(12) APCO Publication No. PB209–022, "Maintenance, Calibration, and Operation of Isokinetic Source-Sampling Equipment", is available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. (Price: $4.00.)

SUBCHAPTER 2. PROCEDURES FOR THE VISUAL DETERMINATION OF THE OPACITY (PER CENT) AND THE SHADE OR APPEARANCE (RINGELMANN NUMBER) OF EMISSIONS FROM SOURCES

Authority

Unless otherwise expressly noted, all provisions of this Subchapter were adopted pursuant to authority of N.J.S.A. 26:2C–8 and were filed and became effective on March 20, 1975, as R.1975 d.76. See: 7 N.J.R. 144(a). Revisions to the original rules were filed on April 21, 1976, as R.1976 d.121 to become effective on June 21, 1976. See: 8 N.J.R. 223(a).

7:27B–2.1 Definitions

The following words and terms, when used in this Subchapter, shall have the following meanings, unless the context clearly indicates otherwise. Terms not defined in this Section are intended to be used as defined in the New Jersey Air Pollution Control Act, N.J.S.A. 26:2C–1 et seq. and Chapter 27 in Title 7 of the New Jersey Administrative Code, or are used in their common engineering or scientific sense.

"Bureau" means the Bureau of Air Pollution Control.

"Department" means the Department of Environmental Protection.

"Opacity" means the property of a substance which renders it partially or wholly obstructive to the transmission of visible light expressed as the percentage to which the light is obstructed.

"Ringelmann number" means a number used to describe the density of smoke as determined from the Ringelmann smoke chart.

"Ringelmann smoke chart" means the "Ringelmann scale for grading the density of smoke" as published by the United States Bureau of Mines or any chart, recorder, indicator or device which is approved by the Department as the equivalent of the Ringelmann scale for the measurement of smoke density.

7:27B–2.2 Acceptable observation methods

Observations shall be conducted in accordance with methods set forth hereinafter. Alternate methods and/or procedures, including the use of auxiliary equipment and instruments, may be used subject to prior approval by the Department. The Department may itself employ such alternates when warranted by observation conditions or other circumstances.

7:27B–2.3 Observation principle

For purposes of observing emissions in accordance with applicable provisions of the rules of the bureau, opacity (per cent) and shade or appearance (Ringelmann number) shall be determined visually by a certified observer. Opacity (per cent) is applicable to all plumes regardless of color. Shade or appearance (Ringelmann number) is applicable to gray and black plumes only. The resultant observation shall be the aggregate of individual readings.

7:27B–2.4 General observation requirements

(a) The observer shall stand at a distance sufficient to provide a clear view of the emissions.

(b) The observer shall be located so that:

1. For per cent opacity readings, the sun shall be oriented in the 140 degree sector to the observer's back.

2. For Ringelmann number readings, the sun should be oriented in the 140 degree sector to the observer's back; however, where conditions do not permit, the sun need not be to the observer's back.

(c) Observations shall be directed to the point of the greatest per cent opacity or greatest Ringelmann number in the plume.

(d) Consistent with the requirements of subsections (a) and (b) of this Section, the observer shall make observations using a line of vision as close to 90 degrees as possible to the direction of the plume at the point specified in subsection (c) of this Section.

(e) The observer shall not look continuously at the plume, but shall observe the plume momentarily at 15–second intervals, except where consecutive second standards are prescribed (that is, N.J.A.C. 7:27–3.4 and 3.5).

(f) Rules for plumes which contain visible water ("steam" plumes) are:

1. Where visible water is present within the plume at the point of discharge of the outdoor atmosphere ("attached" plume), observations shall be made beyond the transition point after which water is no longer visible in the plume.

2. Where water vapor in the plume condenses and becomes visible at a distance after the point of discharge to the outdoor atmosphere ("detached" plume), observations should be made before the transition point where water vapor becomes visible in the plume.

7:27B–2.5 Required observation data

Data to be determined and reported for each observation must include the information required to complete the plume observation record (form AIR–14, Appendix 1) as well as information showing the sun's orientation to the observer's back and the plume characteristics when observing a plume containing visible water set forth in N.J.A.C. 7:27B–2.4(f).

7:27B–2.6 Certification

(a) To be certified, an observer must satisfactorily complete a training course, approved by the Department, in observing and recording opacity and shade or appearance of visible plumes. Certification may be made by the Department or by any person approved by the Department for such purpose. An observer must have been certified (or recertified) within a period of approximately six months immediately preceding the observation.

(b) To be certified, an observer must demonstrate the ability to assign opacity readings in five percent increments and Ringelmann number readings in ¼ scale increments. Certification tests shall consist of no less than 25 plume observations in each plume category. Errors must not exceed 15 per cent (¾ Ringelmann number) on any one reading in each category, and the average error must not exceed 5.5 per cent in each category. Substantially equivalent performance standards for observer certification may be approved by the Department.

References

Federal Register, Volume 39, Number 219, November 12, 1974, EPA Method 9, Visual Determination of the Opacity of Emissions from Stationary Sources, is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Editor's Note: In addition to the above text, an Appendix 1., Plume Observation Record, was filed with these rules but is not reproduced herein. Further information regarding this Appendix may be obtained by contacting the Bureau of Air Pollution Control, Department of Environmental Protection, Post Office Box 2807, Trenton, New Jersey 08625.

SUBCHAPTER 3. AIR TEST METHOD 3: SAMPLING AND ANALYTICAL PROCEDURES FOR THE DETERMINATION OF VOLATILE ORGANIC COMPOUNDS FROM SOURCE OPERATIONS

7:27B–3.1 Definitions

The following words and terms, when used in this subchapter, have the following meanings, unless the context clearly indicates otherwise.

"Aliquot" means a representative portion of a sample.

"ASTM" means the American Society for Testing and Materials.

"Atm" means atmosphere.

"Batch cycle" means the total elapsed time per batch in any single manufacturing process vessel, including all phases of the operation during which the vessel contains process materials, excluding time waiting for removal from the vessel.

"Calibration gas" means a gas of known composition and concentration, certified to within ± two percent by the manufacturer or, if laboratory blended, an independent analysis has been performed.

"Carrier gas" means nitrogen or helium containing less than two ppm of equivalent carbon or methane.

"Combustion gas" means air which contains less than two ppm of equivalent carbon or methane and is used to support the combustion of VOC in the sample gas.

"Condenser" means a system for determining the moisture content of the source gas and consisting of: a probe, two Greenburg–Smith impingers (one standard type containing 100 mls of distilled water and one dry modified type, both immersed in an ice bath), a drying tube containing a suitable desiccant, a pump, and a dry gas meter with a thermometer all connected in series. The condenser collects the moisture in a measured amount of source gas.

"Cutback asphalt" means any paving asphalt which has been liquified by blending with petroleum solvents, or produced directly from the distillation of petroleum and having vaporization properties similar to the blended and liquified asphalt.

"Department" means the New Jersey Department of Environmental Protection.

"Dilution gas" means air or nitrogen containing less than two ppm of equivalent carbon or methane.

"Direct analysis" means the continuous or semi-continuous on-site sampling and immediate analysis of the source sample.

"Emulsified asphalt" means asphalt which has been liquified by mixing with water and an emulsifying agent.

"Fuel gas" means hydrogen or a mixture of hydrogen and an inert gas which contains less than one ppm of equivalent carbon or methane.

"Gas chromatograph-flame ionization detector (GC–FID)" means a gas chromatograph instrument equipped with a flame ionization detector and a suitable column to separate the VOC. The flame ionization detector must have a heating system capable of preventing any condensation of the sample gas. The flame ionization detector must be capable of meeting or exceeding by demonstration the manufacturer's specifications.

"Gasoline" means any petroleum distillate or petroleum distillate/oxygenate blend having a Reid vapor pressure of four pounds per square inch (207 millimeters of mercury) absolute or greater and used as an automotive fuel.

"Gas sampling valve" means a two-position heated valve used to purge the sample loop with the source gas and to insert the loop containing the source gas sample into the carrier gas stream leading to the chromatograph. Both loop and valve must be heated to a temperature that will prevent any condensation of the sample gas.

"Isokinetic sampling" means drawing a gas sample through a nozzle into a sampling train at the same velocity as that in the stack or duct.

"Laboratory standard calibrations gases" means three gas mixtures each containing known concentrations of each of the VOC in the source gas (except trace components) in the same matrix, if possible, as will be sampled. One mixture is to have greater than, one mixture is to be approximately equal to, and one mixture is to have less than the expected concentration of VOC in the source gas. These gases can be certified to ± two percent by the manufacturer or produced locally by approved techniques if the concentration is confirmed by an independent analysis. The standards must be stable in the matrix and container over their period of use.

"LFL" means lower explosive limit.

"Modified particulate train" means a sampling train capable of collecting organic emissions at an isokinetic sampling rate.

"Needle valve" means a fine adjustment valve used to control the source gas sampling rate and constructed of corrosion-resistant material.

"Organic substance" means any chemical compound or mixture of chemical compounds of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbonates, metallic carbides, and ammonium carbonate.

"Ppm" means part per million by volume.

"Partial pressure" means the pressure exerted by a specified component in a mixture of gases.

"Performance test" or "test" means a series of test runs used for the purpose of determining emissions of air contaminants to the outdoor atmosphere.

"Petroleum solvent dry cleaning" means a process used for the cleaning of textiles and fabric products in which articles are washed in a solution of organic material produced by petroleum distillation that exists as a liquid under standard conditions, and then dried by exposure to a heated air stream.

"Probe" means glass, stainless steel or Teflon tubing as required by source gas conditions and equipped with a filter, if necessary. The probe and filter must have a heating or dilution system capable of preventing any condensation of the sample gas.

"Psia" means pounds per square inch absolute.

"Pump" means a leakless Teflon-coated diaphragm pump or equivalent with an appropriate capacity and a heating or dilution system capable of preventing any condensation of the sample.

"Pure component standards" means a gas mixture consisting of only one VOC in an inert gas. A separate mixture is required for each VOC suspected in the source gas.

"Recorder/Integrator" means a strip chart recorder and an optional integrator to calculate the results.

"Reid vapor pressure" or "RVP" means the absolute vapor pressure of a petroleum product in pounds per square inch (kilopascals) at 100 degrees Fahrenheit (°F) (37.8 degrees Celsius (°C)) as measured by "Method 1–Dry RVP Measurement Method" or "Method 2–Herzog Semi–Automatic Method" promulgated at 40 CFR 80, Appendix E; or any other test method approved in advance in writing by the Department and the EPA.

"Rigid sampling container" means a leak-free sampling container large enough to hold a gas sampling bag and capable of being evacuated to a pressure of 20 inches water without collapsing.

"Run" or "test run" means a single integrated measurement or procedure used for the purpose of collecting a sample of air contaminants emitted to the outdoor atmosphere during a specified time interval.

"Sample collector" means any device used to selectively separate and collect a sample of a specified contaminant from a gas stream, including, but not limited to, thimbles, filters, impingers, bubblers, cyclones, condensers, and absorbers.

"Sample line" means glass, Teflon or stainless steel tubing with Teflon or stainless steel fittings, heated if necessary to prevent condensation.

"Sampling location" means the specific position at which a sampling port is located in a stack or chimney.

"Sampling port" means an opening in a stack or chimney into which sampling or measuring devices may be inserted or through which a sample is extracted.

"Sampling rate" means the volume rate at which stack gases are drawn through a sampling train.

"Sampling train" means a combination of entrapment devices, instruments, and auxiliary apparatus arranged in a prescribed sequence to selectively separate and collect samples of specified air contaminants.

"SCFH" means standard cubic feet per hour on a wet basis unless otherwise specified in the text.

"SCFM" means standard cubic feet per minute on a wet basis unless otherwise specified in the text.

"Solvent recovery dryer" means a class of dry cleaning dryers that employs a condenser to liquify and recover solvent vapors evaporated in a closed-loop, recirculating stream of heated air.

"Source operation" or "Source" means any process or any identifiable part thereof that emits or can reasonably be anticipated to emit any air contaminant either directly or indirectly into the outdoor atmosphere.

"Standard conditions" means 70 degrees Fahrenheit (°F) (21.1 degrees Celsius (°C)) and one atmosphere pressure (14.7 pounds per square inch absolute or 760 millimeters of mercury).

"Std" means standard.

"Surface coating formulation" means the material used to form a protective, functional, or decorative film including, but not limited to any architectural coating, paint, varnish, ink, or adhesive, applied to or impregnated into a substrate.

"Temperature sensor" means a thermometer, potentiometer with thermocouple, or other temperature sensing device calibrated with an approved standard.

"Test" or "performance test" means a series of test runs used for the purpose of determining emissions of air contaminants to the outdoor atmosphere.

"Test Run" or "run" means a single integrated measurement or procedure used for the purpose of collecting a sample of air contaminants emitted to the outdoor atmosphere during a specified time interval.

"Transfer operation" means the moving of any substance from any storage tank, manufacturing process vessel, or delivery vessel into any receiving vessel.

"Vapor" means the gaseous form of substances which, under standard conditions, are in the solid or liquid state and which can be changed to these states by either increasing the pressure or decreasing the temperature.

"Vapor pressure" means the pressure of the vapor phase of a substance, or the sum of the partial pressures of the vapor phases of individual substances in a mixture of substances, when in equilibrium with the non-vapor phase of the substance or substances.

"Velocity Meter" means an "S" type Pitot tube with a manometer or other appropriate gas flow measuring device.

"Volatile organic compound" or "VOC" means any compound of carbon (other than carbon monoxide, carbon dioxide, carbonic acid, metallic carbonates, metallic carbides, and ammonium carbonate) which participates in atmospheric photochemical reactions. For the purpose of determining compliance with emission limits or content standards, VOC shall be measured by test methods in the approved SIP (such as N.J.A.C. 7:27B-3) or 40 CFR Part 60, Appendix A, as applicable, or which have been approved in writing by the Department and are acceptable to EPA. This term does not include the compounds which EPA has excluded from its definition of VOC in the list set forth at 40 CFR 51.100(s)(1), which is incorporated by reference herein, together with all amendments and supplements. The list at 40 CFR 51.100(s)(1) currently includes the compounds and the classes of perfluorocarbons set forth below:

methane
ethane
methylene chloride (dichloromethane)
1,1,1–trichloroethane (methyl chloroform)
trichlorofluoromethane (CFC–11)
dichlorodifluoromethane (CFC–12)
trifluoromethane (HFC–23)
1,1,2–trichloro–1,2,2–trifluoroethane (CFC–113)
1,2–dichloro–1,1,2,2–tetrafluoroethane (CFC–114)
chloropentafluoroethane (CFC–115)
chlorodifluoromethane (HCFC–22)
2,2–dichloro–1,1,1–trifluoroethane (HCFC–123)
2–chloro–1,1,1,2–tetrafluoroethane (HCFC–124)
1,1–dichloro–1–fluoroethane (HCFC–141b)
1–chloro–1,1–difluoroethane (HCFC–142b)
pentafluoroethane (HFC–125)
1,1,2,2–tetrafluoroethane (HFC–134)
1,1,1,2–tetrafluoroethane (HFC–134a)
1,1,1–trifluoroethane (HFC–143a)
1,1–difluoroethane (HFC–152a)
parachlorobenzotrifluoride (PCBTF)
cyclic, branched or linear completely methylated siloxanes

Classes of perfluorocarbons:

cyclic, branched, or linear, completely fluorinated alkanes
cyclic, branched, or linear, completely fluorinated ethers with no unsaturations
cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations

sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine

If there is any conflict between the list at 40 CFR 51.100(s)(1) and the list set forth above, the list at 40 CFR 51.100(s)(1) shall control.

"Zero gas" means air or gas which contains less than 1 ppm of equivalent carbon or methane.

Amended by R.1992 d.102, effective March 2, 1992 (operative March 28, 1992).
See: 23 N.J.R. 1858(b), 24 N.J.R. 792(a).
New definition for "ASTM" and "volatile organic compounds (VOC); amended others to comport with "VOS" to "VOC" changes.
Amended by R.1994 d.313, effective June 20, 1994 (operative July 26, 1994).
See: 25 N.J.R. 3339(a), 26 N.J.R. 2600(a).
Administrative Correction.
See: 27 N.J.R. 1406(a).

7:27B–3.2 Sampling and analytical protocol: acceptable test methods

(a) When N.J.A.C. 7:27–8, 7:27–16, 7:27–17, or 7:27–23 requires a source emissions test, the applicant shall submit a written protocol to the Department at least 30 days prior to the date of the test, to the following address:

Chief, Bureau of Technical Services
Division of Environmental Quality
Department of Environmental Protection
CN 411
380 Scotch Road
Trenton, New Jersey 08625–0411

(b) The written protocol shall include a detailed description of the following:

1. Sampling location;
2. Sampling equipment;
3. Sampling and analytical procedures for the tests;
4. Data reporting forms; and
5. Quality assurance procedures.

(c) Any alternative test method, analytical method, instrumentation, source, test period, or data reporting forms shall be submitted in writing with the test protocol for approval at the discretion of the Department at least 30 days prior to the test, to the address set forth in (a) above.

(d) Any changes from the procedures and methods set forth in the protocol may be approved verbally prior to the test at the discretion of the Department; however, the applicant shall note the request and the Department's response in the final test report submitted by the applicant to the Department.

(e) Any Departmental approval pursuant to (c) or (d) above shall be confirmed in writing by the Department.

(f) The Department may itself employ such alternative procedures when warranted by test conditions or other circumstances.

(g) The applicant shall give notice to the Department at least 48 hours prior to the test in order to afford the opportunity for a Departmental observer(s) to be present.

(h) Performance tests shall be conducted in accordance with test methods set forth hereinafter.

(i) For determining the quality and quantity of VOC from source operations, the prescribed test procedures shall be as follows:

1. For a single known VOC: Procedures for the Direct Measurement of VOC Using a Flame Ionization Detector or a Photoionization Detector or a Non–Dispersive Infrared Analyzer (N.J.A.C. 7:27B–3.7).

2. For a mixture of known VOC in known proportion: Procedures for the Direct Measurement of VOC Using a Flame Ionization Detector, a Photoionization Detector or a Non–Dispersive Infrared Analyzer (N.J.A.C. 7:27B–3.7).

3. For a mixture of known VOC in unknown proportions: Procedures for the Direct Measurement of VOC Using a Gas Chromatograph with a Flame Ionization Detector or other suitable detector (N.J.A.C. 7:27B–3.8).

4. For a mixture containing unknown VOC: A procedure has not been included in the test methods, but an analysis using a gas chromatograph with a mass spectrometer will be required and conducted in accordance with established procedures by a qualified operator. Prior to any such test, the Department must receive and approve a written protocol from the operator.

5. For a known or unknown VOC in a stack where condensation is present, isokinetic sampling will be required. A procedure has not been included in these test methods, but sampling using an approved modified particulate train will be required, which shall be submitted for Departmental review pursuant to N.J.A.C. 7:27B–3.2(c), (d), and (e).

(j) Whenever a direct analysis at the source is not possible, the samples shall be taken in accordance with the procedure described at N.J.A.C. 7:27B–3.9.

(k) Whenever a volume flow rate must be determined to establish mass emission rates of VOC or for any other reason, the methods prescribed in N.J.A.C. 7:27B–1, AIR TEST METHOD 1 (N.J.A.C. 7:27B–3.18 Reference 1), or other flow determining method which shall be submitted for Departmental review pursuant to N.J.A.C. 7:27B–3.2(c), (d), and (e).

Amended by R.1992 d.102, effective March 2, 1992 (operative March 28, 1992).
See: 23 N.J.R. 1858(b), 24 N.J.R. 792(a).
"VOS" replaced by "VOC".

7:27B–3.3 Operating conditions during the test

Insofar as practical, the source operation will be tested while operating at normal routine conditions and, as necessary, at other conditions including, but not limited to, design, maximum and fluctuating rates.

7:27B–3.4 Sampling facilities

(a) The following sampling facilities shall be provided by the party responsible for the emissions:

1. Sampling ports installed at locations specified by the Department and of a size large enough to accommodate the sampling equipment;

2. Safe sampling platforms and safe access thereto conforming with laws and regulations concerning safe construction and safe practice (N.J.A.C. 7:27B–3.18, Reference 2);

3. Utilities as needed for sampling and testing equipment, which may include electrical power and water;

4. Any other facilities exclusive of instrumentation and sensing devices as may be necessary for the Department to accurately determine the emissions of VOC from the source operation;

5. Facilities, as necessary, for representative sampling of raw materials and for the determination of the amount of raw materials being used during the test run; and

6. The facilities installed may be either permanent or temporary, at the discretion of the party responsible for their provision.

Amended by R.1992 d.102, effective March 2, 1992 (operative March 28, 1992).
See: 23 N.J.R. 1858(b), 24 N.J.R. 792(a).
"VOS" replaced by "VOC".

7:27B–3.5 Source operations and applicable test methods

The following chart sets forth the applicable test methods, shown by section designation, for the various source operations that are regulated by N.J.A.C. 7:27–8, 7:27–16, 7:27–17, and 7:27–23:

Applicable Test Methods

Source Operation	Vapor Pressure	Efficiency of Control Apparatus	Leaks From Source	Emissions From Source	VOC Content	Leak Tightness of Delivery Vessel	Recovered Solvent Flow Rate
Storage of VOC	3.6	3.7 3.8 3.9	3.14				
Transfer Operations	3.6	3.16	3.15	3.11		3.13	
Open Top Tanks and Surface Cleaners	3.6	3.7 3.8 3.9		3.7 3.8 3.9			
Surface Coating Operations		3.7 3.8 3.9		3.7 3.8 3.9	3.10		
Source Operations Other than Storage Tanks, Open Top Tanks and Surface Outers	3.6	3.7 3.8 3.9	3.14	3.7 3.8 3.9			
Cutback and Emulsified Asphalt					3.12		
Petroleum Solvent Dry Cleaners				3.7 3.8 3.9	3.17		3.17

Amended by R.1992 d.102, effective March 2, 1992 (operative March 28, 1992).
See: 23 N.J.R. 1858(b), 24 N.J.R. 792(a).
Reference to N.J.A.C. 7:27–23 added; "VOS" replaced by "VOC".

7:27B–3.6 Procedures for the determinations of vapor pressures of a single known VOC or mixtures of known and/or unknown VOC

(a) The vapor pressure of a single known volatile organic substance shall be determined as follows: