA approves a State Implementation Plan (SIP) applicable to the area containing all PM_{10} control measures adopted and implemented by the State prior to September 16, 1997, and a section 110 SIP implementing the PM standards published on July 18, 1997.

SIP approvals are codified in 40 CFR part 52.

[52 FR 24663, July 1, 1987, as amended at 62 FR 38711, July 18, 1997]

§ 50.7 National primary and secondary ambient air quality standards for particulate matter.

(a) The national primary and secondary ambient air quality standards for particulate matter are:

(1) 15.0 micrograms per cubic meter ($\mu g/m^3$) annual arithmetic mean concentration, and 65 $\mu g/m^3$ 24-hour average concentration measured in the ambient air as $PM_{2.5}$ (particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers) by either:

(i) A reference method based on appendix L of this part and designated in accordance with part 53 of this chapter; or

(ii) An equivalent method designated in accordance with part 53 of this chapter.

(2) 50 micrograms per cubic meter ($\mu g/m^3$) annual arithmetic mean concentration, and 150 $\mu g/m^3$ 24-hour average concentration measured in the ambient air as PM_{10} (particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers) by either:

(i) A reference method based on appendix M of this part and designated in accordance with part 53 of this chapter; or

(ii) An equivalent method designated in accordance with part 53 of this chapter.

(b) The annual primary and secondary $PM_{2.5}$ standards are met when the annual arithmetic mean concentration, as determined in accordance with appendix N of this part, is less than or equal to 15.0 micrograms per cubic meter.

(c) The 24-hour primary and secondary $PM_{2.5}$ standards are met when the 98th percentile 24-hour concentration, as determined in accordance with appendix N of this part, is less than or equal to 65 micrograms per cubic meter.

(d) The annual primary and secondary PM_{10} standards are met when the annual arithmetic mean concentration, as determined in accordance with appendix N of this part, is less than or equal to 50 micrograms per cubic meter.

(e) The 24-hour primary and secondary PM_{10} standards are met when the 99th percentile 24-hour concentration, as determined in accordance with appendix N of this part, is less than or equal to 150 micrograms per cubic meter.

[62 FR 38711, July 18, 1997]

§ 50.8 National primary ambient air quality standards for carbon monoxide.

(a) The national primary ambient air quality standards for carbon monoxide are:

(1) 9 parts per million (10 milligrams per cubic meter) for an 8-hour average concentration not to be exceeded more than once per year and

(2) 35 parts per million (40 milligrams per cubic meter) for a 1-hour average concentration not to be exceeded more than once per year.

(b) The levels of carbon monoxide in the ambient air shall be measured by:

(1) A reference method based on appendix C and designated in accordance with part 53 of this chapter, or

(2) An equivalent method designated in accordance with part 53 of this chapter.

(c) An 8-hour average shall be considered valid if at least 75 percent of the hourly average for the 8-hour period are available. In the event that only six (or seven) hourly averages are available, the 8-hour average shall be computed on the basis of the hours available using six (or seven) as the divisor.

(d) When summarizing data for comparision with the standards, averages shall be stated to one decimal place. Comparison of the data with the levels of the standards in parts per million shall be made in terms of integers with fractional parts of 0.5 or greater rounding up.

[50 FR 37501, Sept. 13, 1985]

§ 50.9 National 1-hour primary and secondary ambient air quality standards for ozone.

(a) The level of the national 1-hour primary and secondary ambient air quality standards for ozone measured

by a reference method based on appendix D to this part and designated in accordance with part 53 of this chapter, is 0.12 parts per million (235 μg/m³). The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 parts per million (235 μg/m³) is equal to or less than 1, as determined by appendix H to this part.

(b) The 1-hour standards set forth in this section will no longer apply to an area once EPA determines that the area has air quality meeting the 1-hour standard. Area designations are codified in 40 CFR part 81.

[62 FR 38894, July 18, 1997]

§ 50.10 National 8-hour primary and secondary ambient air quality standards for ozone.

(a) The level of the national 8-hour primary and secondary ambient air quality standards for ozone, measured by a reference method based on appendix D to this part and designated in accordance with part 53 of this chapter, is .08 parts per million (ppm), daily maximum 8-hour average.

(b) The 8-hour primary and secondary ozone ambient air quality standards are met at an ambient air quality monitoring site when the average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to 0.08 ppm, as determined in accordance with appendix I to this part.

[62 FR 38894, July 18, 1997]

§ 50.11 National primary and secondary ambient air quality standards for nitrogen dioxide.

(a) The level of the national primary ambient air quality standard for nitrogen dioxide is 0.053 parts per million (100 micrograms per cubic meter), annual arithmetic mean concentration.

(b) The level of national secondary ambient air quality standard for nitrogen dioxide is 0.053 parts per million (100 micrograms per cubic meter), annual arithmetic mean concentration.

(c) The levels of the standards shall be measured by:

(1) A reference method based on appendix F and designated in accordance with part 53 of this chapter, or

(2) An equivalent method designated in accordance with part 53 of this chapter.

(d) The standards are attained when the annual arithmetic mean concentration in a calendar year is less than or equal to 0.053 ppm, rounded to three decimal places (fractional parts equal to or greater than 0.0005 ppm must be rounded up). To demonstrate attainment, an annual mean must be based upon hourly data that are at least 75 percent complete or upon data derived from manual methods that are at least 75 percent complete for the scheduled sampling days in each calendar quarter.

[50 FR 25544, June 19, 1985]

§ 50.12 National primary and secondary ambient air quality standards for lead.

National primary and secondary ambient air quality standards for lead and its compounds, measured as elemental lead by a reference method based on appendix G to this part, or by an equivalent method, are: 1.5 micrograms per cubic meter, maximum arithmetic mean averaged over a calendar quarter.

(Secs. 109, 301(a) Clean Air Act as amended (42 U.S.C. 7409, 7601(a)))

[43 FR 46258, Oct. 5, 1978]

APPENDIX A TO PART 50—REFERENCE METHOD FOR THE DETERMINATION OF SULFUR DIOXIDE IN THE ATMOSPHERE (PARAROSANILINE METHOD)

1.0 *Applicability.*

1.1 This method provides a measurement of the concentration of sulfur dioxide (SO_2) in ambient air for determining compliance with the primary and secondary national ambient air quality standards for sulfur oxides (sulfur dioxide) as specified in § 50.4 and § 50.5 of this chapter. The method is applicable to the measurement of ambient SO_2 concentrations using sampling periods ranging from 30 minutes to 24 hours. Additional quality assurance procedures and guidance are provided in part 58, appendixes A and B, of this chapter and in references 1 and 2.

2.0 *Principle.*

2.1 A measured volume of air is bubbled through a solution of 0.04 M potassium tetrachloromercurate (TCM). The SO_2 present in the air stream reacts with the TCM solution to form a stable monochlorosulfonatomercurate(*3*) complex. Once formed, this complex resists air oxidation(*4*,

5) and is stable in the presence of strong oxidants such as ozone and oxides of nitrogen. During subsequent analysis, the complex is reacted with acid-bleached pararosaniline dye and formaldehyde to form an intensely colored pararosaniline methyl sulfonic acid.(*6*) The optical density of this species is determined spectrophotometrically at 548 nm and is directly related to the amount of SO_2 collected. The total volume of air sampled, corrected to EPA reference conditions (25 °C, 760 mm Hg [101 kPa]), is determined from the measured flow rate and the sampling time. The concentration of SO_2 in the ambient air is computed and expressed in micrograms per standard cubic meter (μg/std m^3).

3.0 *Range.*

3.1 The lower limit of detection of SO_2 in 10 mL of TCM is 0.75 μg (based on collaborative test results).(*7*) This represents a concentration of 25 μg SO_2/m^3 (0.01 ppm) in an air sample of 30 standard liters (short-term sampling) and a concentration of 13 μg SO_2/m^3 (0.005 ppm) in an air sample of 288 standard liters (long-term sampling). Concentrations less than 25 μg SO_2/m^3 can be measured by sampling larger volumes of ambient air; however, the collection efficiency falls off rapidly at low concentrations.(*8, 9*) Beer's law is adhered to up to 34 μg of SO_2 in 25 mL of final solution. This upper limit of the analysis range represents a concentration of 1,130 μg SO_2/m^3 (0.43 ppm) in an air sample of 30 standard liters and a concentration of 590 μg SO_2/m^3 (0.23 ppm) in an air sample of 288 standard liters. Higher concentrations can be measured by collecting a smaller volume of air, by increasing the volume of absorbing solution, or by diluting a suitable portion of the collected sample with absorbing solution prior to analysis.

4.0 *Interferences.*

4.1 The effects of the principal potential interferences have been minimized or eliminated in the following manner: Nitrogen oxides by the addition of sulfamic acid,(*10, 11*) heavy metals by the addition of ethylenediamine tetracetic acid disodium salt (EDTA) and phosphoric acid,(*10, 12*) and ozone by time delay.(*10*) Up to 60 μg Fe (III), 22 μg V (V), 10 μg Cu (II), 10 μg Mn (II), and 10 μg Cr (III) in 10 mL absorbing reagent can be tolerated in the procedure.(*10*) No significant interference has been encountered with 2.3 μg NH_3.(*13*)

5.0 *Precision and Accuracy.*

5.1 The precision of the analysis is 4.6 percent (at the 95 percent confidence level) based on the analysis of standard sulfite samples.(*10*)

5.2 Collaborative test results(*14*) based on the analysis of synthetic test atmospheres (SO_2 in scrubbed air) using the 24-hour sampling procedure and the sulfite-TCM calibration procedure show that:

- The replication error varies linearly with concentration from ±2.5 μg/m^3 at concentrations of 100 μg/m^3 to ±7 μg/m^3 at concentrations of 400 μg/m^3.
- The day-to-day variability within an individual laboratory (repeatability) varies linearly with concentration from ±18.1 μg/m^3 at levels of 100 μg/m^3 to ±50.9 μg/m^3 at levels of 400 μg/m^3.
- The day-to-day variability between two or more laboratories (reproducibility) varies linearly with concentration from ±36.9 μg/m^3 at levels of 100 μg/m^3 to ±103.5 μ g/m^3 at levels of 400 μg/m^3.
- The method has a concentration-dependent bias, which becomes significant at the 95 percent confidence level at the high concentration level. Observed values tend to be lower than the expected SO_2 concentration level.

6.0 *Stability.*

6.1 By sampling in a controlled temperature environment of 15°±10 °C, greater than 98.9 percent of the SO_2–TCM complex is retained at the completion of sampling.(*15*) If kept at 5 °C following the completion of sampling, the collected sample has been found to be stable for up to 30 days.(*10*) The presence of EDTA enhances the stability of SO_2 in the TCM solution and the rate of decay is independent of the concentration of SO_2.(*16*)

7.0 *Apparatus.*

7.1 *Sampling.*

7.1.1 *Sample probe:* A sample probe meeting the requirements of section 7 of 40 CFR part 58, appendix E (Teflon® or glass with residence time less than 20 sec.) is used to transport ambient air to the sampling train location. The end of the probe should be designed or oriented to preclude the sampling of precipitation, large particles, etc. A suitable probe can be constructed from Teflon® tubing connected to an inverted funnel.

7.1.2 *Absorber—short-term sampling:* An all glass midget impinger having a solution capacity of 30 mL and a stem clearance of 4±1 mm from the bottom of the vessel is used for sampling periods of 30 minutes and 1 hour (or any period considerably less than 24 hours). Such an impinger is shown in Figure 1. These impingers are commercially available from distributors such as Ace Glass, Incorporated.

7.1.3 *Absorber—24-hour sampling:* A polypropylene tube 32 mm in diameter and 164 mm long (available from Bel Art Products, Pequammock, NJ) is used as the absorber. The cap of the absorber must be a polypropylene cap with two ports (rubber stoppers are unacceptable because the absorbing reagent can react with the stopper to yield erroneously high SO_2 concentrations). A glass impinger stem, 6 mm in diameter and 158 mm long, is inserted into one port of the absorber cap. The tip of the stem is tapered to a small diameter orifice (0.4±0.1 mm) such that a No. 79 jeweler's drill bit will pass through the opening but a No. 78 drill bit

Code of Federal Regulations
Practical Exercise

Directions: Review the following CFR information and complete the research questions in the space provided.

18. The appropriate Title for *CFR* regulations governing the Internal Revenue Service is

a. Title 9
b. Title 14
c. Title 26
d. Title 40
e. Title 49

19. Administrative agencies in the Pentagon can expect *CFR* updates governing the National Defense not later than _____.

a. January 1
b. April 1
c. July 1
d. October 1
e. December 1

20. The citation 40 CFR 61 are regulations governing

a. OMB approvals under the Paperwork Reduction Act.
b. National emission standards for hazardous air pollutants.
c. Federal operating permit programs.
d. Control of air pollution from motor vehicles and motor vehicle engines.
e. Mandatory patent licenses.

21. The proper citation for "Continuous emission monitoring" regulations is

a. 20 CFR 40.
b. 40 CFR 20.
c. 40 CFR 75.
d. 75 CFR 40.
e. 40 CFR 50 .

22. Which Appendix could you consult to obtain the most current information regarding "Reference Methods for the Determination of Particulate Matter as $PM_{2.5}$ in the Atmosphere"?

a. Appendix A
b. Appendix D
c. Appendix H
d. Appendix L
e. Appendix N

23. What is the National primary ambient air quality standard for sulfur dioxide?

a. .03 ppm
b. .05 ppm
c. .50 ppm
d. .14 ppm
e. .95 ppm

24. Where would you go to read the full text of the regulations governing "National secondary ambient air quality standards for sulfur oxides"?

a. Slip Law
b. 61 FR 25580
c. 40 CFR 50
d. Office of Air Quality Planning and Standards
e. Appendix A to Part 50

25. When were the national primary and secondary ambient air quality standards for particulate matter last revised?

a. May 22, 1996
b. July 1, 1987
c. July 18, 1997
d. September 13, 1985
e. October 5, 1978

26. What is the 1-hour national primary ambient air quality standard for carbon monoxide?

a. 9 parts / million
b. 35 parts / million
c. 15.0 $\mu m / m^3$
d. 50 $\mu m / m^3$
e. 150 $\mu m / m^3$

27. According to Appendix A, the accuracy of reference methods used to determine the amount of sulfur dioxide in the atmosphere (at the 95% confidence level) is _____.

28. According to Appendix A, a suitable sampling probe that may be used to measure the amount of sulfur dioxide in the atmosphere may be constructed from _____.

Chapter 14

REVIEW EXERCISES

Multiple Choice

Directions: Read each question and choose the best answer.

1. The goals of the enforcement process are all of the following, **except** _____.

a. correct the violation.
b. deter future violations.
c. determine compliance with national standards.
d. ensure equitable treatment of offenders.
e. achieve human health and environmental goals.

2. Air pollution laws and regulations are monitored and enforced at all levels, but those primarily responsible for compliance and enforcement actions is (are) the _____.

a. USEPA Office of Air Quality Planning and Standards (OAQPS)
b. National Center for Environmental Assessment (NCEA)
c. NRML Air Pollution Prevention and Control Division (APPCO)
d. Office of General Counsel (OGC)
e. States

3. Which of the following is an enforcement methods or systems?

a. Permits to construct and operate.
b. Compliance monitoring.
c. Surveilance and complaint response.
d. Compliance plan enforcement.
e. All of the above

4. Any agency action, whether formal or informal, intended to compel regulated sources to comply and to make them aware of the consequences of noncompliance are _____ activities.

a. compliance
b. deterrence
c. enforcement
d. measurement
e. monitoring

5. When is a warrant less entry allowed:

a. Emergencies
b. “Open Fields” and “in plain view”
c. When you can get permission from the gate guard.
d. A and B

6. CBI should be discussed at the opening conference portion of your inspection.

   a. True
   b. False

7. An inspection should always sign the liability waiver that the source request you to sign.

   a. True
   b. False

Matching

Directions: Match each of the following descriptions with the proper level of compliance inspection.

Compliance Monitoring Categories

_____	**8.**	Full Compliance Evaluation	a. Focuses on a subset of regulated pollutants, emissions units or regulatory requirements.
_____	**9.**	Partial Compliance Evaluation	b. Generally limited to a portion of the facility, more resource intensive, and more in-depth on a particular issue.
_____	**10.**	Investigation	c. A comprehensive evaluation of a facility's compliance status (covers all facility's emission units and regulated pollutants).