

NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION

NEW JERSEY ADMINISTRATIVE CODE

TITLE 7, CHAPTER 27B-2

AIR TEST METHOD 2

PROCEDURES FOR THE VISUAL DETERMINATION  
OF THE OPACITY (PERCENT) AND SHADE OR APPEARANCE  
(RINGELMANN NUMBER) OF EMISSIONS FROM SOURCES

Promulgated: April 21, 1976  
To be effective: June 21, 1976

TABLE OF CONTENTS

7:27B-2.1	Definitions
7:27B-2.2	Acceptable Observation Methods
7:27B-2.3	Observation Principle
7:27B-2.4	General Observation Requirements
7:27B-2.5	Required Observation Data
7:27B-2.6	Certification
	Reference
	Appendix 1 Plume Observation Record

7:27B-2.1 Definitions

Terms not defined in this section are intended to be used as defined in the New Jersey Air Pollution Control Act, N.J.A.C. 26:2C-1 et seq. and the Administrative Code, Title 7, Chapter 27, 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 (percent) and shade or appearance (Ringelmann Number) shall be determined visually by a certified observer. Opacity (percent) 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 percent opacity readings, the sun shall be oriented in the 140° sector to the observer's back.
  - 2. for Ringelmann Number readings, the sun should be oriented in the 140° 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 greatest percent opacity or greatest Ringelmann Number in the plume.
- (d) Consistent with the requirements of subsections 2.4(a) and (b), the observer shall make observations using a line of vision as close to 90° as possible to the direction of the plume at the point specified in subsection 2.4(c).
- (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 (e.g., N.J.A.C. 7:27-3.4 and 3.5).

- (f) For plumes which contain visible water ("steam" plumes):
1. Where visible water is present within the plume at the point of discharge to 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 as set forth in subsection 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  $\frac{1}{4}$  scale increments. Certification tests shall consist of no less than 25 plume observations in each plume category. Errors must not exceed 15 percent ( $\frac{3}{4}$  Ringelmann number) on any one reading in each category. Substantially equivalent performance standards for observer certification may be approved by the Department.

**Reference**

Federal Register, Volume 39, Number 219, November 12, 1974, EPA Method 9, Visual Determination of the Opacity of Emission from Stationary Sources, is available from the Superintendent of Documents, US Government Printing Office, Washington, DC 20402

## **Appendix 1 – Opacity Observation Form**

### GENERAL NOTE

Editor's Note: In addition to the above text, Appendix 1 was filed with these rules, but not reproduced herein. Further information regarding this Appendix may be obtained by contacting:

Bureau of Technical Services  
Division of Environmental Regulation  
Department of Environmental Protection  
CN 437 (380 Scotch Road)  
Trenton, New Jersey 08625-0437