

VISIBLE EMISSIONS TRAINING AND CERTIFICATION PROGRAM EVALUATION FORM

Good management practice requires that every visible emission training (VETC) program activity be periodically reviewed and evaluated in order to assess effectiveness. This form was developed as an aid to conducting the evaluation of a visible emissions training and certification program in a systematic manner.

The form covers every aspect of the visible emissions training and certification program: staffing, qualifications, lecture content, equipment, field procedures, forms, record keeping, techniques, quality assurance, etc. Utilizing the form as an evaluation aid assures thorough program coverage. There are mandatory requirements for many aspects of the visible emissions training and certification program stipulated in Method 9 (40 CFR 60, Appendix A) and these items are considered the minimal program content and criteria necessary for a training program. Entitled "Visual Determination of the Opacity of Emissions from Stationary Sources," Method 9 was published in the Federal Register, Volume 39, No. 219, November 12, 1974. These items, while not regulatory requirements, are necessary for an effective VETC program. They can be found in U.S. Environmental Protection Agency (EPA) guideline documents including:

- EPA-600/4-77-027b, *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. Stationary Source Specific Methods, Addition Section 3.12,*
- EPA-340/1-75-007, *Guidelines for Evaluation of Visible Emissions, Certification, Field Procedures, Legal Aspects, and Background Material,* and
- EPA-650/4-74005-i *Guidelines for Development of a Quality Assurance Program: Volume IX - Visual Determinations of Opacity Emissions from Stationary Sources.*

Within the attached evaluation form, the items required to meet Method 9 criteria are indicated by an "R", and items recommended by the guidelines are indicated by a "G".

Utilizing the form as an evaluation aid assures thorough program coverage. The form is typically incorporated into a detailed narrative evaluation report which more fully describes the findings and conveys conclusions and recommendations.

Any VETC program which exceeds the criteria and guidelines for facilities, equipment, instrumentation and quality control is certainly encouraged to maintain its higher standards and pursuit of excellence through future improvements. Upgrading and cross-training of personnel should be a continuing process through on-the-job training and the various training programs, workshops and seminars available through EPA. Such activities will help insure the continued production of data and records acceptable for planning and enforcement purposes.

GENERAL INFORMATION

Form Completion Date:

VETC Program Organization:

Address:

City:

State:

Zip:

Phone:

Fax:

E-mail:

Website (if applicable):

Training Director:

Quality Assurance Coordinator:

VISIBLE EMISSIONS PERSONNEL: SEE ORGANIZATIONAL CHART

Position	Name	Division	Phone
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Director

Manager

Lecturer

Field Instructor

Registrar

Generator Manufacturer:

Model #

Year:

Serial #:

DEP #:

Evaluation Conducted By:

Address:

City:

State:

Zip:

Phone:

Fax:

E-mail:

Evaluation Dates:

PERSONS PRESENT DURING EVALUATION:

Name

Affiliation

OUTLINE:

CRITERIA AND PROCEDURES FOR THE EVALUATION OF VISIBLE EMISSIONS
TRAINING AND CERTIFICATION PROGRAMS (LECTURE AND FIELD)

I. RESOURCES

- A. Organization and Qualifications
- B. Staff Training
- C. Equipment
- D. Facilities

II. LECTURE SESSION

- A. History & Legal Aspects
- B. Scientific Principles
- C. Field Operations & Documentation
- D. Sources
- E. Related Methods
- F. Testing Procedure
- G. Lecture Attendance
- H. Written Tests
- I. Handouts

III. FIELD SESSION

- A. Method 9 Specifications for Testing
- B. Method 9 Training
- C. Maintenance and Preparation

IV. DOCUMENTATION AND RECORDS

- A. Calibration Standards
- B. Calibration of Transmissometer
- C. Records of Participant Roster
- D. Records of Tests
- E. Testing Forms
- F. Certificates
- G. Generator Log Book
- H. Records
- I. Calibration Curves

V. QUALITY ASSURANCE

- A. Quality Assurance Program
- B. Confidence Intervals

	R/G	Yes/No Comments
I. RESOURCES		
A. Organization and Qualifications		
1. Provide a current contractor organizational chart including visible emissions training and certification personnel positions.	R	
2. Are the following items adequate to demonstrate that the visible emissions program can produce quality data in accordance with annual Program and State Implementation Plans?	R	
a. Staff Size	R	
b. Program Organization	R	
c. Staff Qualifications	R	
B. Staff Training		
1. Do VE staff members receive periodic formal training to upgrade employees skills?	G	
a. At least once a year?	G	
2. Are staff members cross-trained?	G	
3. Are the relevant Federal regulations, manufacturer instrument manuals and quality guideline and technical assistance documents for visible emissions available to the operators?	G	
4. Are the following references available?	G	
a. Generator operation manual	G	
b. Smoke Generator Trouble Shooting Guide		
C. Equipment		
1. Does the smoke generator meet the design specifications of Method 9, Table 9.1 as specified on the current regulations for:		
a. Angle of Projection.....15 degrees	R	
b. Angle of View.....15 degrees	R	
c. Photopic response photocell	R	
(1) Type _____		
(2) Are manufacturer's specifications available? _		
(3) Describe any modification to the photocell: _____		
d. Linearity.....±3%	R	
e. Response time.....5 seconds	R	
f. Zero and span drift.....±1% opacity	R	

	R/G	Yes/No Comments
g. Capacity for generation of white smoke from 0-100%	R	
h. Capacity for generation of black smoke from 0-100%	R	
i. Light source is incandescent.	R	
(1) Type of lamp _____	R	
(2) Manufacturer _____	R	
(3) Rated voltage _____	R	
j. Light source is operated within $\pm 5\%$ of nominal rated voltage.	R	
k. Is opacity based on path length equal to the exit diameter of the stack?	R	
l. Does the agency have NIST/NBS traceable neutral density filters with nominal opacities of 20, 50, and 75%?	R	
m. Are the filters of uniform opacity across the surface?	R	
n. Circle items checked every six months.		

a b c d e f g h i j k l m

2. Does the smoke generator have the operational characteristics that are necessary for the proper training of visible emissions inspectors such as:

a. Stable white smoke generator?	G	
b. Stable black smoke generator?	G	
c. Adequate stack exit velocity?	G	
d. Stable transmissometer?	G	
e. Emissions recording system?	G	
Type: _____		
f. Minimum 1 foot diameter stack?	G	
g. Spare parts inventory to prevent downtime?	G	
h. Are tools and diagnostic equipment on hand to perform necessary maintenance and field repairs?	G	
i. Type and quality of fuel used to generate white smoke.	G	
j. Type and quality of fuel used to generate black smoke.	G	

	R/G	Yes/No Comments
3. Communications		
a. Components of public address system	G	
1. Amplifier (20 watt minimum)	G	
2. Weather resistant speaker(s)	G	
3. Hand microphone and stand	G	
4. Lapel microphone	G	
b. Two way communications between proctor and generator operator	G	
4. Audio-Visual Equipment Available (specify)		
a. _____	G	
b. _____	G	
c. _____	G	
d. _____	G	
D. Facilities		
1. Adequate classroom available?	G	
a. Size	G	
b. Comfort - temperature control	G	
c. Lighting control	G	
d. Quiet - free from distractions	G	
e. Seating	G	
(1). Desks	G	
(2). Tables and chairs	G	
(3). Restrooms	G	
2. Is adequate field training/testing area available?	G	
a. power	G	
b. backgrounds	G	
c. open space	G	
d. relatively quiet	G	
e. parking	G	
f. restrooms	G	

II. LECTURE SESSION

Is the instruction adequate to train an inspector to go into the field and identify, document, and prepare evidence on a violation that will withstand the litigation process?

G

A. Is a lecture presented containing:

1. Legal precedents?

G

2. Free and open fields concepts?

G

3. Requirements of certification?

G

4. Chain of custody?

G

5. Certification interval (6 months)?

G

B. Is a lecture presented addressing the following scientific principles:

1. The steps toward certification

G

a. How white smoke is generated

G

b. How black smoke is generated

G

c. How opacity is measured

G

2. The specifics of Method 9

G

a. Angle of view/sun

G

b. Number of readings required

G

c. The proper place to read is the densest part of the plume

G

d. Identifying water droplet plumes

G

e. Importance of background

G

f. Not to stare at the plume

G

g. Evaluate non-circular stacks perpendicular to the longer axis of the outlet

G

h. Observer has a clear view of the emissions

G

i. Assure that the line of sight does not include more than one plume

G

j. Observations are made at 15 second intervals

G

k. A minimum of 24 consecutive readings constitutes a set

G

l. Sets may not overlap for separate violations

G

m. Average opacity is determined for each set (highest-block-rolling)

G

3. Nature of particulate matter

a. Size/opacity

G

b. Optical properties

G

4. Instrumentation techniques

G

	R/G	Yes/No Comments
5. Detached/attached condensation plumes	G	
6. Opacity	G	
a. Definition	G	
b. Equivalent opacity and Ringelman chart	G	
c. Opacity (light altering) mechanisms	G	
C. Is a field operations and documentation lecture presented containing:		
1. Documentation forms (ref. paragraph 2.2)	G	
2. Use of compass	G	
3. Use of windmeters/Beaufort Scale	G	
4. Use of cameras	G	
5. Use of rangefinders	G	
6. Use of Abney levels	G	
7. Use of sling psychrometers	G	
8. Chain of custody	G	
9. Safety equipment	G	
10. Special clothing	G	
11. Practical Field Exercise	G	
D. Does the source lecture contain:		
1. Types of sources frequently encountered	G	
2. Special procedures for those sources	G	
3. Nature of emissions	G	
4. Process vs Combustion	G	
5. Principles of combustion (three T's)	G	
6. Control equipment and particle size	G	
7. In stack transmissometers	G	
8. Special problems	G	
9. Fugitive emissions	G	
E. Are related methods discussed:		
1. Method 22	G	
2. Methods 203A, 203B, and 203C	G	

F. Testing Procedures

- | | |
|---|---|
| 1. Demonstrate forms used | G |
| 2. Explain test procedure | G |
| 3. Explain practice procedure and forms | G |
| 4. Explain calculations | G |
| 5. Explain how to change answer | G |
| 6. Explain what to bring | G |
| a. Clipboard | G |
| b. Several ball point pens | G |
| c. Rubber bands | G |
| d. Folding chair | G |
| e. Sun visor or cap | G |
| f. Appropriate clothing | G |

G. Lecture Attendance

- | | |
|---|---|
| 1. Are initial certifiers required to attend a lecture program? | G |
| 2. Are re-certifiers required to attend the full course? At what frequency and what are the other related requirements? | |
| 3. Number of attendees per year: _____ | |

H. Written Tests

- | | |
|--|---|
| 1. Is a written test given to determine the level of understanding of the students (as required by some states)? | G |
| 2. Is this test required for certification/re-certification? | G |
| 3. Is this test for information only? | G |
| 4. Is a course critique requested? | G |
| 5. What is the passing rate? _____ | |

- | | |
|--|---|
| I. Are relevant handouts provided (specify)? | G |
|--|---|

	R/G	Yes/No Comments
III. FIELD SESSION		
A. Are the following performed to assure that the specifications of Method 9 are met?		
1. Allow a full 30 minute warm up time?	R	
2. Both 25 white and 25 black readings are in one test?	R	
3. No more than 7.5% opacity deviation (average of absolute values of errors) is accepted on either the white set of 25 or the black set of 25?	R	
4. No error of 20% or greater opacity is allowed?	R	
5. Opacity values of the test are given at random (no patterns or hints apparent)?	R	
6. Is proctoring or other technique (specify) used to ensure that answers belong to observer of record?	G	
7. Technique to ensure answers not changed during self-grading specify?	G	
6. Are applicants required to certify from correct viewing angle?	R	
7. Does the agency certify observers under nighttime conditions (optional)?	G	
8. Are measurements recorded in % opacity?	G	
9. Are measurements recorded to nearest 5%?	G	
10. Are zero and span drift checked between each test?	G	
B. Are the field sessions conducted to optimize the training and certification of the applicants?		
1. Is good crowd control maintained?	R	
2. Are the applicants trained before testing?	G	
3. Is there adequate communication between tester-applicant?		G
4. Are standards provided prior to tests?	G	
5. Is a background provided?	G	
6. Is the smoke held at one value long enough for evaluation?	G	
7. Is the weather considered?	G	
8. Is an elbow used during the windy periods?	G	
9. Is the session conducted in a low key (relaxed) atmosphere?	G	
10. How is wind speed determined?	G	
11. How is wind direction determined?	G	
12. Percentage of applicants certified: _____		

	R/G	Yes/No Comments
C. Are proper maintenance and preparations performed to assure efficient generator operation and optimize applicant performance and confidence?	R	

IV. CALIBRATION, DOCUMENTATION AND RECORD KEEPING

Is complete data traceability available to assure that the data are of adequate quality for planning and enforcement purposes? Including the following:

- | | |
|--|---|
| A. Calibration Standards (neutral density filters) | R |
| 1. Is the actual value of the filter NIST/NBS traceable? | R |
| 2. Are the filters certified neutral density by absorption spectrometry? | G |
| B. Calibration of Transmissometer | |
| 1. Zero and span | R |
| 2. Linearity | R |
| 3. Five (5) nonconsecutive readings for each filter | R |
| 4. Generator/transmissometer calibrated (zero and span) between each run of 50 readings? | R |
| 5. Frequency for checking | |
| a. Linearity: beginning and end of day filter test | R |
| b. Calibration: each run or test | R |
| 6. Are these measurements recorded? | R |
| a. On a strip chart? | |
| b. On a printout? | |
| c. In a log book? | |
| d. Other? (specify) | |
| 7. At beginning of field session | R |
| 8. At end of field session | R |
| C. Records of Participants Roster | R |
| D. Records of Tests | |
| 1. Strip charts or printouts | R |
| 2. Grading masters | R |
| 3. Applicant papers | R |

	R/G	Yes/No Comments
E. Testing Forms		
1. Carbon or NCR (original and at least one copy)?	G	
2. Provides for entering the following:		
a. Applicants name	R	
b. Affiliation	G	
c. Test location	G	
d. Test date	G	
e. Time of day	G	
f. Run identification (number, etc.)	G	
g. Applicant's distance from stack	R	
h. Direction to stack from applicant	R	
i. Cloud cover	R	
j. Wind speed	R	
k. Wind direction	G	
l. Sunglasses (type)	G	
m. Corrections noted	G	
n. Grader's name	G	
o. Validation by	G	
p. Applicant's signature	R	
F. Certificates, Cards and Letters		
1. Is a classroom certificate provided?	G	
2. Is a field certificate provided to certifiers?	G	
3. Are they dated?		G
4. Are they accountable forms (numbered or other unique designation)?	G	
5. Does affirmation include expiration date (exactly 6 months)?	G	
6. Do they have an authorized signature?	G	
7. Who signs the field certificates?	G	
8. Who signs the field certification cards?	G	
G. Is a comprehensive generator log book maintained for:		
1. Calibrations and dates performed?	R	
2. Generator repairs with dates?	G	
3. Generator maintenance activities with dates?	G	
H. Are records retained for 5 years?		
1. For transmissometer?	G	
2. For applicant reading	G	
3. For generator log book?	G	
I. Calibration curves available to responsible agency?	R	

	R/G	Yes/No Comments
V. QUALITY ASSURANCE		
A. Does the organization conducting the visible emissions training and certification program have a quality assurance program for this function?	G	
1. Are the following items implemented as part of the plan?		
a. Quality Assurance Mission Statement	G	
b. NIST/NBS traceability of calibration standards	G	
c. Calibration of generator/transmissometer.	G	
d. Auditing of generator/transmissometer	G	
e. Verification of documentation	G	
f. Internal (program) audits & external audits	G	
2. Are confidence intervals available		
a. For generator operation?	G	
b. For standards?	G	
c. For transmissometer response?	G	
d. For grading/reporting system?	G	
e. For applicants' final test score?	G	
f. Other	G	
g. Calculated according to recognized methods?	G	
B. Are standard operating procedures followed for the routine operations of the program?		
1. Calibration procedures	G	
2. Maintenance procedures	G	
3. Documentation procedures	G	
4. Quality assurance procedures	G	
5. Testing procedures	G	
6. Grading procedures	G	

R/G

Yes/No
Comments