AIR POLLUTION CONTROL DISTRICT
REGULATORY COMPLIANCE DIVISION

POLICIES AND PROCEDURES

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Topic: Visible Emission Evaluation (VEE)

Distribution: All Policy Holders

This policy and procedure document provides guidance to inspectors in the proper methods of conducting Visible Emission Evaluations (VEE) and describes the APCD policy as to when a VEE will be conducted.

In order to verify compliance with APCD Rule 302 (Visible Emissions), it is APCD policy that inspectors and field observers will conduct a VEE during the inspection of any source which is emitting visible emissions or which may have a natural tendency to emit visible emissions, unless that source is exempt from the provisions of Rule 302. The following procedures will be used when conducting a VEE:

ENVIRONMENTAL PROTECTION AGENCY (EPA) METHOD 9:

The standards for the certification and training of observers in the techniques of reading visible emissions are contained in EPA Test Reference Method Section 3.12 Method 9 (Visible Determination of Opacity of Emissions from Stationary Sources) which is incorporated by reference into this policy and procedure document. A copy of Method 9 may be obtained from a supervisor in the Regulatory Compliance Division.

INSPECTOR CERTIFICATION

APCD inspectors and field observers will be certified semiannually as visible emissions evaluators by state Air Resources Board (ARB) personnel. Inspectors and field observers will attend VEE training and certification in Ventura, CA on the dates scheduled by ARB. In certain circumstances it may be necessary for the inspector to receive the VEE certification in an alternative location. It is APCD policy that all field inspectors and observers be certified as visible emission evaluators.

OPACITY

Opacity is the degree to which transmitted light is obscured by a visible plume of air contaminant emissions. Ringelmann densities are shades of gray by which the density of columns of the visible emissions may be compared. Ringelmann densities range from a Ringlemann 0, which is no visible plume, to Ringelmann 5 which is 100% opaque. Equivalent opacity ranges from 0%, which is no plume to 100%, which is a plume so dense that the observer cannot see the background behind the plume.

READING TECHNIQUES

1. Black emissions are read in densities (shades of gray) and recorded in appropriate Ringelmann numbers and fractions in one-quarter increments.

2. Other colored emissions are read in opacities and recorded in percentages in five percent increments.

3. Opacities are related to corresponding densities on the Ringelmann chart in the following manner:

   Percent opacity = Ringelmann number x 20%

4. The observer should be positioned at a distance sufficient to provide a clear view of the emissions, at least two emission point heights but not more than one quarter mile from the emission point.

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

6. The light source should be behind the plume if VEE is conducted at night. To conduct a valid VEE at night, an observer must be certified to read smoke at night.

7. Readings should be made at approximately right angles to the wind direction.

8. Observations should be made at the point of greatest opacity in that portion of the plume where 1) condensed water vapor is not present, and 2) the plume does not fold over on itself.

VEE FORM

1. All appropriate information should be recorded in the applicable spaces on the reporting form (see attached visible emission evaluation form).

2. Observations should be recorded every 15 seconds and times should be noted in terms of minutes and quarter minutes.

3. Record all emissions during observation in consecutive order.

4. Total that time during which the emissions exceeded the Ringelmann or opacity standard.

5. Record the color of the visible emission and note any changes in color which occur and the times the changes happened during the observation.

6. Any hour means any consecutive 60-minute period, consequently if the standard allows for visible emissions to exceed the opacity standard for three minutes in any one hour, the inspector should

record at least six minutes of violation prior to issuing an NOV, to avoid disputes about when any given hour begins.

7. Document all VEE, where visible emissions are observed, with photograph(s). Refer to RCD P&P #I.F.1 (Documentation of Violations).

8. If the inspector is documenting the fact that there are no visible emissions from a source which has potential for visible emissions, the VEE form should be used to document that no visible emissions were observed.

READING TECHNIQUES APPLICABLE TO ABRASIVE BLASTING

1. Emissions from abrasive blasting operations shall be read in opacities and recorded in percentages.

2. Emissions from unconfined abrasive blasting shall be read at the densest point of the emission after a major portion of the spent abrasive has fallen out at a point 25 feet from the source. Emissions may be read at a point greater than 25 feet from the source if the observer reasonably determines that the greater distance will not significantly affect the reading.

3. Where the presence of uncombined water is the only reason for a failure to meet the limitations of the visible emission standard, that standard shall not apply.

4. Emissions from unconfined abrasive blasting employing multiple nozzles shall be judged as a single source.

5. Emissions from confined abrasive blasting shall be read at the densest point of the plume after the air contaminant leaves the enclosure.

6. APCD inspectors shall conduct visible emission evaluations of abrasive blasting operations in accordance with the provisions of Section 92400 of the Health and Safety code.

READING TECHNIQUES APPLICABLE TO MARINE VESSELS

1. Emissions from marine vessels shall be read in opacities and recorded in appropriate percentage, or Ringelmann numbers.

2. The observer should be positioned at a distance sufficient to provide a clear view of the emissions, at least two emission point heights but not more than one quarter mile from the emission point.

3. The sun should be oriented within a 140^{0} sector to the observer's back. If the boat is moving the inspector has to maintain this 140^{0} sector for the reading to be valid. In some cases it will not be possible to complete a reading because of the boat's motion.

4. Readings should be made at approximately right angles to the wind direction. The wind direction could be a function of the movement of the boat.

5. The observer should note the plume fold phenomenon developed by the exhaust and the moving boat.

6. If possible, the inspector should stand on the boat. This is not always possible, so the inspector should position him/herself as best as possible on shore.

7. Where the presence of uncombined water is the reason for a failure to meet the limitations of the visible emission standard, that standard shall not apply.

8. Emissions from exhausts stacks shall be read at the densest point of the plume after the air contaminant leaves the stack.

WATER VAPOR PLUMES

Water vapor is not considered an air contaminant. Consequently, the opacity standard does not apply to water vapor plumes. However, often the dilution and dissipation of the water vapor in a plume will leave a residual particulate plume. This particulate must be evaluated for compliance with the opacity standard.

The inspector shall read residual particulate plumes at the point of greatest plume density after the water vapor plume has completely disappeared. The inspector will otherwise use the same techniques outlined in the sections of this policy and procedure titled "READING TECHNIQUES" and "VEE FORM."

DETACHED PLUMES

Another type of water vapor plume is the detached plume. This phenomenon occurs when the water vapor condenses and becomes visible at some distance downwind from the stack. The most common condition to cause a detached plume is a very high stack temperature. In this instance, opacity determinations can be made in the interval between the stack and the point where the vapor begins to condense and become visible. In rare cases a detached vapor plume may be an acid mist plume. This phenomenon can only be determined by a source test. After a source test has verified that the detached vapor plume is indeed acid mist, then the vapor plume is subject to the visible emission standard. Inspectors shall read detached acid mist plumes using the same techniques employed to evaluate the opacity of white smoke, reading at the point of greatest opacity in the plume.

RELATIVE HUMIDITY

If the relative humidity is 60% or greater, the evaluation of any visible emission is not valid unless there is nothing in the process

or control equipment that would be forming or adding water in the exhaust.

The relative humidity is the amount of moisture in the air relative to the amount of moisture the air can hold at any given temperature. This value is determined by the comparison of values on a psychometric chart. Some of the values are determined by the use of a sling psychrometer. The inspector will verify that the relative humidity is less than 60% by using the sling psychrometer and psychometric chart in accordance with the procedures outlined RCD P&P #I.D.2 (Use of Equipment in the Field). Alternatively, the inspector may consult a local weather service to determine the relative humidity for the geographic area where the VEE is taken and that time of day.

SANTA BARBARA COUNTY APCD
VISIBLE EMISSIONS EVALUATION RECORD

Company _____ Date _____

Contact _____ Title _____

Location _____

Time first sighted plume _____ Time start _____ Time stop _____

Sky condition _____ Background _____

Wind speed _____ mph Direction _____ Air temp. _____°F Humidity _____

Plume characteristics: Continuous ____ Yes ____ No Color _____

Dispersion description _____

Stack height: _____ ft. Observer location: _____ft. _____ of stack

Sun location: ___ Back of observer ___ Left shoulder ___ Right shoulder
___ Other

Emission point _____

MIN	0	15	30	45
01				
02				
03				
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

MIN	0	15	30	45
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23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

MIN	0	15	30	45
41				
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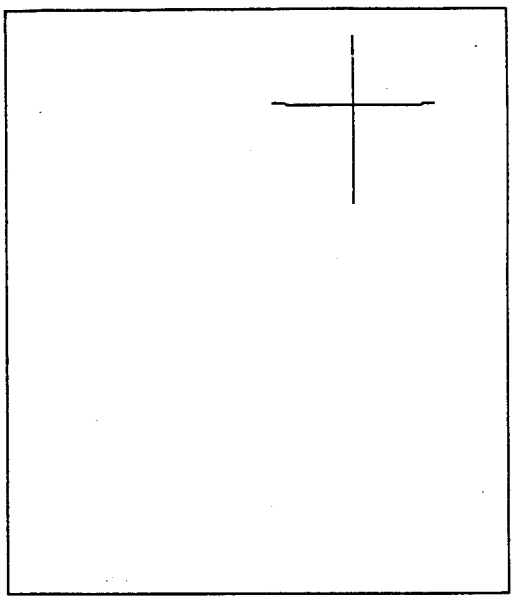
60				

Total Time of Discharge of Density or Opacity Greater than Ringlemann 1 or 20% _____

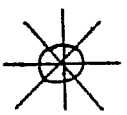
Average Density or Opacity During this Time _____

Inspector _____ Date _____

PHOTO



Symbols:

Sun= 

Observer = 

Plume Direction = ——→

Point Where Plume Observed =...

Water Vapor Condensate _____

_____

ients _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

nature _____ Date _____