

SSPC: The Society for Protective Coatings

Technology Update No. 7

CONDUCTING AMBIENT AIR, SOIL, AND WATER SAMPLING OF SURFACE PREPARATION AND PAINT DISTURBANCE ACTIVITIES

1. SCOPE

1.1 This technology update describes a variety of air, water and soil/sediment monitoring methods used for measuring emissions of hazardous and toxic substances, particulate matter, or dust emissions during surface preparation operations, construction or painting activities. The monitoring guidelines presented in this document provide methods for assessing the effectiveness of work site engineering controls (e.g., containment and ventilation systems) implemented to protect the public and the surrounding environment and to assess the impact of hazardous and toxic substances, as well as; dust emissions from project operations, materials, equipment and other potential emission generating operations (e.g., waste handling operations).

1.2 STATEMENT OF PURPOSE

1.2.1 This technology update describes methods and equipment used for assessing emissions during surface preparation and other emission generating operations and to assess whether the controls in place are adequate for protecting the public, the environment, and adjacent personnel or meeting federal, state and local regulations or specified requirements. The intent of this report is to present the user with a variety of methods of testing that may be appropriate for monitoring project emissions, and describe the information provided by each of the monitoring methods. The criteria used for selecting a particular monitoring method must be determined on a case-by-case basis by the facility owner or specifier but should include consideration of the type of surface preparation operation being performed; the dust-producing nature of the operation; the type of containment; proximity of the work area(s) to the public; sensitive environmental receptors; adjacent personnel; the amount of lead, other toxic metal, or hazards present in the coating, abrasive or other materials; and other site-specific characteristics.

1.2.2 The emission assessment methods presented herein are primarily intended to provide guidance to designers, engineers, facility owners and specifiers when conducting surface preparation involving hazardous and toxic substances. However, the methods may be applicable to demolition, retrofitting, and other construction activities where hazardous and toxic substances, dust, or fume emissions may be generated.

1.3 INTENDED USERS: This technology update is intended to be used by facility owners, government agencies, engineers, specifiers, designers, environmental monitoring firms, and contractors. The guidelines may also be used by other responsible parties conducting similar activities.

1.4 REGULATIONS: The primary federal regulations currently addressing exposures to hazardous and toxic substances, fugitive emissions of dust include: the Clean Air Act (CAA), and all amendments such as the National Ambient Air Quality Standards (NAAQS) for airborne lead, particulate matter with an aerodynamic diameter of less than ten (10) and two and one-half (2.5) micrometers (PM-10 and PM-2.5), the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), all mandated by the Environmental Protection Agency (EPA), and the current Occupational Safety and Health Administration (OSHA) General Industry, Shipyard, and Construction Industry Comprehensive Health Standards for Lead, Cadmium, Arsenic, Hexavalent Chromium, and other constituents that are present in or on substrates, coatings, and abrasives.

2. APPLICATION

2.1 USE OF THE TECHNOLOGY UPDATE: This Technology Update is intended to provide assistance in selecting a method or methods of emission monitoring to use during surface preparation projects. Once the method is selected, the Technology Update presents guidance on how to perform the emission assessments and how to interpret the information provided by the monitoring method and methods for establishing acceptance criteria. This Technology Update is not intended to replace professional training, certification, or the experience of environmental, health and safety professionals.

2.2 EMISSION MONITORING METHODS AND ACCEPTANCE CRITERIA: A summary of the methods presented in this report and the common acceptance criteria (based on federal regulations or practice) is summarized below. State and local regulations, or specifications may impose more stringent acceptance criteria:

2.2.1 TSP-Lead: This method is performed using high-volume air samplers to monitor lead in the form of total suspended particulate (TSP-lead). Monitoring is performed

in accordance with 40 CFR Part 50, Appendix B. Analysis is performed in accordance with 40 CFR 50, Appendix G. The acceptance criteria have traditionally been based upon the NAAQS criteria for lead or an adjusted value based on the NAAQS. The current value is 0.15 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) as a three month rolling average. It was previously 1.5 $\mu\text{g}/\text{m}^3$ as a 90-day average.

2.2.2 Area or Perimeter Air Monitoring for Hazardous and Toxic Substances or Dusts: This method is performed at the perimeter or other work areas for hazardous and toxic substances. Monitoring and analysis is performed in accordance with the applicable NIOSH Method for the hazardous and toxic substances present. The acceptance criteria are typically established as less than the OSHA Action Level or PEL for the substance.

2.2.3 PM-10: This method is performed using high-volume air samplers to assess particulate matter having an aerodynamic diameter of less than ten (10) micrometers. Monitoring and analysis is performed in accordance with 40 CFR Part 50, Appendix J. Acceptance criteria are typically based upon the NAAQS criteria for PM-10 of 150 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) as a 24-hour average. NOTE: While it used to be common, PM-10 monitoring is rarely specified and SSPC recommends TSP method over PM-10 in most cases. However, because the PM-10 method is referenced in current federal regulations and has been previously specified, it is included here for the sake of completeness and the monitoring method has been retained.

2.2.4 PM-2.5: This method is performed using either continuous monitoring or filter-based high- or low-volume air samplers to assess particulate matter with an aerodynamic diameter of less than 2.5 micrometers. Monitoring and analysis is performed in accordance with 40 CFR Part 50, Appendix J. Acceptance criteria are typically based upon the NAAQS primary or secondary standards for PM-2.5 of 12 to 13 as a 3-year average or of 35 $\mu\text{g}/\text{m}^3$ as a 24-hour average. NOTE: PM-2.5 is rarely performed. However, because the PM-2.5 method is referenced in current federal regulations, it is included here as a discussion item for the sake of completeness.

2.2.4 Visible Emission Evaluations - Timing: This method is performed by measuring the duration of the visible emission of total dust. Visible emission evaluations are performed in accordance with 40 CFR Part 60, Appendix A, Method 22, Visual Determination of Fugitive Emissions for Material Sources and Smoke Emissions from Flares. Acceptance criteria are typically based upon a limit of allowable emissions such as 1% of the workday.

2.2.5 Visible Emission Evaluations - Opacity: This method is performed by assessing the opacity of observed emissions of total dust. Opacity emission evaluation is performed in accordance with 40 CFR Part 60, Appendix A, Method 9, Visual Determination of the Opacity of Emissions from Stationary Sources. The acceptance criterion is typically

an allowable opacity based upon federal, state and local requirements such as 20% opacity for up to three (3) minutes or a maximum of 60 % opacity at any time. NOTE: While it used to be common, visible emissions for opacity is rarely specified. However since it continues to be used by federal, state and local agencies to assess compliance with fugitive, abrasive blasting, and/or visible emission regulations, it is included here for the sake of completeness and the method has been retained.

2.2.6 Soil Sampling: Soil sampling for lead is typically performed by collecting pre- and post-project samples and performing a statistical comparison between the sample sets. Sample preparation is typically performed in accordance with EPA Method 3050 and analysis for total lead is performed using an approved NIOSH or similar method. The acceptance criteria are typically based upon a minimum statistical increase in total lead using geometric mean averages, the Student T-test, or the EPA 40 CFR 745 Guidelines. While generally only performed for lead, the methodologies could be applied to other hazardous and toxic substances.

2.2.7 Water and Sediment Sampling: Sample collection is typically performed at the surface of the water or in sediment where the depth of the water is less than 18 feet. Sample preparation is typically performed in accordance with EPA Method 3050 and analysis for total lead using an approved NIOSH or similar method. NOTE: Water and sediment sampling is rarely performed unless sensitive environmental receptors are present.

2.2.8 Real-Time Monitoring: This method is performed by using hand-held or mounted samplers to monitor for respirable or total dust. There is no regulatory standard assigned to this method. The acceptance criteria are typically established by the specifier. NOTE: This method is rarely performed outside of NYCDOT where it was required as part of the Final Environmental Impact Statement for Bridge Painting. This method was included in Appendix A of the previous version of SSPC-TU 7, but has been deleted from this version.

2.3 Monitoring Frequency: In the case of soil, water, and sediment sampling, samples are typically collected pre- and post-project (with occasional mid-project samples). Visible emissions observations are generally conducted for short durations throughout the workday. There are five typically specified monitoring frequencies for ambient air monitoring.

2.3.1 No Monitoring: Monitoring of emissions is not performed.

2.3.2 Monitoring for Complaints: Emission monitoring is performed when a complaint is received. The duration of monitoring is determined on a case-by-case basis.

2.3.3 Job Initiation Monitoring: Emission monitoring is performed during the initial phases of the project. The total number of monitoring days is determined and established in

the specification, e.g., five of the first ten work days. No further monitoring is performed if the project is determined to be in compliance with the acceptance criteria. Monitoring is continued if the project is not in compliance with the acceptance criteria until controls are modified and it is shown to be in compliance.

2.3.4 Job Initiation and Periodic Monitoring: Monitoring is performed at the beginning of the project and at regular intervals thereafter. Initial monitoring is performed in accordance with 2.3.3. Monitoring is repeated at a predetermined interval, i.e., one week per month. The monitoring frequency is determined by the specifier or user.

2.3.5 Full-time (Continuous) Monitoring: Monitoring is performed for the duration of the potential dust- or emission-producing operations.

2.4 SELECTION OF MONITORING METHODS: The selection of emission monitoring methods for a particular project will be dependent upon a variety of factors. Each project will have unique characteristics that must be considered by the specifier.

2.4.1 Project-Specific Considerations:

- a. The presence and concentrations of lead or other toxic metals such as cadmium, chromium, and arsenic present in the substrate, coatings, or abrasives.
- b. The dust or emission generating potential of the method of surface preparation being performed.
- c. The type and level of containment being specified.
- d. The type of emissions, if any, which may be generated by the project. Typically these would include total dust, PM-10, lead, or other toxic metal, or fume.
- e. The proximity of adjacent personnel.
- f. The proximity of the public, particularly locations where children may be present such as day care centers, schools, or high density populations, housing and other sensitive receptors.
- g. The proximity of sensitive environmental receptors (e.g., wetlands, oyster beds).
- h. The duration of the project.
- i. Specific state or local regulatory requirements.
- j. Mobilization or cost considerations

2.4.2 Objective / Purpose of Monitoring

2.4.2.1 Compliance With NAAQS for Lead, PM-10 or PM-2.5: It must be noted that while ambient air monitoring methods for Lead and Particulate Matter are based upon the NAAQS limits, such monitoring is not being performed to assure strict compliance with NAAQS. (The NAAQS is not directly applicable to short-term field maintenance painting projects.) Monitoring is most often performed to determine that the health and welfare of the public is not being impacted and to establish documentation of lead and PM-10 emissions generated during the work.

2.4.2.2 Compliance With State and Local Regulations: Many state and local environmental and air quality regulations have prohibitions on visible or fugitive emissions, water cleaning and wet removal, and in some cases have specific regulations related to abrasive blast cleaning and coatings application, including containment methods, ambient air monitoring requirements, permit requirements, etc. Users should review state and local regulations and incorporate their requirements into project specifications and environmental monitoring programs.

2.4.2.3 Compliance with Project Specifications: Many owners and facilities establish their own acceptance criteria or objectives.

2.4.3 Type of Results / Immediacy of Results: The desired accuracy of the data and the turnaround time for obtaining results may also be a factor when selecting monitoring methods. A combination of qualitative and quantitative results may be appropriate.

2.4.3.1 Qualitative (Immediate) Feedback: Methods that give immediate results include: visible emission evaluations using timed measurements and visible emission evaluation using opacity measurements. Visual methods do not provide quantitative information on hazardous and toxic substance values; however, they do provide a means of assessing emissions immediately and may provide information on the level of controls provided by containment and ventilation systems.

2.4.3.2 Quantitative Results: These methods include: high-volume air sampling for lead and PM-10, low-volume area sampling for hazardous and toxic substances, or soil, water, and dust sampling. These methods provide quantitative results regarding emissions that can be compared to the NAAQS, OSHA Action Levels, and specified requirements. These methods require sample collection and related equipment, as well as laboratory analysis. The results are typically not available for 24 to 72 hours.

2.5 SELECTION OF RECOMMENDED MONITORING METHOD AND FREQUENCY AND ACCEPTANCE CRITERIA

2.5.1 Specifiers should evaluate the relative risk to the public, adjacent workers, critical receptors and the environment before selecting monitoring methods and acceptance criteria.

2.5.2 Once all of the factors have been identified and considered, select the monitoring method(s) and frequencies, if it is determined that monitoring will be performed.

2.5.3 For each method selected, the designer should determine the acceptance criteria that will be used for acceptance or to trigger corrective action. This can be based on regulatory or specified requirements, or using the options provided in each method section.

3. DEFINITIONS AND ACRONYMS

Action Level: Employee exposure, without regard to the use of respirators, to an airborne concentration of a contaminant in milligrams per cubic meter (mg/m^3) or micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) calculated as an eight-hour Time Weighted Average (TWA). Unless otherwise specified by regulation, the Action Level of a material will be equivalent to one half of the OSHA Permissible Exposure Limit (PEL) for that substance. Current Action Levels for metals for which OSHA has comprehensive health standards are:

- Action Level for lead is $30 \mu\text{g}/\text{m}^3$ as an 8-hour TWA
- Action Level for arsenic is $5 \mu\text{g}/\text{m}^3$ as an 8-hour TWA
- Action Level for cadmium is $2.5 \mu\text{g}/\text{m}^3$ as an 8-hour TWA
- Action Level for hexavalent chromium is $2.5 \mu\text{g}/\text{m}^3$ as an 8-hour TWA

Adjusted Daily Allowance (ADA): A method of adjusting NAAQS limits for extended periods into a value that can be used as a daily acceptance criterion based on the actual workday duration.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (commonly called “Superfund”): Federal laws addressing the cleanup of hazardous waste sites. EPA regulations are contained in 40 CFR 300-373.

Containment System: A containment system includes the cover panels, screens, tarps, scaffolds, supports, and shrouds used to enclose an entire work area or a paint removal tool. The purpose is to minimize or prevent the debris generated during surface preparation from entering into the environment, and to facilitate the controlled collection of the debris for disposal. Containment systems may also employ the use of ground covers or water booms.

Daily Allowance (DA): A method of adjusting NAAQS limits for extended periods (e.g. 90-day) into a 24-hour limit that can be used as an acceptance criterion; calculated by the concentration of TSP-lead in air in $\mu\text{g}/\text{m}^3$ allowed per day, accounting for the number of days of non-surface preparation activities in a 90-day period; calculated by multiplying the acceptance criteria by a factor of (90/PD), where PD is the number of days of surface preparation activity in a 90-day period. It should be noted for short duration periods the DA or ADA may be too high. In these cases, the specifier should select a maximum value or use another method for establishing acceptance criteria.

Discharge: Accidental or intentional spilling, leaking, pumping, pouring, emitting, emptying, or dumping of hazardous material or waste into or on any land, water or airspace.

Dust Collection: Mechanical ventilation system designed specifically for the containment, capture, and removal of airborne particulate from containment. A dust collection system generally includes ductwork, plenums and hoppers, and dust collector(s) for the removal of hazardous materials from the

airstream prior to discharge to the atmosphere. Use of a tool equipped with a vacuum attachment and filtration system is also dust collection. See SSPC 16, Guide to Specifying and Selecting Dust Collectors.

Emission: A release of material to the air, water, or ground.

EPA: The U.S. Environmental Protection Agency. EPA regulations are contained in Title 40 of the Code of Federal Regulations (40 CFR).

Hazardous and toxic substances: are defined by OSHA as those chemicals present in the workplace which are capable of causing harm. In this definition, the term “chemicals” includes: dusts, mixtures, and common materials such as paints, fuels, and solvents.

Lead: The word “lead” when used in this guide means elemental lead, all inorganic lead compounds and a class of organic lead compounds called lead soaps. Lead is a heavy metal at room temperature and pressure and is a basic chemical element. It can combine with various other substances to form lead compounds.

Lead-based paint: Lead-based paint is defined by 40 CFR 745, Lead; Identification of Dangerous Lead Levels—Final Rule (in 2001) as 0.5% (5,000 ppm) by laboratory test or 1.0 mg/cm^2 . OSHA’s Lead in Construction Standard is implemented when lead in any amount is detected in the paint.

Micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$): Common units for reporting/regulating airborne concentrations.

Milligrams per cubic meter of air (mg/m^3): Also a commonly used unit for reporting/regulating airborne concentrations.

National Ambient Air Quality Standards (NAAQS): Federal regulations that establish limits on allowable pollutants in the ambient air. Lead (TSP-Lead) and particulate matter (PM-10). Regulations are found in 40 CFR 50.

National Institute for Occupational Safety and Health (NIOSH): Federal agency that conducts research on safety and health issues, and tests and certifies respirators.

Occupational Safety and Health Administration (OSHA): Safety and health standards are contained in Title 29 of the Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910, General Industry and 29 CFR 1926, Construction Industry).

PM-2.5: Particulate matter with an aerodynamic diameter of less than 2.5 micrometers.

PM-10: Particulate matter with an aerodynamic diameter of 10 micrometers or less in size.

Parts Per Million (ppm): Common units for reporting a concentration of a specific substance in volume-to-volume or mass-to-mass ratios (e.g., concentration of lead contained in paint film reported as mass of lead to the total mass of paint).

Permissible Exposure Limit (PEL): Employee exposure, without regard to the use of respirators, to an airborne concentration of contaminant in micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) calculated as an eight hour TWA. A formula is used to calculate the PEL if an employee is exposed to lead for more than 8 hours in any workday. Current PELs for metals for which OSHA has comprehensive health standards:

- Permissible Exposure Limit for lead is 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) as an eight hour Time Weighted Average (TWA).
- Permissible Exposure Limit for arsenic is 10 $\mu\text{g}/\text{m}^3$ as an 8-hour TWA.
- Permissible Exposure Limit for cadmium is 5 $\mu\text{g}/\text{m}^3$ as an 8-hour TWA.
- Permissible Exposure Limit for hexavalent chromium is 5 $\mu\text{g}/\text{m}^3$ as an 8-hour TWA.

The employee's allowable exposure to lead, as a TWA for that day, is reduced according to the following formula:

$$\text{PEL } \mu\text{g}/\text{m}^3 = 400 \div \text{Number of Hours Worked in the Day}$$

Regulated Area: Area identified by physical markings to indicate the zone(s) where airborne concentrations of hazardous or toxic substances exceed, or can be expected to exceed, the Action Level or PEL.

Resource Conservation and Recovery Act (RCRA): RCRA regulations address waste handling and disposal and are found in 40 CFR 240 through 280.

Total Suspended Particulate (TSP): Total suspended particles (TSP) was the NAAQS standard for particulate matter until 1987 when replaced by PM-10. It is generally considered to represent dust or particles in aerodynamic diameter ranging from 20 to 100 μm (microns).

Time Weighted Average (TWA): This is the employee's average exposure to airborne contaminants in any eight-hour workday.

Ventilation: See Dust Collection.

4. REFERENCED STANDARDS AND DOCUMENTS

4.1 The standards and references in this technology update are listed in Sections 4.4 through 4.8 and form a part of this update.

4.2 The latest issue, revision, or amendment of the referenced standards in effect on the date of invitation to bid generally governs unless otherwise specified.

4.3 If there is a conflict between the requirements of the cited referenced standards and this document, the requirements of this technology update prevails.

4.4 SSPC: SOCIETY FOR PROTECTIVE COATINGS:

Guide 6	Guide for Containing Debris Generated During Paint Removal Operations
Guide 16	Guide to Specifying and Selecting Dust Collectors
SSPC 93-02	Industrial Lead Paint Removal Handbook, 2nd Edition, Volume I
SSPC 95-06	Project Design, Industrial Lead Paint Removal Handbook, Volume II

4.5 CODE OF FEDERAL REGULATIONS (CFR)¹

29 CFR 1926	Occupational Safety and Health Regulations for Construction
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.62	Lead (Construction)
29 CFR 1926.1118	Arsenic
29 CFR 1926.1127	Cadmium
29 CFR 1926.1126	Hexavalent Chromium
40 CFR 50	National Primary and Secondary Ambient Air Quality Standards
40 CFR 58	Ambient Air Quality Surveillance
40 CFR 60, App. A	
Method 9	Visual Determination of the Opacity of Emissions from Stationary Sources
Method 22	Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Fires

4.6 NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH (NIOSH) METHODS²

Method 7082	Lead (AAS)
Method 7105	Lead (Graphite)
Method 7300 or 7048	Cadmium
Method 7900	Arsenic
Method 7600, 7604, 7605 or OSHA ID 215	Hexavalent Chromium
Method 7300	Total ICP Method

4.7 U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) METHODS³

SW 846	Test Methods for Evaluating Solid Waste Physical/Chemical Methods
Method 3050	Acid Digestion of Sediment, Sludge, and Soils

¹ CFRs may be obtained via <http://www.ecfr.gov/cgi-bin/ECFR?page=browse>

² Centers for Disease Control and Prevention, National Institute of Occupational Safety and Health (NIOSH), 1600 Clifton Rd. Atlanta, GA 30333, USA. Phone: 800-CDC-INFO (800-232-4636). Methods may be obtained from <http://www.cdc.gov/niosh/docs/2003-154/default.html>

³ U.S. Environmental Protection Agency (EPA), 1200 Pennsylvania Avenue, NW, Washington, DC 20460; <http://www.epa.gov/ttn/emc/methods.html> (for Reference Test Methods).

EP/600/R-94/038b Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Ambient Air Specific Methods, Section 2.8 (Lead) and 2.11 (PM-10).

4.8 AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (AIHA):⁴

- Environmental Lead Proficiency Analytical Testing Program (ELPAT)
- Environmental Lead Laboratory Accreditation Program (ELLAP)
- Proficiency Analytical Testing Program (PAT) for Metals Analysis
- Laboratory Accreditation for Metals Analysis

5. MONITORING METHODS

5.1 Monitoring methods addressed in this update include those formerly referenced in SSPC Guide 6 (Section 5.0) as follows⁴

- Method A: Visible Emissions (Section 6.0)
- Method B: Ambient Air Monitoring for PM-10 (Section 7.0)
- Method C: Occupational Monitoring of Area Emissions of Hazardous and Toxic Substances (Section 8.0)
- Method D: Ambient Air Monitoring for TSP Lead (Section 9.0)
- Method E: Soil Analysis for Hazardous and Toxic Substances (Section 10.0)
- Method F: Water and Sediment Analysis for Hazardous and Toxic Substances (Section 11.0)

6. VISIBLE EMISSION OBSERVATIONS (METHOD A)

6.1 General: The following provides methods for observing for and detecting potential emissions through the use of EPA Methods by a knowledgeable observer. EPA defines knowledgeable as be trained and knowledgeable regarding the effects of background contrast, ambient lighting, observer position relative to lighting, wind, and the presence of uncombined water (condensing water vapor) on the visibility of emissions. This training is to be obtained from written materials found in the Method 9 certification course.

Visible emissions assessments allow for immediate, containment or work practice changes to be made without waiting for the results of laboratory analysis. These methods are suitable supplements to instrument monitoring methods, but in the event of a conflict, the instrument data typically prevails. Visible emissions assessments are useful for identifying areas in need of repair, for project shutdown to avoid a potential pollution event, rather than for acceptance purposes.

⁴ American Industrial Hygiene Association (AIHA), 3141 Fairview Park Drive, Suite 777 Falls Church, VA 22042; <<http://www.aiha.org>>.

6.2 VISIBLE EMISSION EVALUATION USING 40 CFR 60, APPENDIX A, METHOD 22 (TIMING)

6.2.1 Description of Method: The method is based on 40 CFR 60, Appendix A, Method 22, which assesses total emissions.

6.2.2 Materials and Equipment: A wristwatch, a stop watch (i.e., two watches) and a site plot plan are needed for visual emissions assessment.

6.2.3 Observation Locations

6.2.3.1 The observer should stand at a distance that provides a clear view of the emissions with the sun generally oriented to the observer's back.

6.2.3.2 The observer should view emissions approximately perpendicular to the angle of the emissions.

6.2.3.3 The observer should view emissions against a background of contrasting color.

6.2.4 Emission Evaluation Procedures

6.2.4.1 Fugitive emissions from all project activities are assessed. This includes the surface preparation and paint removal activities, dust collection systems, abrasive reclamation or handling areas, and debris containerizing operations.

6.2.4.2 The observer measures and records the length of time that emissions are observed from any area.

6.2.5 Duration of Emission Evaluations

6.2.5.1 An observation time no longer than 15 to 20 minutes is selected, and all sources of emissions are observed for the entire time. The stopwatch is started and stopped each time emissions are visible.

6.2.5.2 For every 15 to 20 minutes of observation time, a rest break of 10 to 15 minutes is suggested.

6.2.5.3 The accumulated time of all visible emissions within each observation period is reported.

6.2.6 Acceptance Criteria Options: Select the acceptance criteria for emissions from the list in Table 1. Level 0 is the most stringent.

When interpreting visible emissions data, recognize that violations of any of the other methods of monitoring (e.g., TSP lead) will typically prevail even if the visible emissions assessments are acceptable. Check with state and local air agencies to identify their criteria related to visible emissions.

6.2.7 Documentation: The following information should be recorded at a minimum:

1. Name and location of jobsite
2. Date of evaluation
3. Weather conditions
4. Name of observer
5. Location of observer
6. Activities underway at the time of observation
7. Items observed
8. Observations start and stop times
9. Descriptions of any emissions observed
10. Work activities halted
11. Corrective action taken

6.3 VISIBLE EMISSION EVALUATION USING METHOD 9 (40 CFR 60, APPENDIX A)

6.3.1 Description of Method

6.3.1.1 This method provides procedures for certifying and training observers, conducting observations, and interpreting results. It provides a means for quickly detecting potential pollution-causing events through the observation of visible emissions.

6.3.1.2 An opacity scale ranging from 5% to 100% in 5-percent increments is used. Opacity is defined by the degree to which the transmission of light is reduced or as the degree to which the visibility of a background as viewed through the plume is reduced.

6.3.1.3 To conduct opacity assessments in accordance with Method 9, the emission evaluator must be certified at least twice yearly. (The certification is valid for six months.)

6.3.1.4 This method is generally used only to comply with state and local air quality opacity regulations. It is most frequently used by state and local regulatory agencies to assess and evaluate fugitive, visible or abrasive blasting emissions compared to state and local regulations.

6.3.2. Materials and Equipment:

1. Stop Watch
2. Compass
3. Air Velocity Meter
4. Range Finder
5. Site Plot Plan

6.3.3 Observation Locations:

6.3.3.1 The observer should stand at a distance that provides a clear view of the emissions.

6.3.3.2 The sun should be oriented within 140-degree sector to the observer's back.

6.3.3.3 The observer should view emissions approximately perpendicular to the angle of the emissions.

TABLE 1
ACCEPTANCE CRITERIA OPTIONS BY LEVEL

LEVEL	ACCEPTANCE CRITERIA OPTIONS	CONSIDERATIONS
A	Level 0 Emissions: Any sustained visible emission regardless of its duration.	It should be noted that Level 0 emissions may not be achievable during abrasive blasting in less than Class 1A containments.
B	Level 1 Emissions: Random emissions of a cumulative duration of no more than 1% of the workday. This amounts to a duration of 5 minutes in an 8-hour workday. This might also be adjusted to an hourly rate such as no more than 36 seconds per hour, or 9 seconds per 15-minute observation period.	-----
C	Level 2 Emissions: Random emissions of a cumulative duration of no more than 5% of the workday. This amounts to a duration of 24 minutes in an 8-hour workday. This might also be adjusted to an hourly rate such as no more than 3 minutes per hour, or 45 seconds per 15-minute observation period.	-----
D	Level 3 Emissions: Random emissions of a cumulative duration of no more than 10% of the workday. This amounts to a duration of 48 minutes in an 8-hour workday. This might also be adjusted to an hourly rate of 6 minutes per hour or 90 seconds per 15-minute observation period.	-----
E	Level 4 Emissions: Emissions are unrestricted and may occur at any time.	-----
F	Emissions may not escape the property line.	This is sometimes established in state/local fugitive emission regulations.

6.3.3.4 The observer should view emissions against a background of contrasting color.

6.3.3.5 Establish a viewing distance somewhere between the height of the emissions and no more than two times the height of the point of emission.

6.3.4 Emission Evaluation Procedures:

6.3.4.1 Fugitive emissions from all project activities are assessed. This includes the paint removal activities, dust collection systems, abrasive reclamation or handling areas, and debris containerizing operations.

6.3.4.2 The observer reads the opacity at 15-second intervals, viewing only momentarily then looking away. Each reading is reported to the nearest 5 percent opacity with a minimum of 24 observations being recorded per observation period (6 minutes).

6.3.4.3 Most states establish limiting criteria such as no more than 20% opacity for three (3) minutes or no more than 60% opacity at any time.

6.3.4.4 Check with state and local air quality agencies to determine emission criteria and to establish if unacceptable emissions are those which escape the containment, pass beyond a certain boundary such as the regulated area or property line, or some other criteria.

6.3.5 Duration of Emission Evaluations:

6.3.5.1 An observation time of at least 6 (six) minutes and no longer than 60 minutes is selected.

6.3.5.2 One source of emissions is observed at a time.

6.3.6 Acceptance Criteria Options: Select the acceptance criteria for emissions from Table 2.

When interpreting visible emissions data, recognize that violations of any of the other methods of monitoring (e.g., TSP lead) will typically prevail even if the visible emissions assessments are acceptable.

6.3.7 Documentation: The following information should be recorded at a minimum:

1. Name and location of jobsite
2. Date of evaluation
3. Weather conditions
4. Name of observer
5. Location of observer
6. Activities underway at the time of observation
7. Items observed
8. Observations start and stop times
9. Opacities observed / location
10. Descriptions of emissions observed
11. Certificate number of observer (if applicable)
12. Work Activities halted and corrective actions taken

7.AMBIENT AIR MONITORING FOR PM-10 (METHOD B)

7.1 Description of Method: PM-10 concentration is defined by EPA as particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM-10) in ambient air over a 24-hour period for purposes of determining compliance with the ambient air concentrations as prescribed in the Primary and Secondary National Ambient Air Quality Standards (NAAQS) for particulate matter.

The EPA does not require PM-10 monitoring to be conducted on paint removal or surface preparation projects. PM-10 monitoring is generally used as a quantitative means of documenting the effectiveness of the containment system and verifying that the public is not being impacted by the surface preparation operations.

While used extensively from the 1980s into the 2000s, fewer and fewer industrial painting projects are requiring PM-10 monitoring opting for the use of TSP-lead monitoring instead. PM-10 may still be appropriate for non-lead projects, populated areas, demolition, or monitoring of other dust producing activities, etc.

When the project involves hazardous coating removal, SSPC generally suggests use of TSP-Lead (or similar) monitoring. PM-10 may be appropriate when respirable dusts (less than 10 micrometers) are of concern.

7.2 MATERIALS AND EQUIPMENT

7.2.1 The following equipment is commonly used:

1. High volume air samplers designed in accordance with 40 CFR 50, Appendix J, that are capable of

**TABLE 2
ACCEPTANCE CRITERIA OPTIONS FOR OPACITY**

LEVEL	ACCEPTANCE CRITERIA OPTIONS	CONSIDERATIONS
A	Per applicable state or local regulations	----
B	20% opacity at any time	These levels are generally used in state/local fugitive and visible emission standards.
C	Greater than 60% opacity at any time	
D	20% opacity for three (3) minutes or greater	

