Crowder Environmental Associates, Inc.

Method 303

Determination of Visible Emissions from By-Product Coke Oven Batteries

Classroom Course Manual

May 2005 (Rev. 4)

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Classroom Course Manual

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May 2005 (Rev. 4)

Notice

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Method 303
Determination of Visible Emissions from
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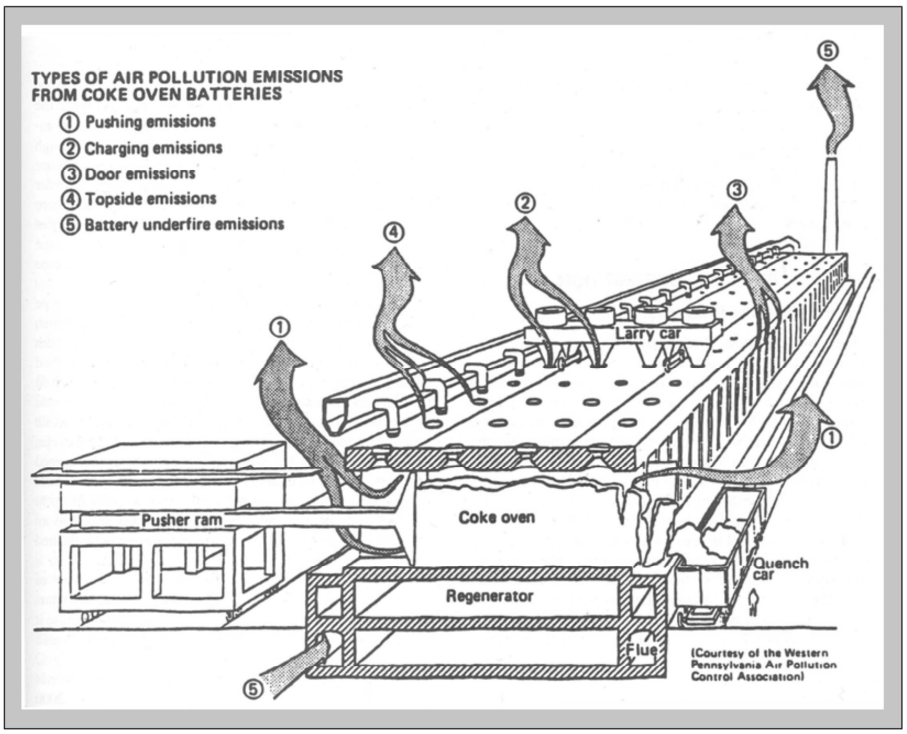
Coke is used in blast furnaces for the conversion of iron ore to iron, which can then be further refined to produce steel. The conversion of coal to coke is performed in coke oven batteries. A battery consists of a group of ovens connected by common walls.

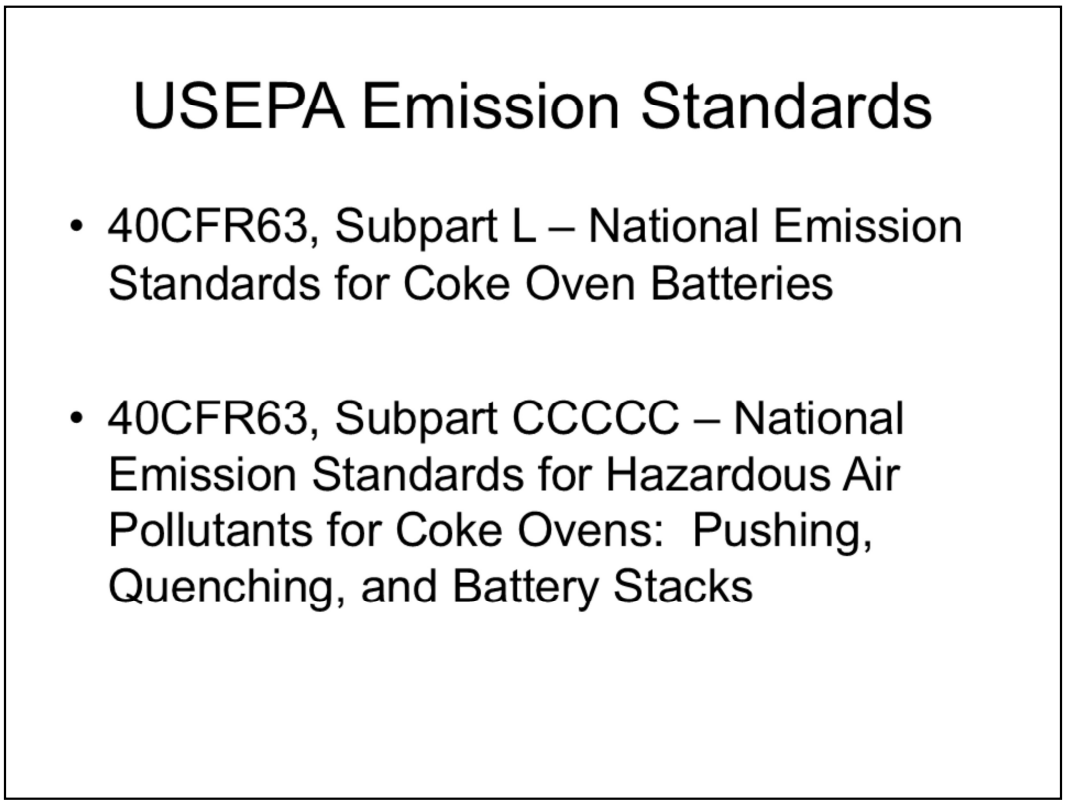
Coke oven emissions are among the most toxic of all air pollutants. Emissions from coke ovens include a mixture of polycyclic organic matter, benzene, and other chemicals that can cause cancer. Occupational exposure studies of coke oven workers have shown statistically significant excess mortality from cancers of the respiratory tract, kidney, and prostate and of all cancer sites combined.

USEPA and several states have long been concerned about the health effects associated with coke oven emissions. In the late 1970s, USEPA initiated a regulatory examination of coke oven emissions and, in 1987, proposed a regulation to control them. The Clean Air Act Amendments of 1990 included sweeping and complex provisions to limit emissions from both new and existing coke ovens. These new standards were proposed in the Federal Register on December 4, 1992. The 1987 proposal was withdrawn.



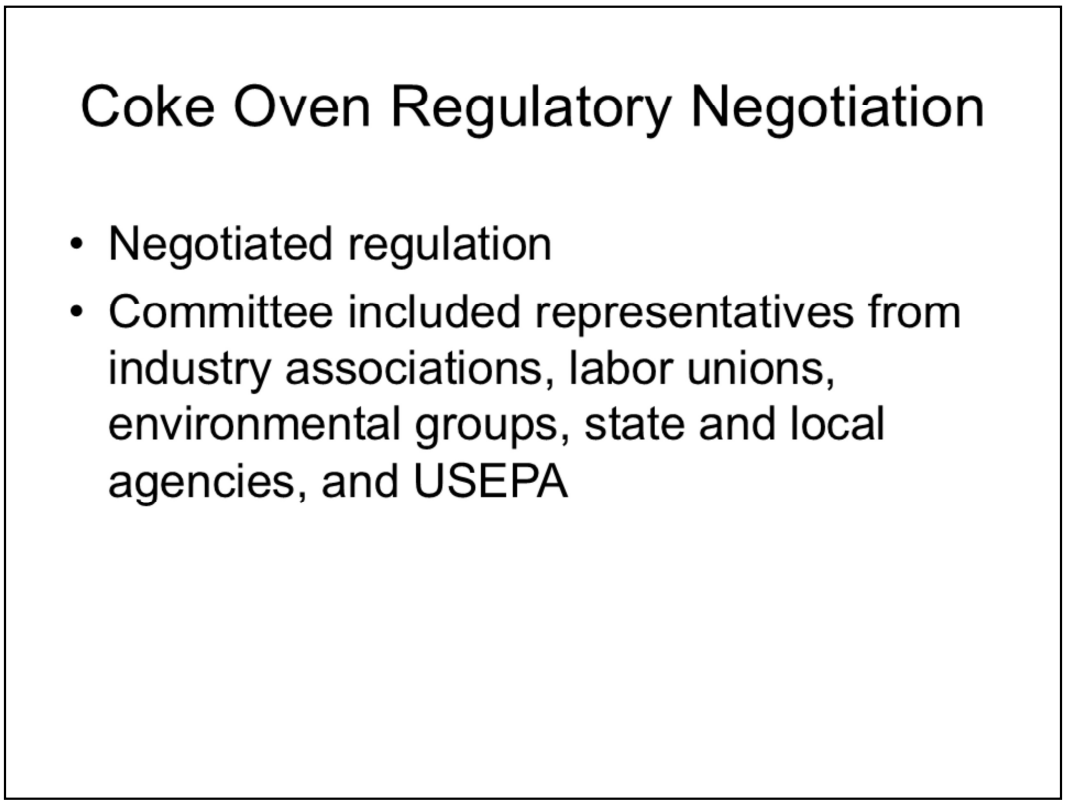
There are several sources of emissions from coke production facilities. Coal dust emissions occur as the coal is unloaded, crushed and transferred to the larry car. These emissions are not considered hazardous.

Hazardous emissions occur during oven charging (Point 2); from doors (Point 3), topside lids and offtakes (Point 4), and collecting mains during the coking cycle; from pushing the coke into the quench car (Point 1); during the travel of the quench car to the quenching station; and from the quenching station. Another source of hazardous emissions is the stack from the battery heating system (Point 5).



USEPA has promulgated two emission standards for coke batteries. The *National Emission Standards for Coke Oven Batteries* (40CFR63, Subpart L) regulates emissions from charging, doors, lids and offtakes, and collecting mains. The method used to demonstrate compliance with these standards is Method 303.

The *National Emission Standards for Hazardous Air Pollutants for Coke Ovens: Pushing, Quenching, and Battery Stacks* (40CFR63, Subpart CCCCC) regulates emissions from pushing, quenching and the battery heating system stack. Method 303 is not used in this subpart.



USEPA has made wide spread use of consultation in developing rules under the Clean Air Act. In some rulemaking, including Subpart L, formal regulatory negotiation was used. In this process, parties negotiate and sign a formal agreement that becomes the basis for USEPA's proposed rule.

The Coke Ovens Regulatory Negotiation Committee was composed of several interested parties: environmental groups, such as the National Resources Defense Council (NRDC) and the Group Against Smog and Pollution (GASP); industry associations, such as the American Iron and Steel Institute (AISI) and the American Coke and Coal Chemicals Institute (ACCCI); representative from the Steel Worker's Union and representative from state and local agencies and USEPA.

The Committee held a series of public meetings and informal workshops to identify and resolve the many issues associated with the regulation. At the final negotiating session on October 8, 1992, the Committee members conceptually resolved all outstanding major issues and decided to reach final agreement after reviewing and concurring on the draft regulation. The final Subpart L standard reflects the agreements reached by this Committee.

Emission Limits for Existing Coke Oven Batteries

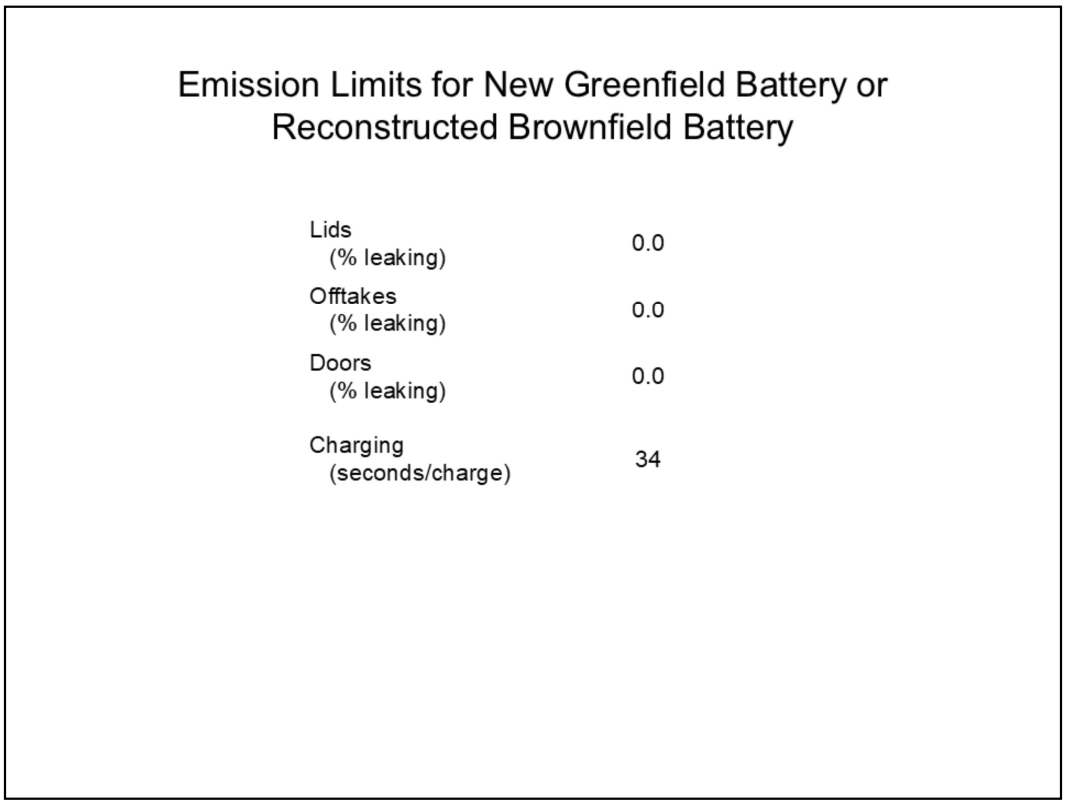
	MACT	LAER
Lids (% leaking)	0.32	0.4
Offtakes (% leaking)	2.1	2.5
Tall doors (% leaking)	2.5* 3.8	2.5* 3.8
Foundry doors (% leaking)	4.0	2.5* 3.8
Not tall doors (% leaking)	1.7* 3.2	1.7* 3.2
Charging (sec/charge)	12	12

*capacity ≥ 3 million tpy

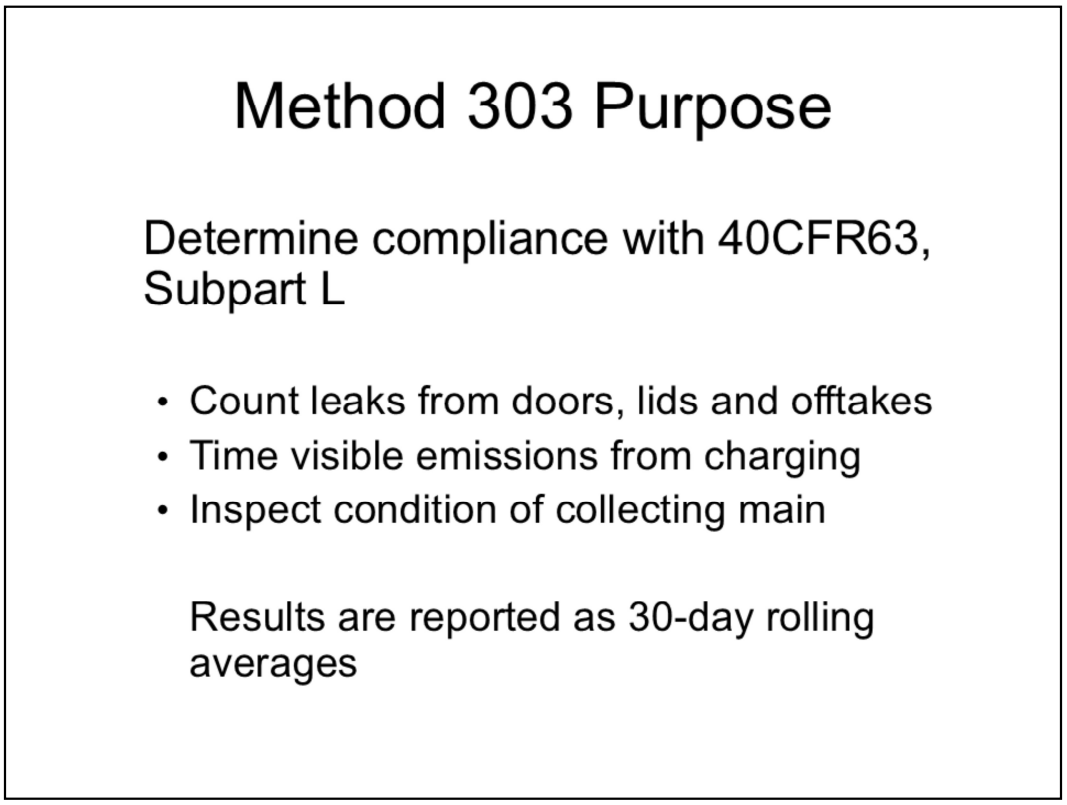
The Clean Air Act Amendments of 1990 required USEPA to issue coke oven emissions standards for maximum achievable control technology (MACT) for new and existing sources, and an even tighter control limits, called lowest achievable emissions rate (LAER), for certain existing sources. These standards establish emission limits for different aspects of coke oven facilities, including doors, lids and offtakes and charging operations.

The Amendments required USEPA to issue work practice standards, with compliance by November 15, 1993, and to issue residual risk standards by November 15, 2000, with compliance by January 1, 2003. Existing facilities that wanted an extension for compliance with the residual risk standards beyond the January 1, 2003, compliance date, elected to follow the LAER track. In exchange for a compliance extension to January 1, 2010, these facilities were required to meet lower emission limitations.

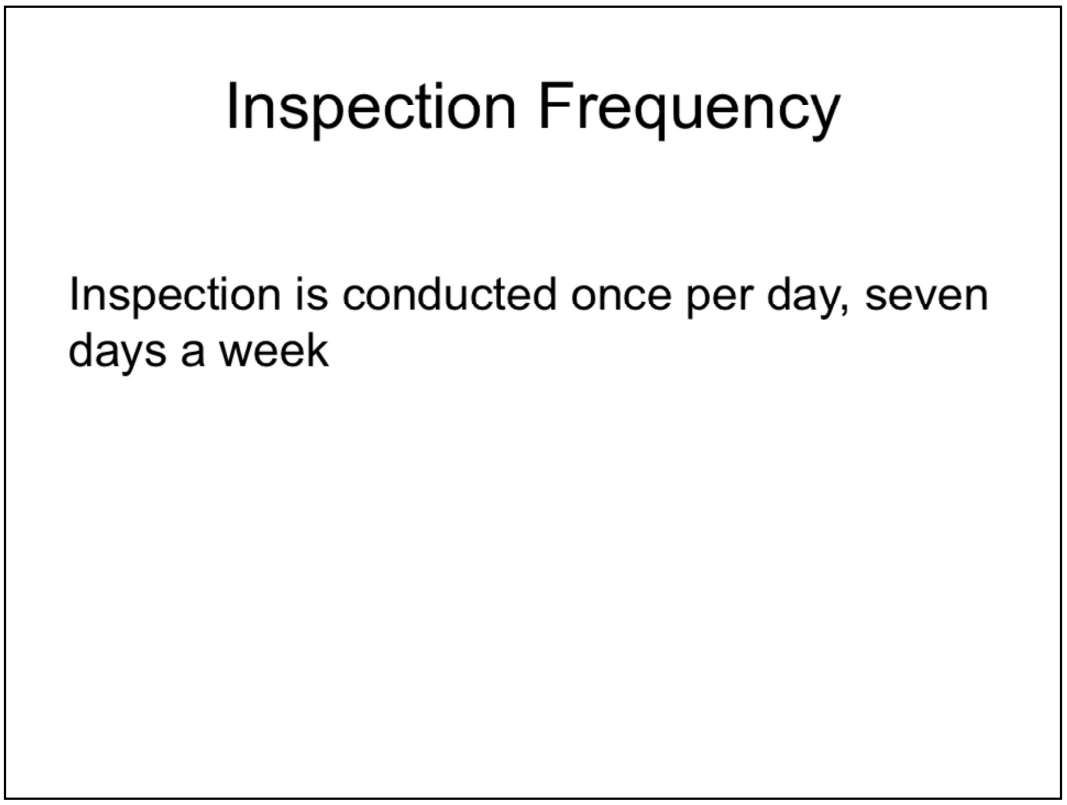
Eight years after promulgation, and every 8 years thereafter, USEPA must evaluate a MACT standard for any "residual risk." If the residual risk for a source category does not protect public health with "an ample margin of safety", then USEPA must promulgate health-based standards for that source category to further reduce emissions. The current emission limits, effective July 7, 2025, are shown in the table and are rolling averages of the last thirty daily readings.



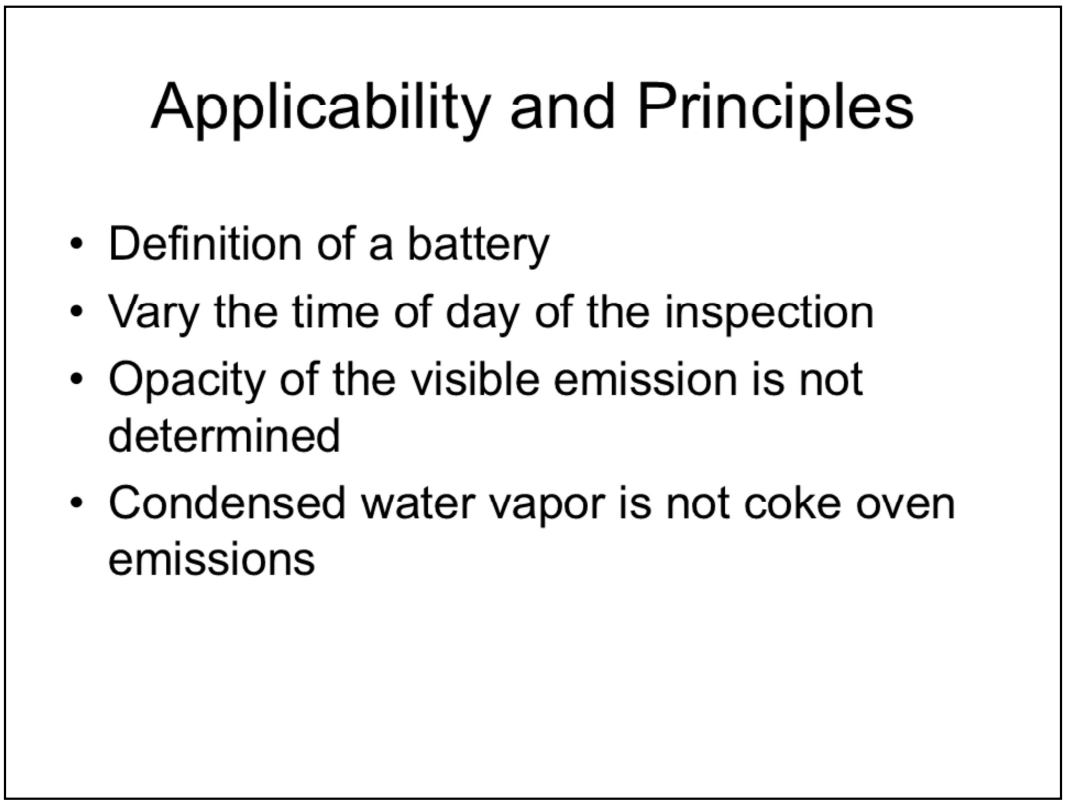
Facilities commencing construction of ovens after December 4, 1992, must meet new source MACT requirements, unless the ovens are constructed as replacement capacity. A new or reconstructed battery that utilizes a new recovery technology, including but not limited to larger size ovens, operation under negative pressure, and processes with emission points different from those regulated, will have emission standards set specifically for each battery. Those standards must be less than the July 7, 20205, limits for existing batteries.



Method 303 is the method used to determine compliance with 40CFR63, Subpart L, *National Emission Standards for Coke Oven Batteries*. The method involves counting leaks from doors, lids and offtakes, timing visible emissions from charging, and inspecting the collecting main. The results of the inspection are reported daily. The percentage of leaking doors, lids and offtakes and the seconds of visible emissions are expressed as 30-day rolling averages. If no readings were taken on a particular day, that day is omitted from the averages.



The inspection is conducted once per day, seven days a week, unless unusual conditions prevent it. There are no exceptions specified in the rule; however, inspections might be prevented by intense rain that creates steam that obscures the view of the battery or by unsafe conditions. If a daily observation is not possible, then no compliance determination is made for that day and the missed day is omitted from all subsequent 30-day calculations.

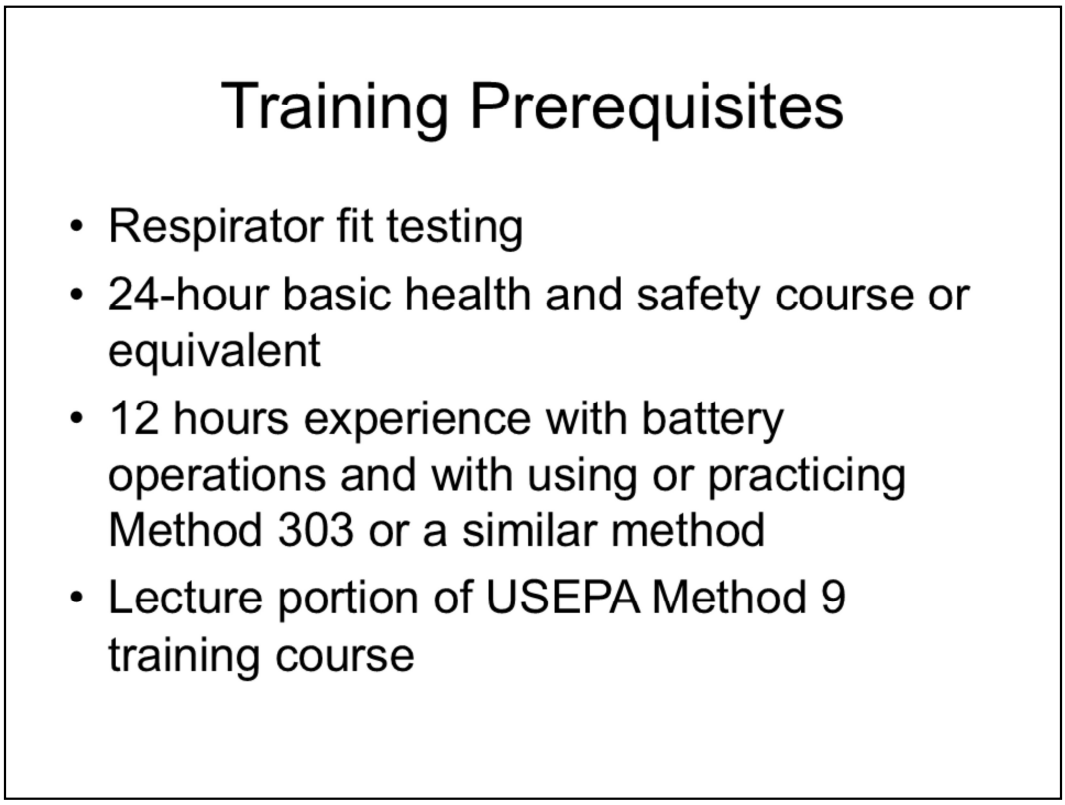


The results of Method 303 inspections are reported for each battery. A list of coke oven batteries in the U.S. is provided in 40CFR63, Subpart L, Appendix A, *Operating Coke Batteries as of April 1, 1992*.

In order to more accurately characterize battery performance, the observer should vary the time of day a battery is inspected. There is nothing in the Method that prevents an observer from conducting an inspection at night.

Unlike Method 9, the opacity of the visible emission is not determined. The observer only determines the number of leaking components and the number of seconds of visible emissions from charging.

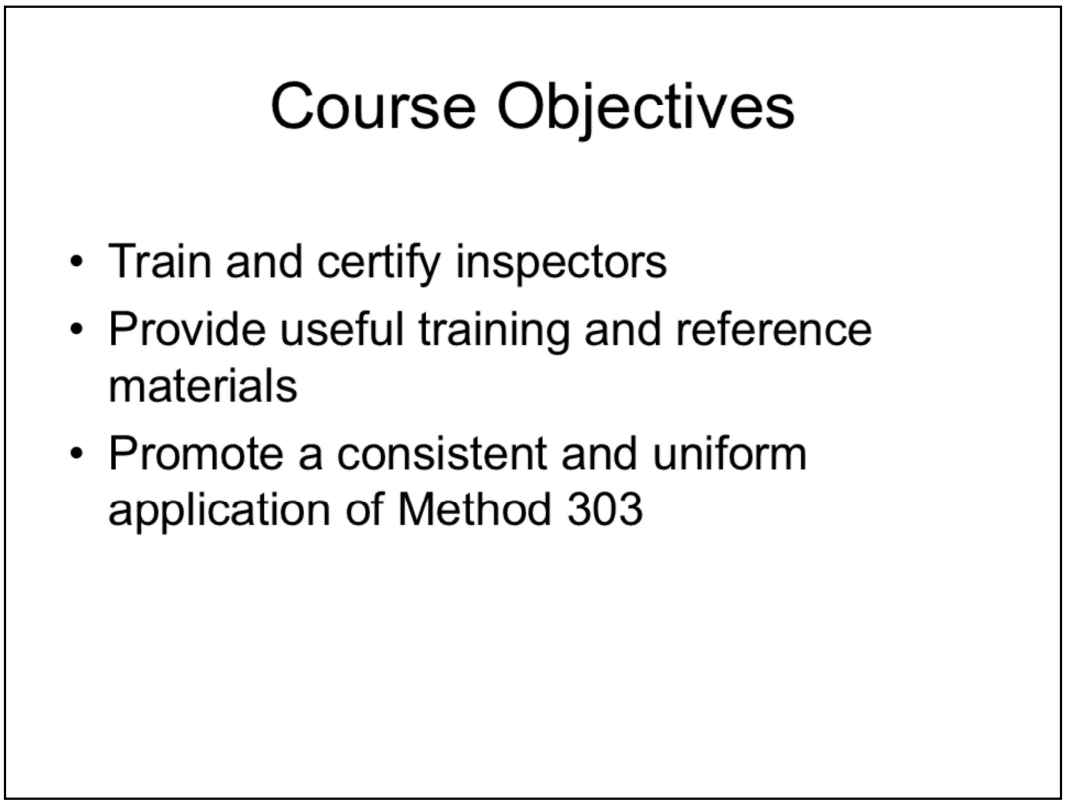
The purpose of regulating coke oven batteries is to protect public health from exposure to pollutants generated during the coking process. Accordingly, emissions of condensed water vapor (steam) and other materials that do not originate from within the battery are not considered coke oven emissions.



A applicant for initial certification as a Method 303 Observer must complete the following prerequisites:

- Respirator fit testing
- 24-hour basic health and safety course or equivalent
- 12 hours experience with battery operations and with using or practicing Method 303 or a similar method
- Lecture portion of USEPA Method 9 training course

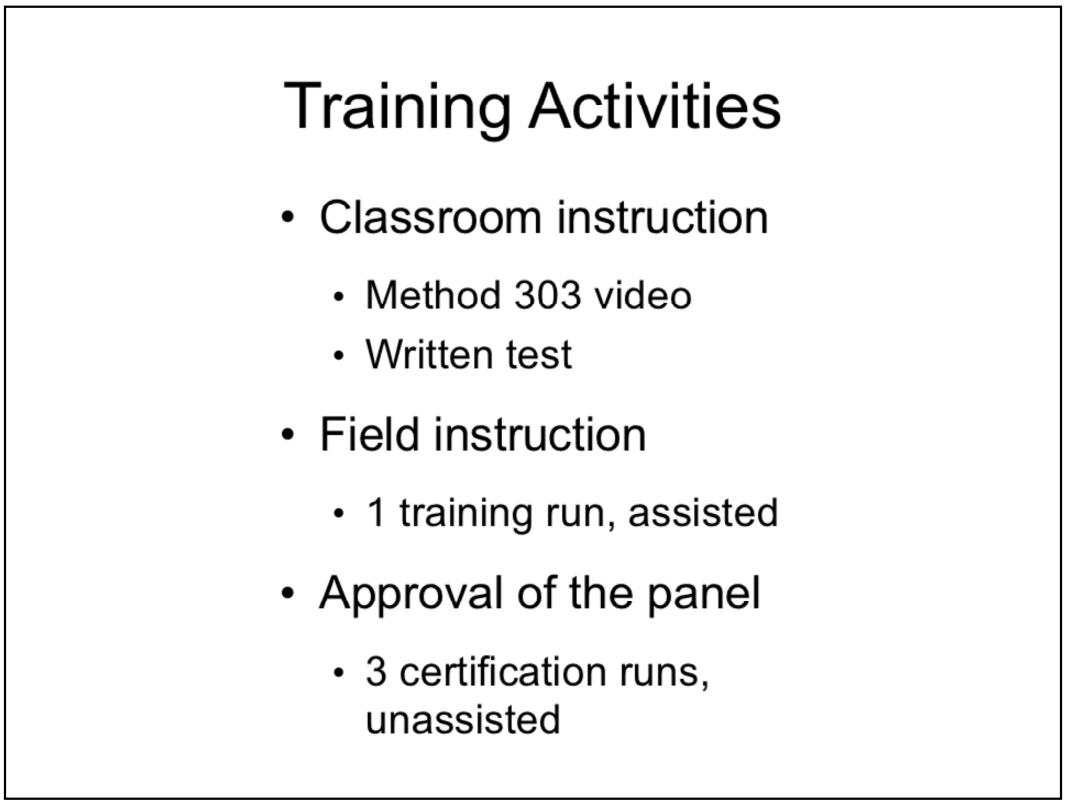
The first three prerequisites are safety related and must be complete prior to Method 303 training. The lecture portion of Method 9 may be taken after Method 303 training; however, the applicant will not be certified until it is completed. Note that it is not necessary that applicants be currently certified in Method 9, only that they have taken the course at some time.



The primary purpose of this course is to train and certify Method 303 inspectors. As part of that training, the applicant is provided with the following materials:

- Classroom Course Manual
- Coke Oven NESHAP
- Method 303 Questions and Answers
- Method 303 Video Tape

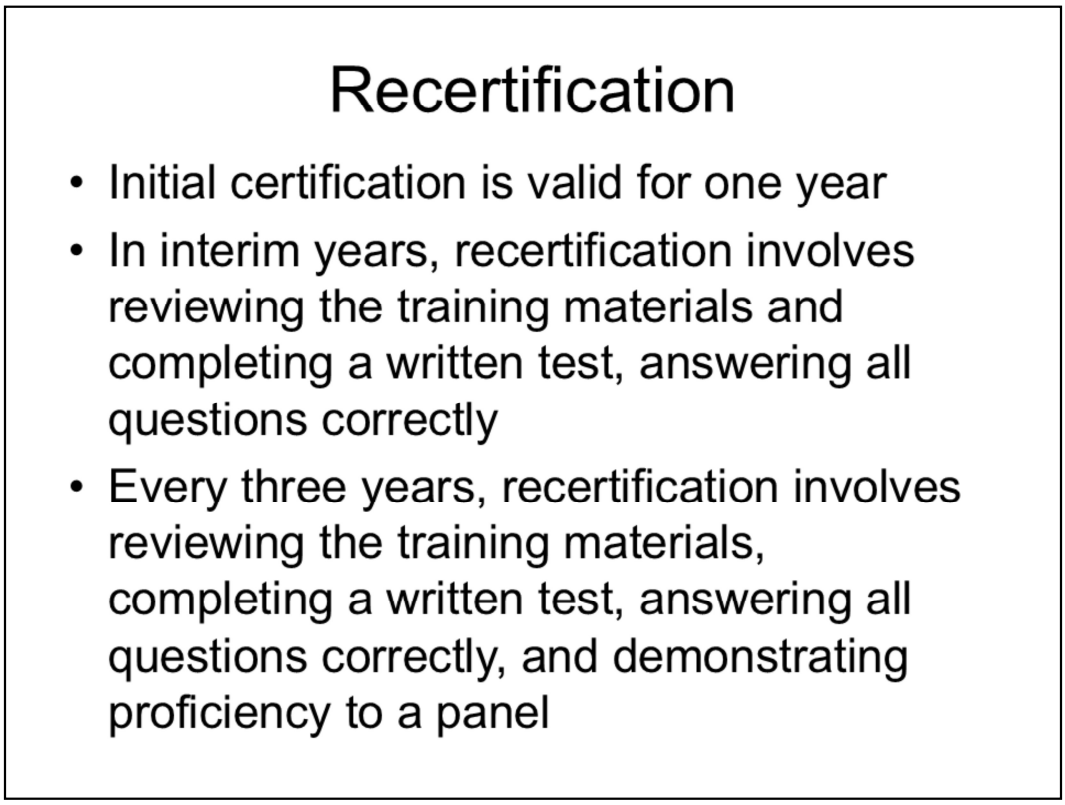
These materials should be retained for use in preparing for annual recertification testing.



Method 303 training is divided into three segments. The course begins with classroom instruction centered around the Method 303 training video. This material covers the procedures for conducting inspections of the various components and the calculation methods for documenting the results of the inspection. At the end of the classroom instruction, the applicant must complete a closed-book written test, answering all questions correctly.

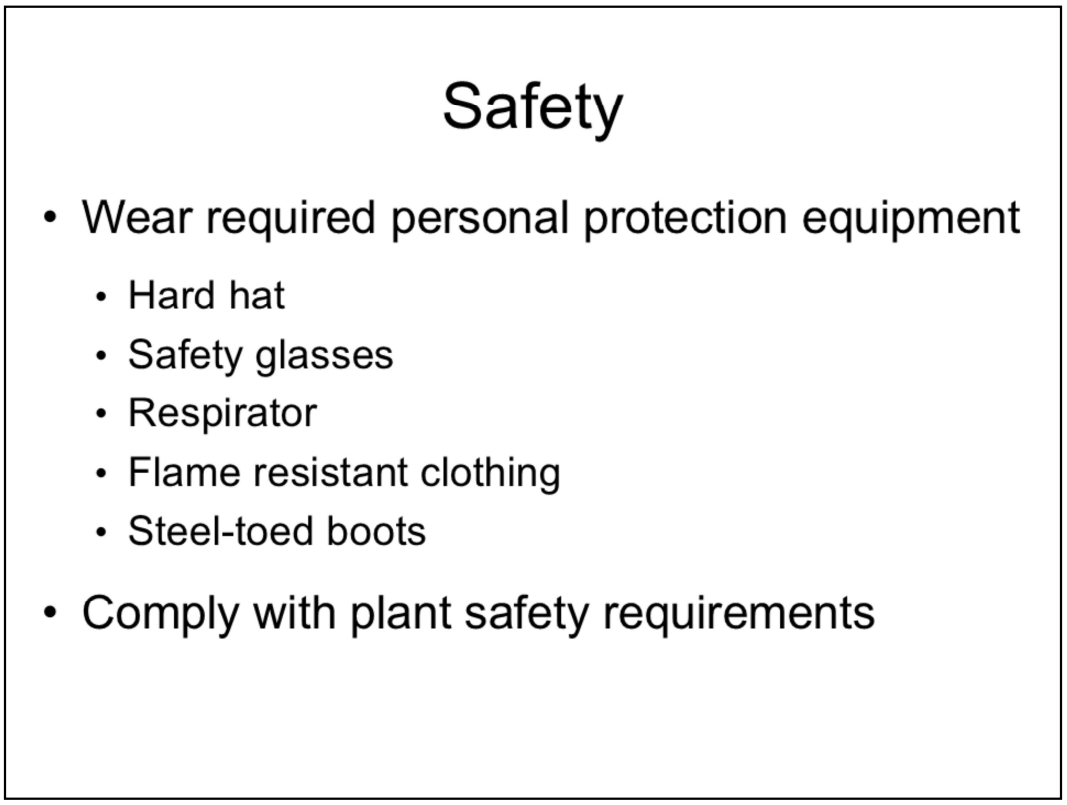
The second segment of the training is field instruction. This training is conducted at the host battery by a 3-member panel. The panel observes the applicants as they conduct one daily inspection of the battery and prepare the documentation and instructs them in the use of proper procedures.

The final segment of the training is the approval of the panel. Under the observation of the panel, applicants conduct three repetitions of the daily inspection and prepare the documenting calculations. Successful completion of this segment completes the certification requirements.



Initial certification is valid for one year, expiring at the end of the month in which the initial training was received. For the next two years (called *interim years*), recertification involves reviewing the training materials and completing a written test, answering all questions correctly. Every three years, recertification involves reviewing the training materials, completing a written test, answering all questions correctly, and demonstrating proficiency to a panel. The cycle of two interim years followed by a third-year evaluation is continued to maintain certification.

Maintaining certification is the responsibility of the observer. However, to assist in this, observers will be notified of recertification requirements at the beginning of the month before interim recertification is required and at the beginning of the year when third-year recertification is required.



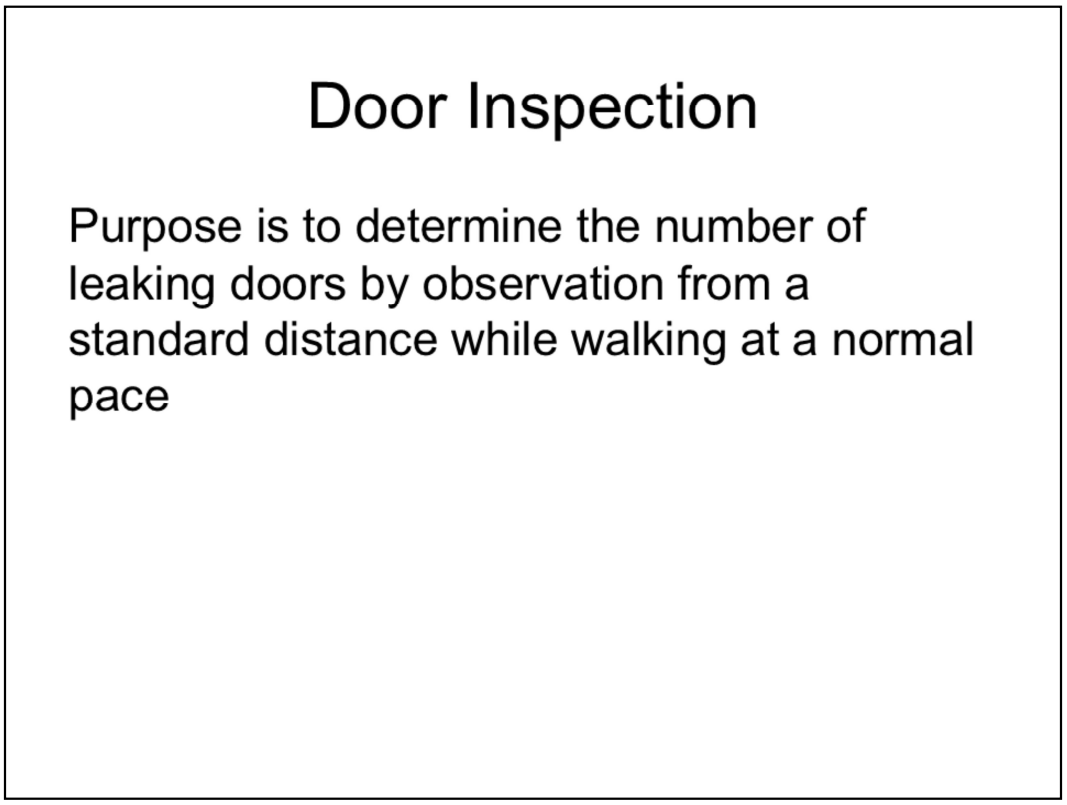
There are a number of workplace hazards present at a coke battery. However, the potential harm from these hazards can be reduced and the inspections conducted safely. To this end, inspectors should wear all required personal protection equipment and comply with plant safety requirements.

Inspectors should wear the following personal protection equipment:

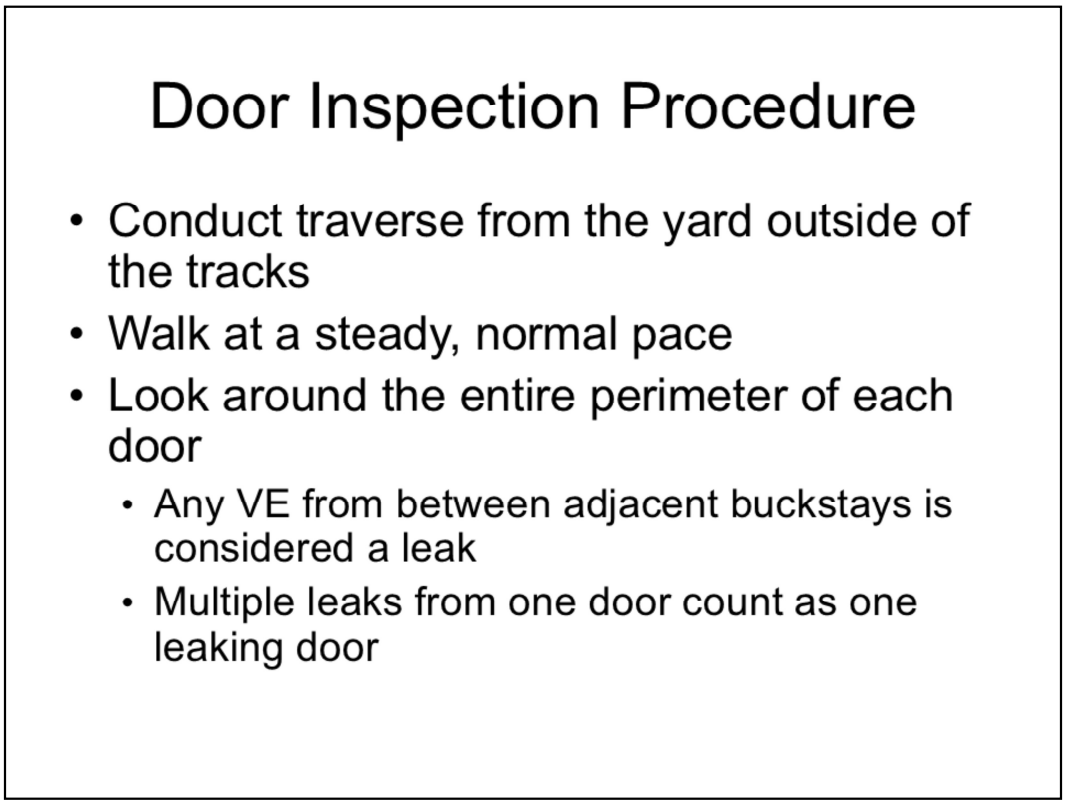
- Hard hat
- Safety glasses
- Respirator
- Flame resistant clothing
- Steel-toed boots

The respirator should be at least a half-face and must be fit tested. OSHA requires only a particle filtering cartridge; however, many inspectors use a particle-acid gas-organic vapor cartridge for additional protection. Most facilities require steel-toed boots with metatarsal protection. Some facilities may require additional personal protection equipment.

Door Inspection



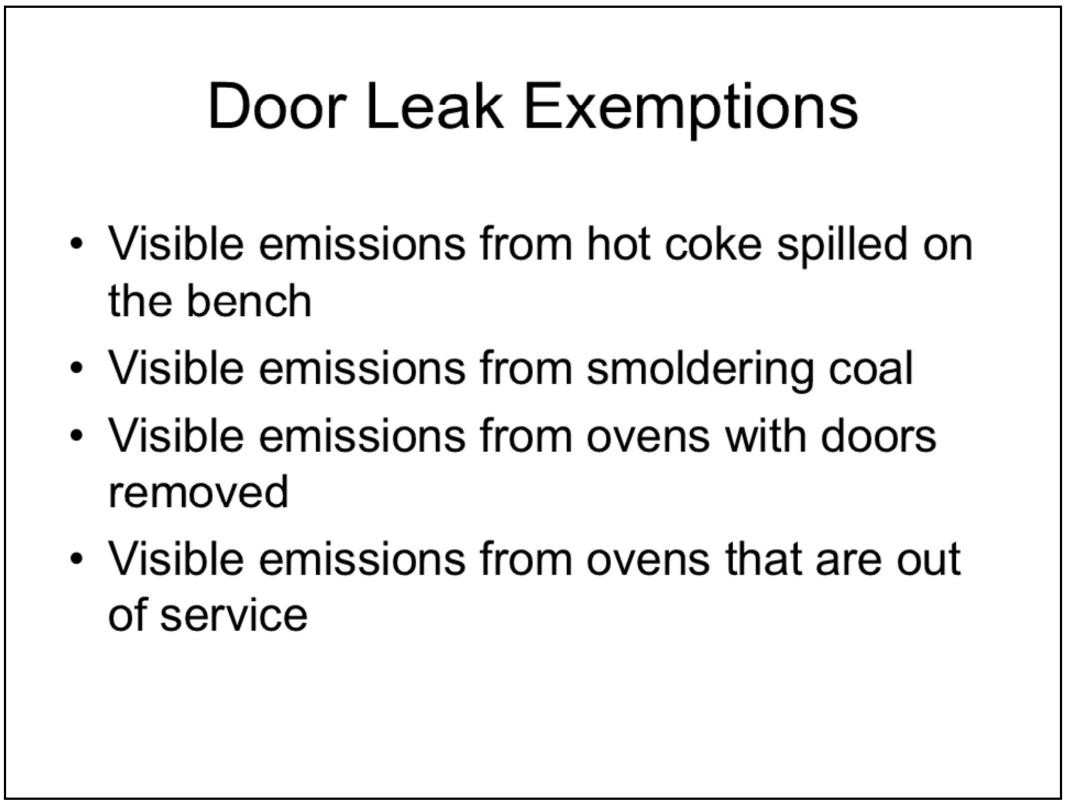
The purpose of the door inspection is to determine the number of leaking doors by observation from a standard distance while walking at a normal pace.



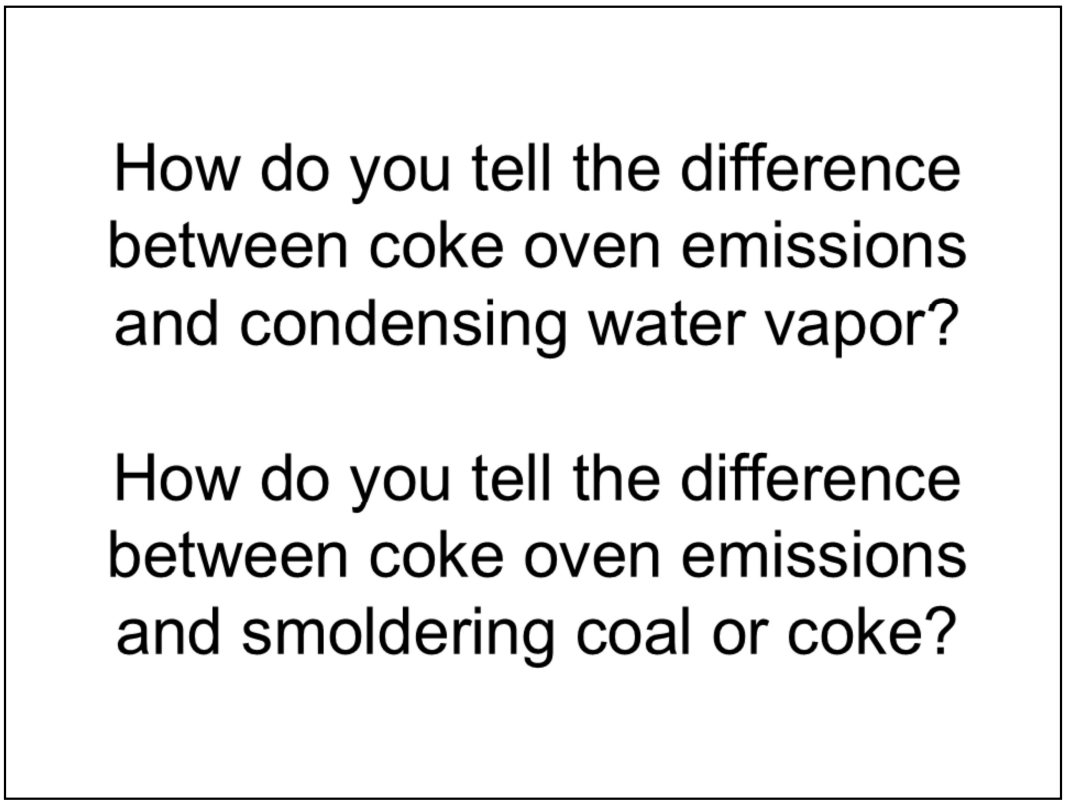
The door inspection should be conducted from the yard outside of the tracks. While walking in this area, the inspector should be aware of moving vehicles and trains.

The traverse should be conducted at a steady, normal walking pace. This is typically three seconds per oven. However, as will be discussed later, there is a limit on the maximum total time that can be used in inspecting both sides of the battery. The observer may stop walking to make an appropriate notation on the data sheet, but should not stop to stare at any particular door. If the observer sees visible emissions but is not sure if they are coke oven emissions, the observer may make a note on the data sheet and, after the traverse is completed, move to a position where a determination can be made.

The door area is defined as the area from the top of the battery to the bench and between adjacent buckstays. The inspector should look around the entire perimeter of each door and around the chuck door. Any visible emission from the door area is considered a leak. Multiple leaks from one door count as one leaking door.

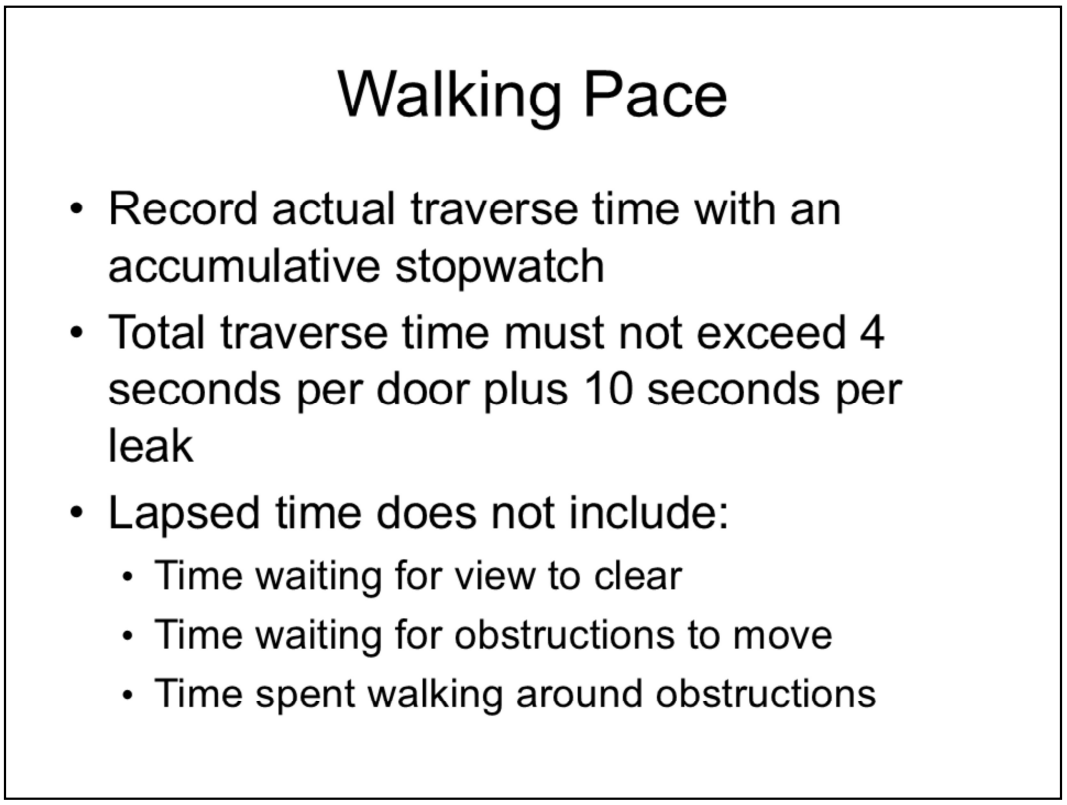


As noted earlier, there may be a number of sources that produce visible emissions not directly related to the coking process. These include hot coke spilled on the bench, smoldering coal, ovens with door removed and ovens that are out of service. These visible emissions are not associated with hazardous emissions; and, although they may be regulated under other statutes, they are not counted as door leaks.



It is usually easy to distinguish between coke oven emissions and condensing water vapor or smoldering coal. Coke oven emissions are released under pressure and, under some conditions, may exhibit a modest amount of jetting. The color of the emissions varies, but is typically yellow-green.

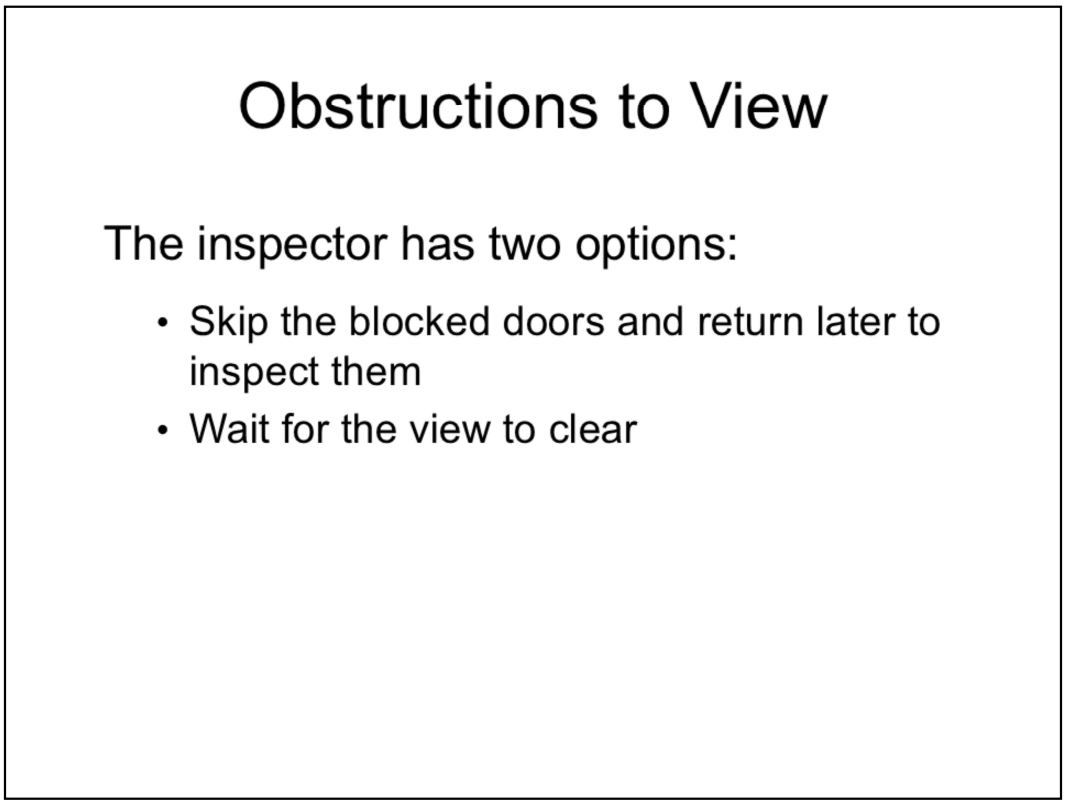
Condensing water vapor may also be emitted as a jet, but it is white in color and usually dissipates quickly. Smoldering coal releases grayish emissions at a low velocity.



The actual traverse time should be measured with an accumulative stopwatch having unit divisions of at least 0.5 seconds. In general, the stopwatch is started at the beginning of each traverse and stopped when that traverse is completed. However, lapsed time does not include time waiting for the view to clear or obstructions to move or time spent moving around obstructions. If any of these activities are necessary, the stopwatch should be stopped and then restarted when the traverse is continued.

The daily inspection consists of two timed traverses, one for the coke side and one for the push side. For a single battery, the inspection is normally conducted by making sequential traverses down each side of the battery. However, when there are two or more batteries in a row, it is permissible to conduct sequential inspections of one side of the aligned batteries and then conduct sequential inspections of the other side. In this case, extra care must be taken to be sure the results of the inspection are properly recorded.

The total traverse time *must not* exceed 4 seconds per door, plus 10 seconds per leak. The maximum time of 4 seconds per door applies to each door in the battery, regardless of whether it is in service (even an out-of-service door requires time to walk by it). The allowance of 10 seconds per leak is to allow time to record the documenting information.



It is not unusual in the course of a door inspection to find that some doors are blocked by processing equipment or that the view of the doors is obstructed by steam or fugitive emissions. When this occurs, the inspector has two options: skip the blocked doors and return to inspect them later or wait for the view to clear.

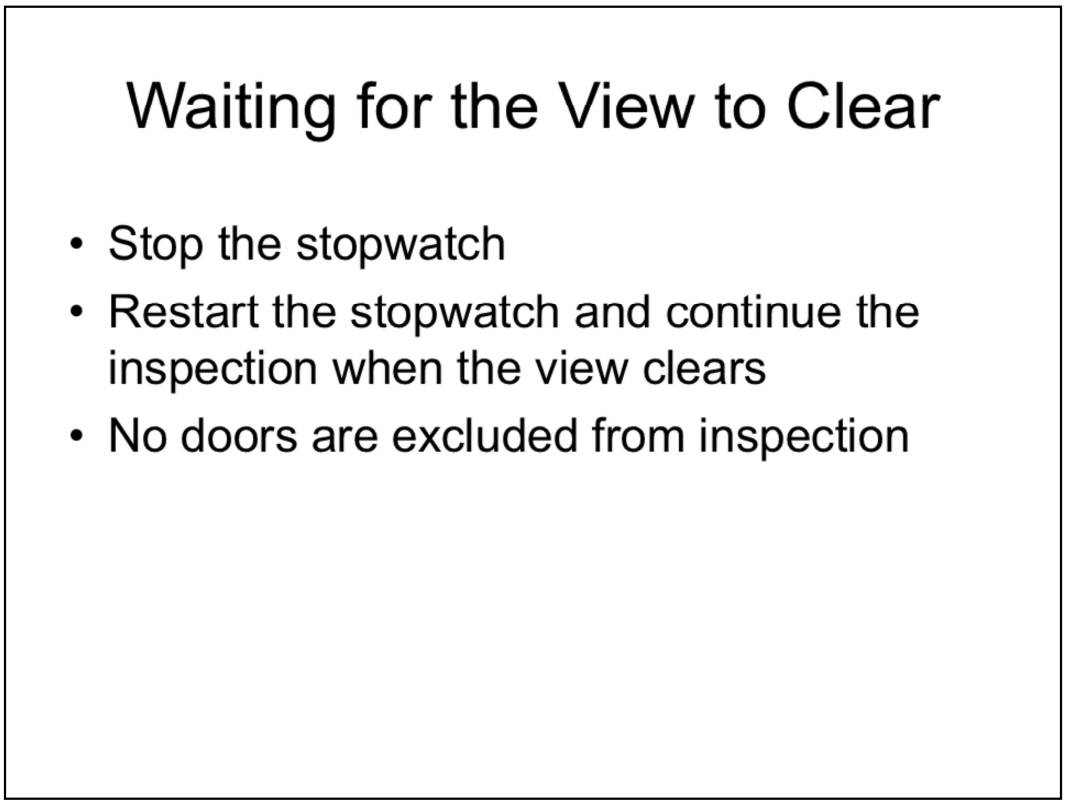
In some cases, the operator may elect to suspend processing operations during door inspections, allowing for a more efficient and complete door inspection. Obviously, it is illegal to use machinery to block doors for the purpose of hiding leaks.

Skipping Blocked Doors

- Stop the stopwatch
- Move around the blocked doors
- Note blocked doors on the inspection form
- Restart stopwatch and continue traverse
- Stop stopwatch at end of traverse
- Return to inspect blocked doors
  - If still blocked, count as "not observed"
  - If clear, but were blocked because of charging, exclude door from most recently charged oven

If the choice is to skip blocked or obstructed doors, the stopwatch is stopped while the inspector moves to a position beyond these doors. The blocked or obstructed doors are noted on the inspection form, and the inspector starts the stopwatch and continues the traverse. When the inspector reaches the end of the traverse, the stopwatch is again stopped. Usually, the inspector will return to inspect the blocked or obstructed doors at this time.

If the doors are still blocked or obstructed, they are counted as "not observed." If the doors are clear, the stopwatch is started and the inspection is completed. However, if the doors were blocked because of charging operations, the door on the most recently charged oven is excluded and counted as "not observed." Note that this situation can only occur on the push side, when the leveler arm is being used to level the charge. Accordingly, only the push side door is excluded. The exclusion does not apply to the coke side door of that oven.



It the inspector elects to wait until the blocked or obstructed doors are clear, the stopwatch is stopped. When the view clears, the stopwatch is restarted and the inspection is continued. Interestingly, if this option is chosen and the doors were blocked because of charging operations, the door of the most recently charged oven is *not* excluded from inspection.

Criteria for Acceptance

The maximum time allowed to inspect the doors is determined from:

$$T = (4 \text{ sec} \times D_t) + (10 \text{ sec} \times L)$$

where:

T = maximum time allowed, seconds
D_t = total number of doors on battery
L = number of leaking doors on battery

For a door inspection to be acceptable, the accumulated time used in conducting the traverses *must be* less than the maximum allowable time. The maximum allowable time is determined by multiplying 4 seconds times the total number of doors in the battery and then adding 10 seconds for each leaking door.

It is important to note that this acceptability test is applied to the total battery and not individually to each side. Thus, it is conceivable that an inspector could be too slow on one side of the battery and much faster on the other side and still have an acceptable run. Regardless, the inspector is encouraged to maintain a steady inspection pace on both sides of the battery.

Calculating Percent Leaking Doors

$$PLD = \frac{L_y \times 100}{D_{ob}}$$

where:

PLD = percent leaking doors
L_y = number of leaking doors
D_{ob} = total number of doors observed

The percent leaking doors for a daily observation is determined by dividing the number of leaking doors seen from the yard by the total number of doors observed on operating ovens, and then multiplying by 100. The result is rounded off to the nearest hundredth of 1 percent (x.xx percent).

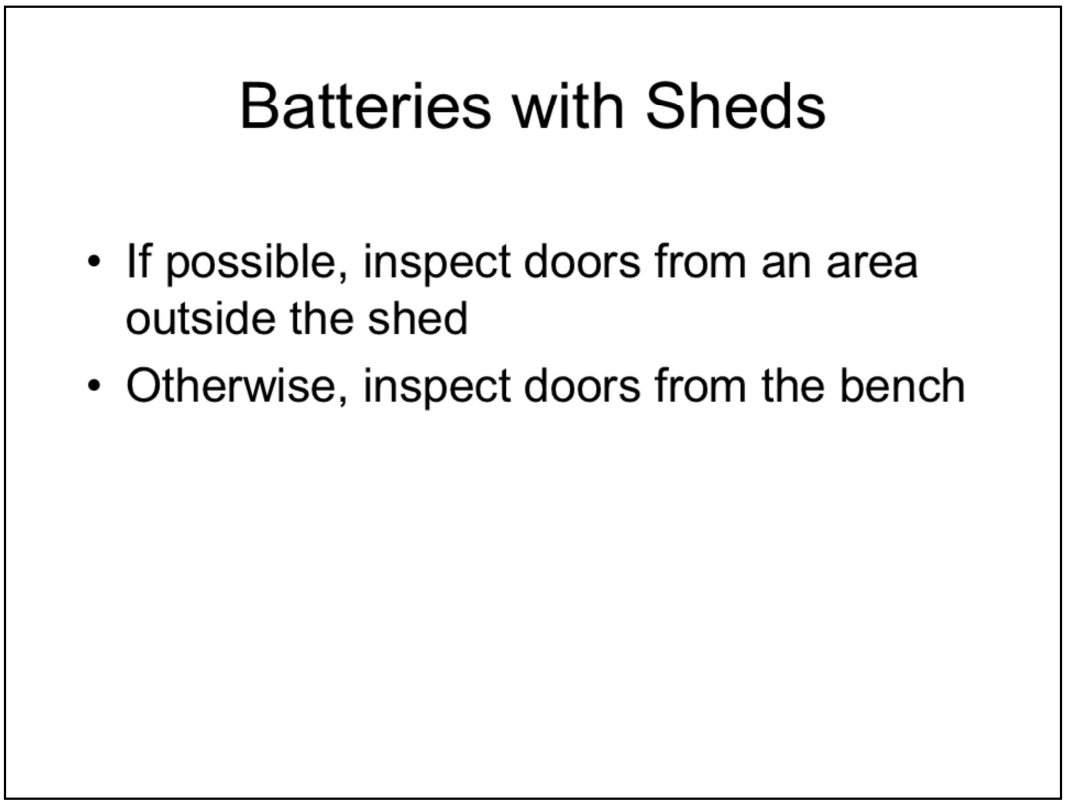
Number of Doors Observed

$$D_{ob} = D_t - (D_i + D_{no})$$

where:

D_{ob} = number of doors observed on operating ovens
D_t = total number of doors in battery
D_i = number of doors on inoperative ovens
D_{no} = number of doors not observed

The number of doors observed on operating ovens is determined by taking the total number of doors in the battery and subtracting from that the number of doors on inoperative ovens and the number of doors that were not observed.



Some batteries have sheds on the coke side that are used to control emissions during pushing. Emissions within the shed are captured and sent to a control device for collection. If possible, the door inspection on these batteries should be conducted from the yard, outside of the shed. Typically, this is not possible, since the sides of sheds usually extend down close to the ground. When this is the case, the inspection should be conducted from the bench area in front of the doors.

Inspections conducted from the bench raise several concerns, the greatest of which is safety. Being on the bench increases the inspector's exposure to processing machinery, flames and hot surfaces. It is critically important that the foreman and operating personnel are aware of the inspector's presence on the bench and that the inspector exercise caution during the inspection.

Another concern is that an inspection from the bench will identify leaks that would not have been seen in an inspection from the yard. To account for this, a bench correction factor is applied to the number of leaks determined.

Bench Correction Factor

$$L_b = L_s - (N \times 0.06)$$

where:

L_b = yard equivalent door leaks
L_s = number of door leaks observed from bench
N = total number of ovens

Since it is likely that an inspection conducted from the bench will identify leaks that would not have been seen had the inspection been conducted from the yard, the bench results are corrected to "yard equivalent door leaks." This is done by taking the number of door leaks observed from the bench and subtracting from that the total number of ovens multiplied by 0.06. If this correction results in a negative value, L_b is set to zero.

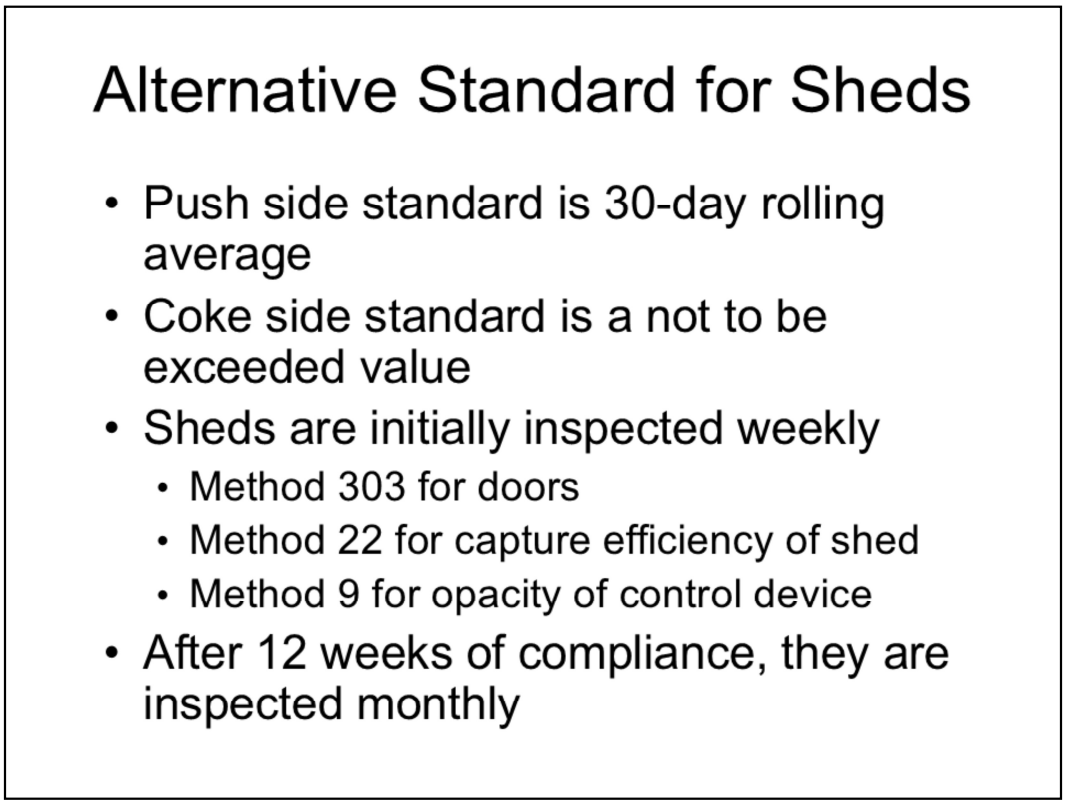
Percent Leaking Doors for Sheds

$$PLD = \frac{(L_b + L_y) \times 100}{D_{ob}}$$

where:

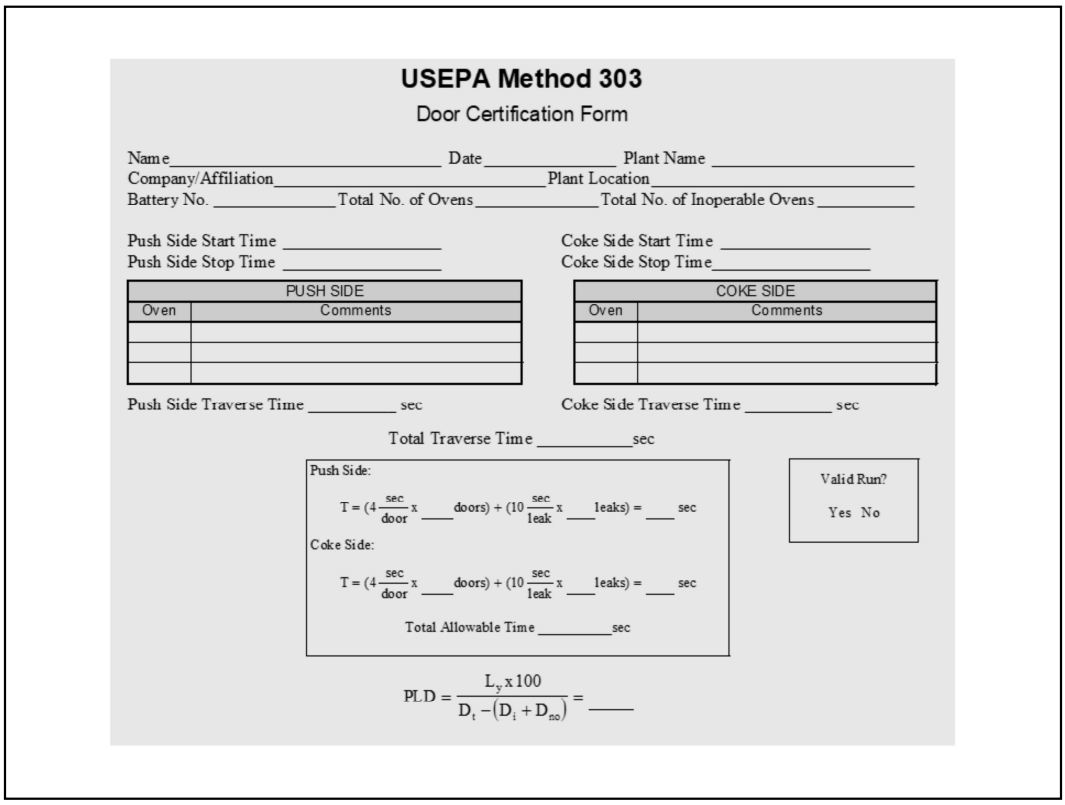
PLD = percent leaking doors
L_b = yard equivalent door leaks
L_y = number of leaking doors on push side
D_{ob} = total number of doors observed

For batteries with sheds, the percent leaking doors for a daily observation is determined by adding the yard equivalent door leaks for the coke side to the number of leaking doors seen from the yard on the push side and then dividing by the total number of doors observed on operating ovens. The result is then multiplied by 100 and rounded off to the nearest hundredth of 1 percent (x.xx percent).



A source with a shed may ask the regulatory agency to set an alternative standard. In this case, the push side standard for door leaks is the 30-day rolling average limit specified in 40CFR63, Subpart L, and the inspection is conducted daily using Method 303.

The coke side standard, however, is set as a value that is not to be exceeded. Coke-side sheds are initially inspected weekly using Method 303 for door leaks, Method 22 for the capture efficiency of the shed, and Method 9 for the opacity of the control device. After 12 weeks of demonstrated compliance, the inspections may be conducted monthly. If one of the monthly inspections exceeds the set standards, the source must return to weekly inspections until they can again demonstrate 12 weeks of compliance.



USEPA Method 303

Door Certification Form

Name_____ Date_____ Plant Name _____
Company/Affiliation_____Plant Location_____
Battery No. _____Total No. of Ovens_____Total No. of Inoperable Ovens _____

Push Side Start Time _____
Push Side Stop Time _____

Coke Side Start Time _____
Coke Side Stop Time_____

PUSH SIDE	
Oven	Comments

COKE SIDE	
Oven	Comments

Push Side Traverse Time _____ sec

Coke Side Traverse Time _____ sec

Total Traverse Time _____sec

Push Side:

$T = (4\frac{sec}{door} \times \_\_\_\_ doors) + (10\frac{sec}{leak} \times \_\_\_ leaks) = \_\_\_ sec$

Coke Side:

$T = (4\frac{sec}{door} \times \_\_\_\_ doors) + (10\frac{sec}{leak} \times \_\_\_ leaks) = \_\_\_ sec$

Total Allowable Time _____sec

Valid Run?

Yes No

$$PLD = \frac{L_y \times 100}{D_t - (D_i + D_{no})} = \_\_\_\_$$

This is the form that is used to record door inspection results during the training and certification sessions. One form is used for each battery inspection and should be filled out completely. Information on the battery number, the total number of ovens and any ovens that are inoperative will be provided by the panel. The push and coke side start and stop times listed above each table are used to record the clock times for the inspection. The traverse times from the accumulative stopwatch are entered below each table, and the total traverse time is entered on the next line. The table is used to record leaking doors and other information, such as blocked or obscured doors.

The box near the bottom of the form is used to calculate the allowable traverse time. Remember, this calculation is based on the total number of doors, regardless of whether they are in service, and the total number of leaks observed. The sum of the times for each side gives the total allowable time, which is recorded on the last line in the box. This time is compared to the total traverse time from above the box to determine if the run is valid. A valid run is indicated by circling "Yes" in the box on the right side.

Finally, the percent leaking doors is calculated using the formula at the bottom of the form, and the result is entered in the blank space.

Practice Problems

Practice Problems for Doors

1. True or False? Visible emissions from between the brick and the door jamb are counted as door leaks if viewed from the yard during a door traverse.
2. During a door traverse, the inspector's view of several doors is obstructed by the pusher car. What options does the inspector have for completing the traverse?

3. True or False? Before beginning a traverse, the inspector is informed that ovens 5 and 6 are not operational. During the traverse, the inspector's view of ovens 6 through 8 is obstructed on the coke side and remains obstructed. When performing the percentage door leak calculation, the inspector should input 4 doors on nonoperating ovens (2 each on ovens 5 and 6) and 3 doors not observed (1 each on ovens 6, 7 and 8).
4. A battery has 70 ovens. During a door traverse, an inspector records 5 leaking doors. The traverse takes 450 seconds to perform. Is this a valid traverse?

5. A battery has 70 ovens. During a door traverse, an inspector records 2 door leaks on the push side, 4 door leaks on the coke side, 8 doors that were blocked from view, and 1 inoperative oven. Calculate the percent leaking doors (PLD).

6. A battery with a shed has 70 ovens. During a door traverse, an inspector records 2 door leaks on the push side, 4 door leaks from the bench on the coke side, 8 doors that were blocked from view, and 1 inoperative oven. Calculate the percent leaking doors (PLD).

7. During a door traverse, an inspector sees flame coming from a door. Under what conditions does the inspector record a leak?

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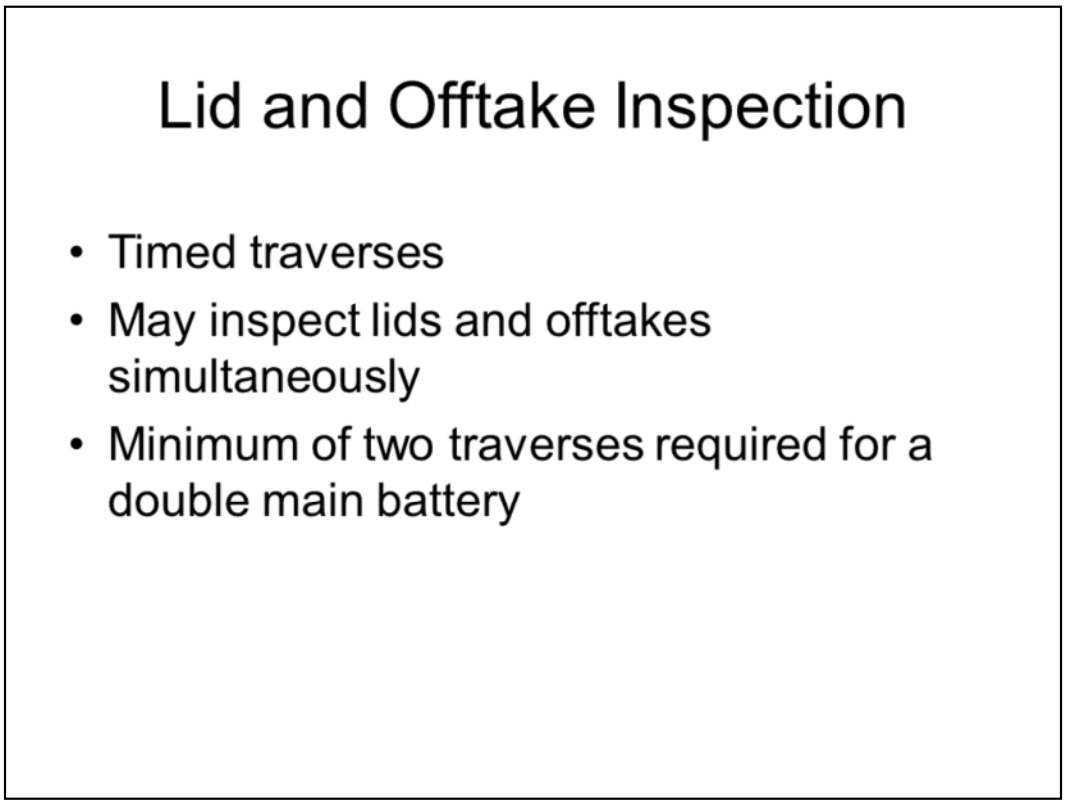
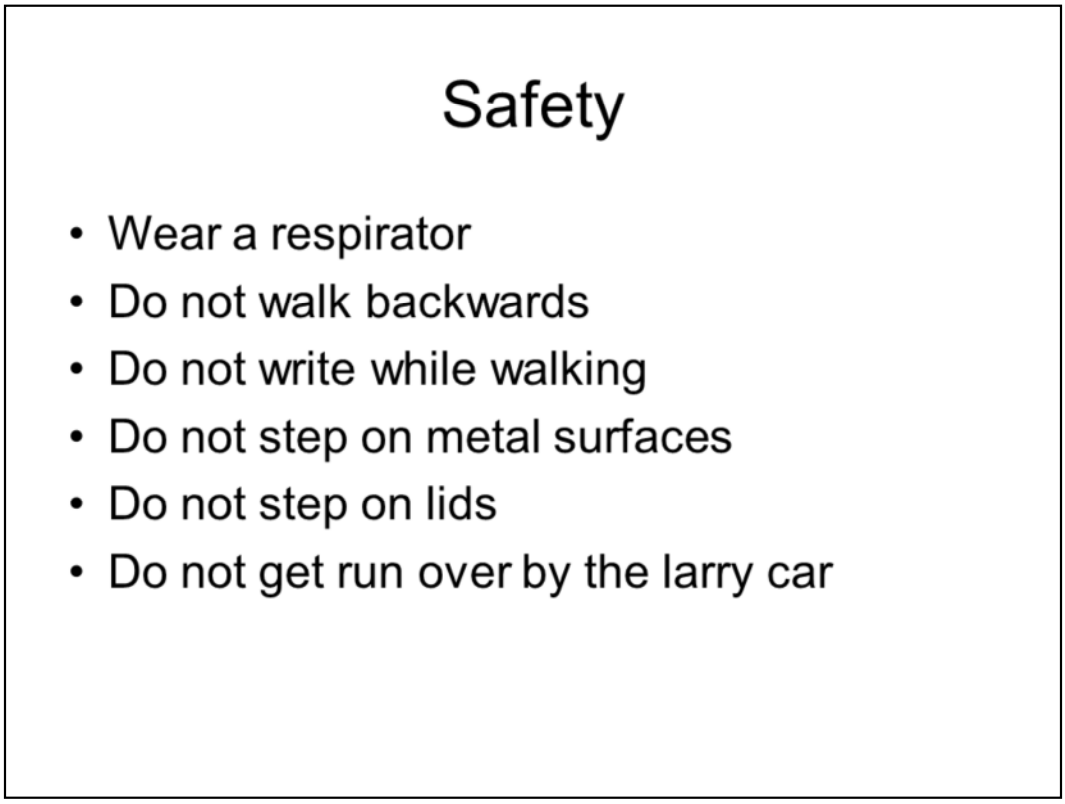
Lid and Offtake Inspection



Like the door inspection, the inspection of lids and offtakes is conducted once per day, seven days a week, unless unusual conditions prevent it. Also like the door inspection, the lids and offtakes are observed during timed traverses of the top of the battery.

For a battery with a single collecting main, the lids and offtakes may be inspected using separate traverses for each, or they may be inspected simultaneously using only one traverse.

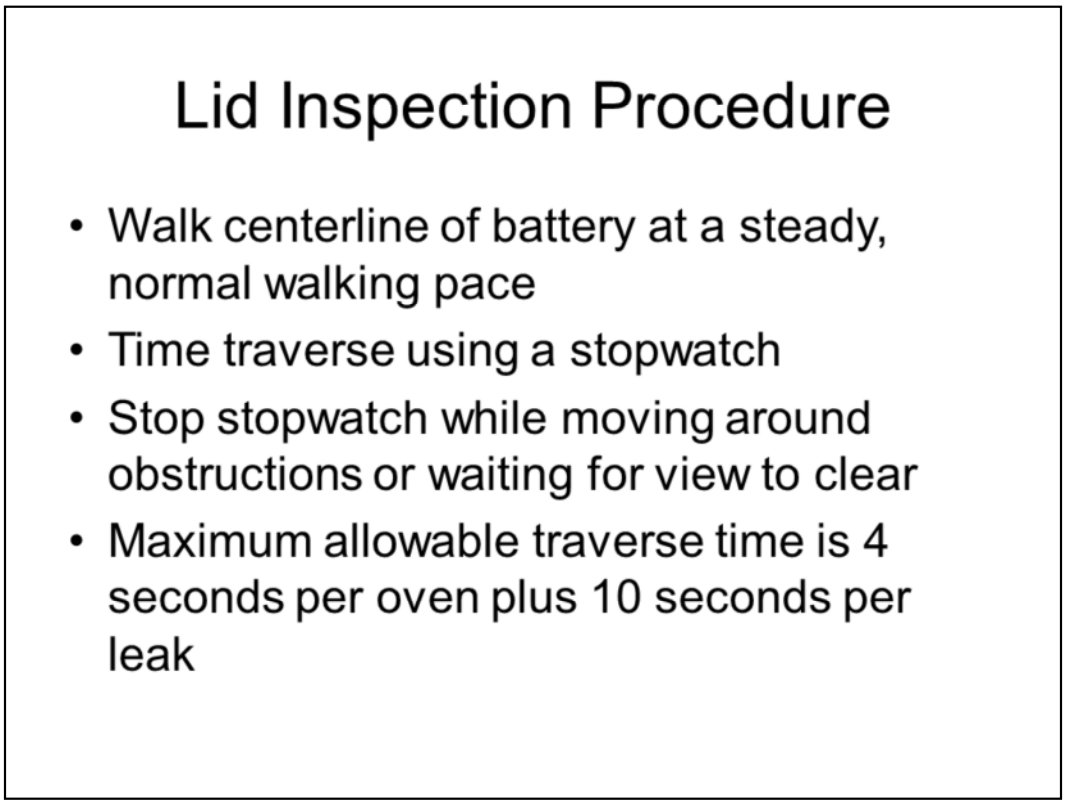
For a battery with two collecting mains, the lids and offtakes may also be inspected using separate traverses for each set of offtakes and a third traverse for the lids. However, unlike single main batteries, a minimum of two traverses are required for a battery with two collecting mains. This could be done by making one traverse for the lids and a second traverse for both sets of offtakes. The inspector could also make one traverse while observing the lids and offtakes on one side of the battery and then make a second traverse, observing the lids and offtakes on the other side. When this technique is used, extra care must be taken to be sure that the results of the inspection are recorded properly.



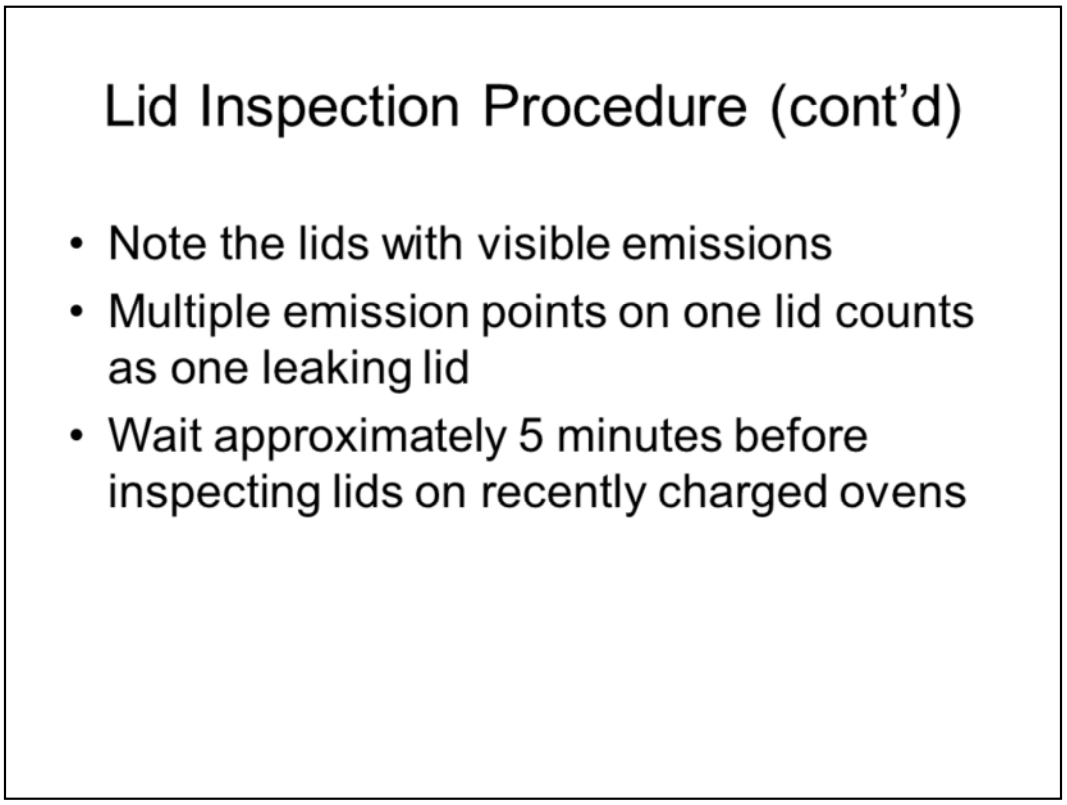
Inspecting the top side of the battery presents several safety hazards to the inspector. These include moving equipment with limited clearances, inhalation hazards, hot surfaces and open flames. By using all required personal protection equipment and remaining alert, the potential harm from these hazards can be reduced and the inspections conducted safely.

Inhalation hazards require that a respirator be worn whenever the inspector is within the pinion walls of the battery. While within this area, the inspector should not walk backwards or write while walking and should be careful not to step on metal surfaces, flue caps or lids.

Particular attention should be paid to the larry car. The visibility of the operator is limited, and the vehicle may move suddenly. Typically, there are limited areas that have sufficient clearance for it to pass by or over the inspector.

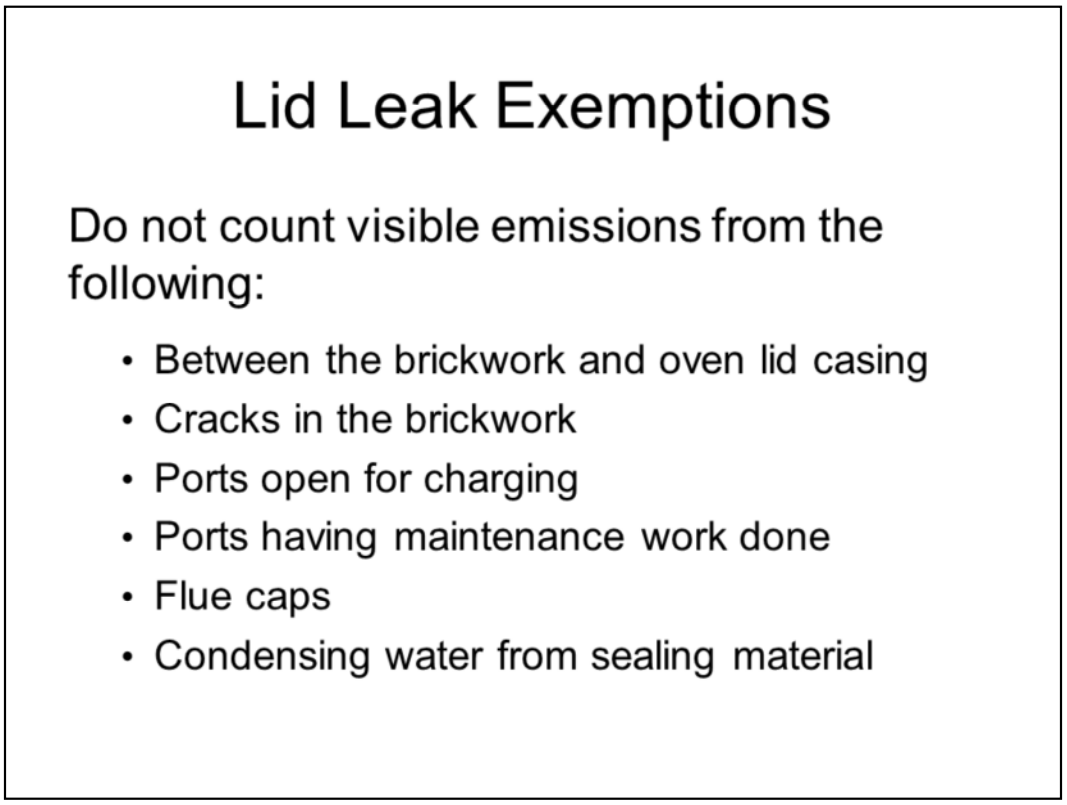


The lid inspection is conducted from the centerline of the battery while walking at a steady, normal pace. The traverse is timed with an accumulative stopwatch having unit divisions of at least 0.5 seconds, starting and stopping it as needed to move around obstructions or to wait for the view to clear. The maximum allowable time for *each* traverse is 4 seconds per oven plus 10 seconds per leak.

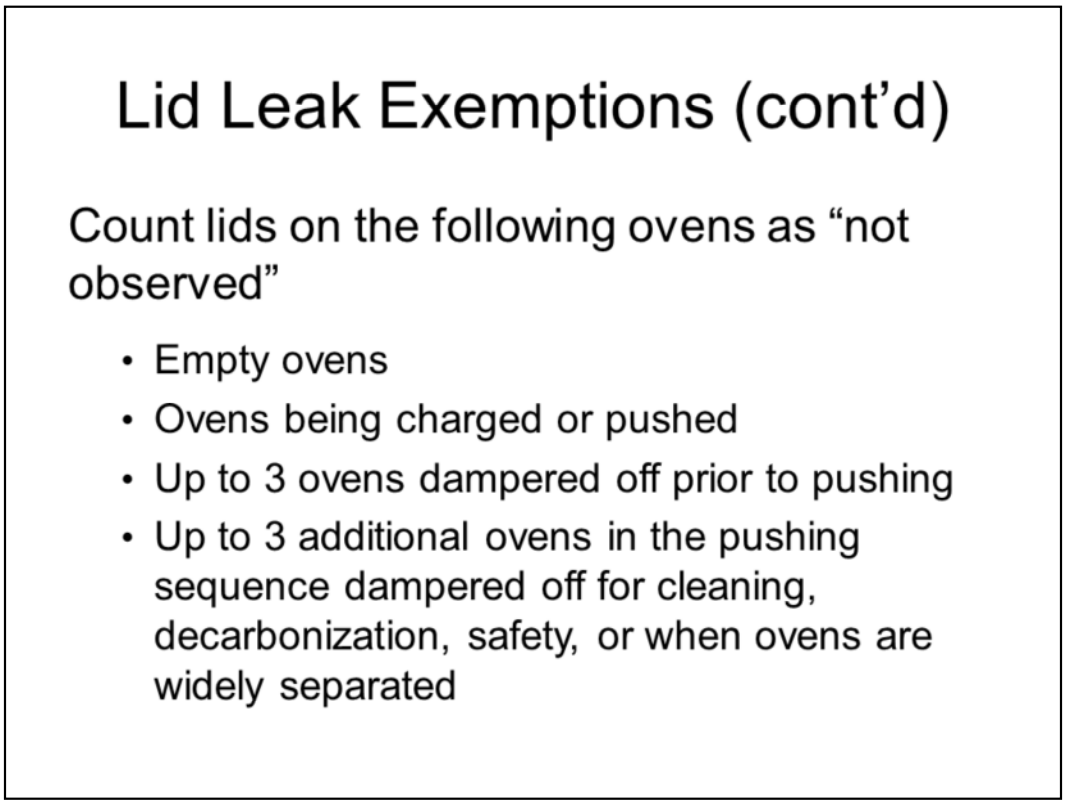


While walking at a steady pace, note the lids with visible emissions coming from the port. Multiple emission points on one lid counts as one leaking lid. Pause to record the location of the leaking lids on the inspection form.

Wait approximately 5 minutes before inspecting lids on recently charged ovens. This provides time for the lids to be luted and sealed and to give the water in the sealing material time to evaporate, reducing the chance that evaporating water will be mistaken as a leak.



The only visible emissions that count as leaks are those coming from the port. Do not count visible emissions from between the brickwork and the oven lid casing or from cracks in the brickwork, but note them under comments. Do not count visible emissions from ports open for charging or from ports having maintenance work done, but note these conditions under comments. Do not count visible emissions from flue caps or condensing water from the sealing material.



Lids on the following ovens should be counted as "not observed," and visible emissions from them should not be counted:

•Empty ovens, including those undergoing maintenance, which are dampered off from the collecting main

•Ovens being charged or pushed

•Up to 3 full ovens that have been dampered off from the collecting main prior to pushing

•Up to 3 additional full ovens in the pushing sequence that have been dampered off from the main for offtake system cleaning, decarbonization, safety reasons, or when a charging/pushing schedule involved widely separated ovens

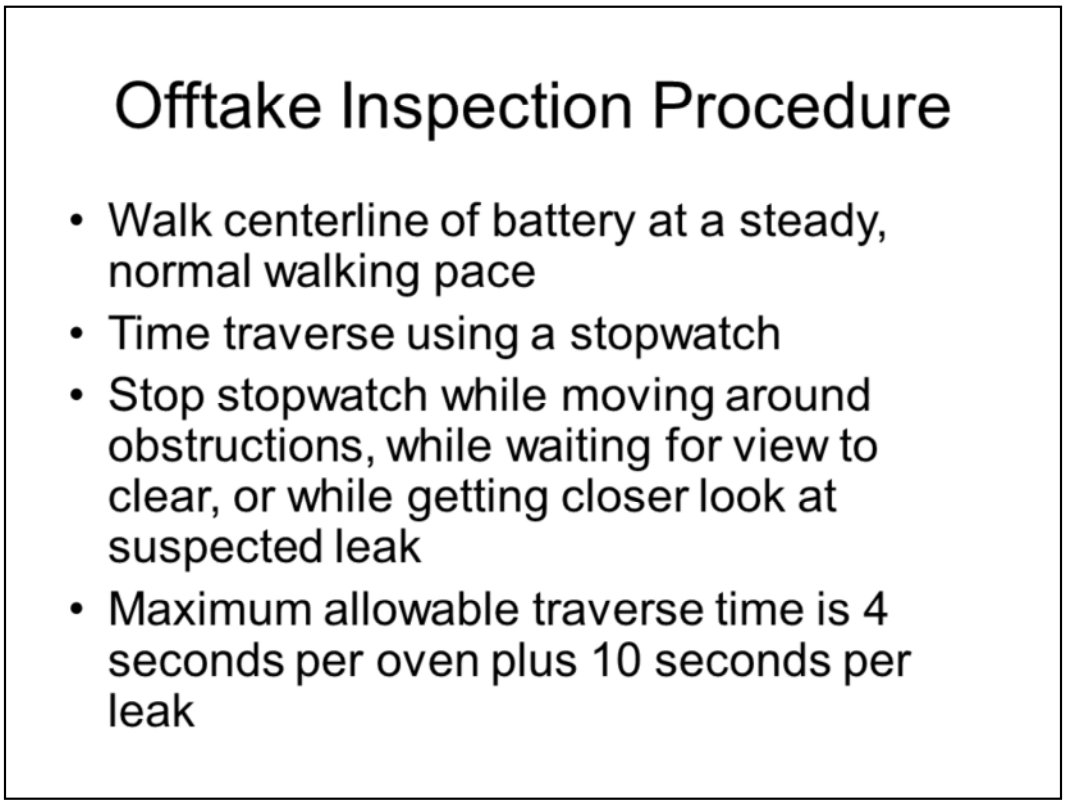
Calculating Percent Leaking Lids

$$PLL = \frac{P_{ve} \times 100}{P_{ovn}(N - N_i) - P_{no}}$$

where:

- PLL = percent leaking lids
- P_{ve} = number of leaking lids
- P_{ovn} = number of lids per oven
- N = total number of ovens in battery
- N_i = number of inoperative ovens
- P_{no} = number of lids not observed

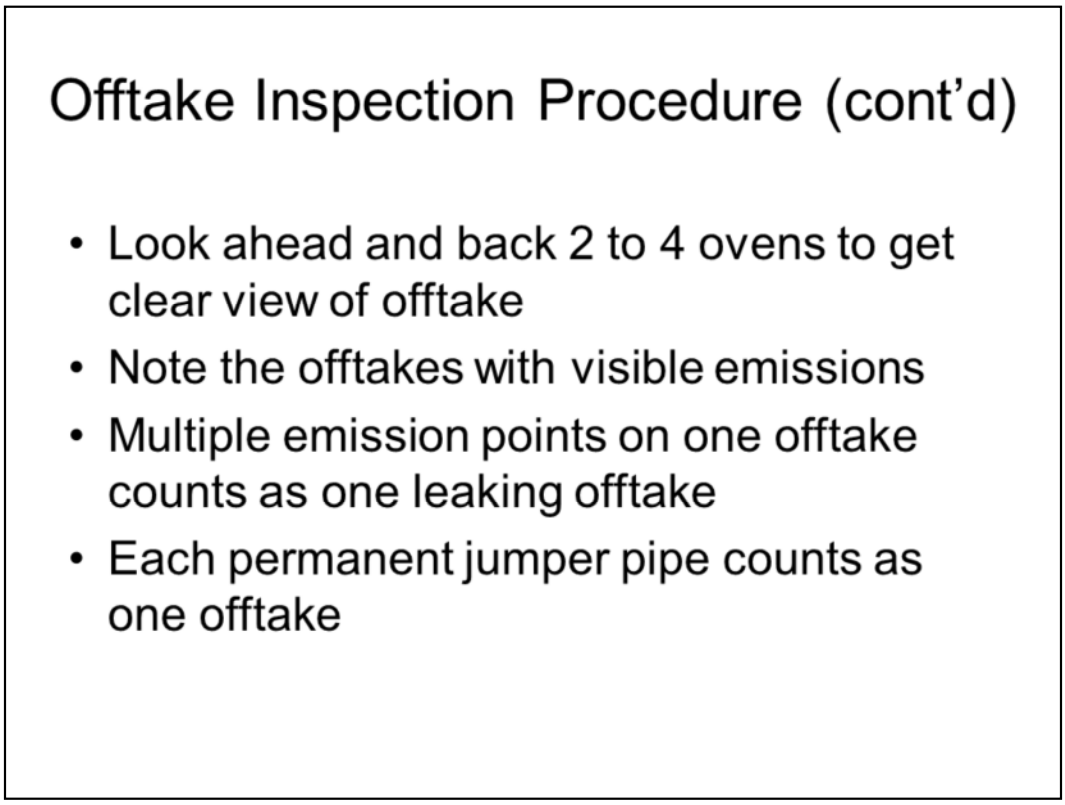
The percent leaking lids for a daily observation is determined by dividing the number of leaking lids by the total number of lids observed, and then multiplying by 100. The result is rounded off to the nearest hundredth of 1 percent (x.xx percent). The total number of lids observed is simply the number of lids on operating ovens minus those that were not observed.



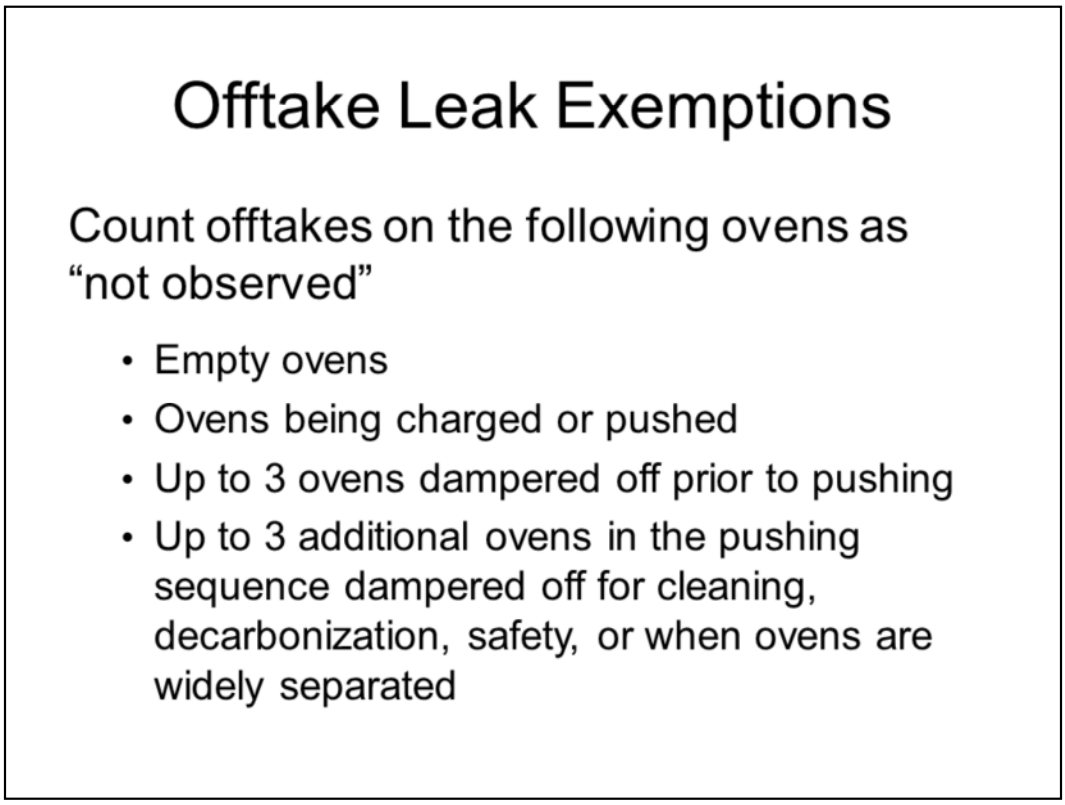
The offtake inspection is normally conducted from the centerline of the battery while walking at a steady, normal pace; however, the inspection may be conducted from a traverse line that is further away from the offtake than the centerline. The traverse is timed with an accumulative stopwatch having unit divisions of at least 0.5 seconds, starting and stopping it as needed to move around obstructions or to wait for the view to clear.

The inspector may also stop the traverse and move closer to the offtake in order to confirm that visible emissions seen from the centerline is an offtake leak. However, if the inspector sees and offtake leak that is not visible from the centerline, that leak is not counted.

The maximum allowable time for *each* traverse is 4 seconds per oven plus 10 seconds per leak.



While walking at a steady pace, look ahead and back 2 to 4 ovens in order to get a clear view of the offtake. Note the offtakes with visible emissions. Likely sources include the flange between the gooseneck and the collecting main, the standpipe base, and closed standpipe caps. Multiple emission points on one offtake counts as one leaking offtake. Pause to record the location of the leaking offtakes on the inspection form. Note that each permanently installed jumper pipe counts as one offtake.



Offtakes on the following ovens should be counted as "not observed," and visible emissions from them should not be counted:

•Empty ovens, including those undergoing maintenance, which are dampered off from the collecting main

•Ovens being charged or pushed

•Up to 3 full ovens that have been dampered off from the collecting main prior to pushing

•Up to 3 additional full ovens in the pushing sequence that have been dampered off from the main for offtake system cleaning, decarbonization, safety reasons, or when a charging/pushing schedule involved widely separated ovens

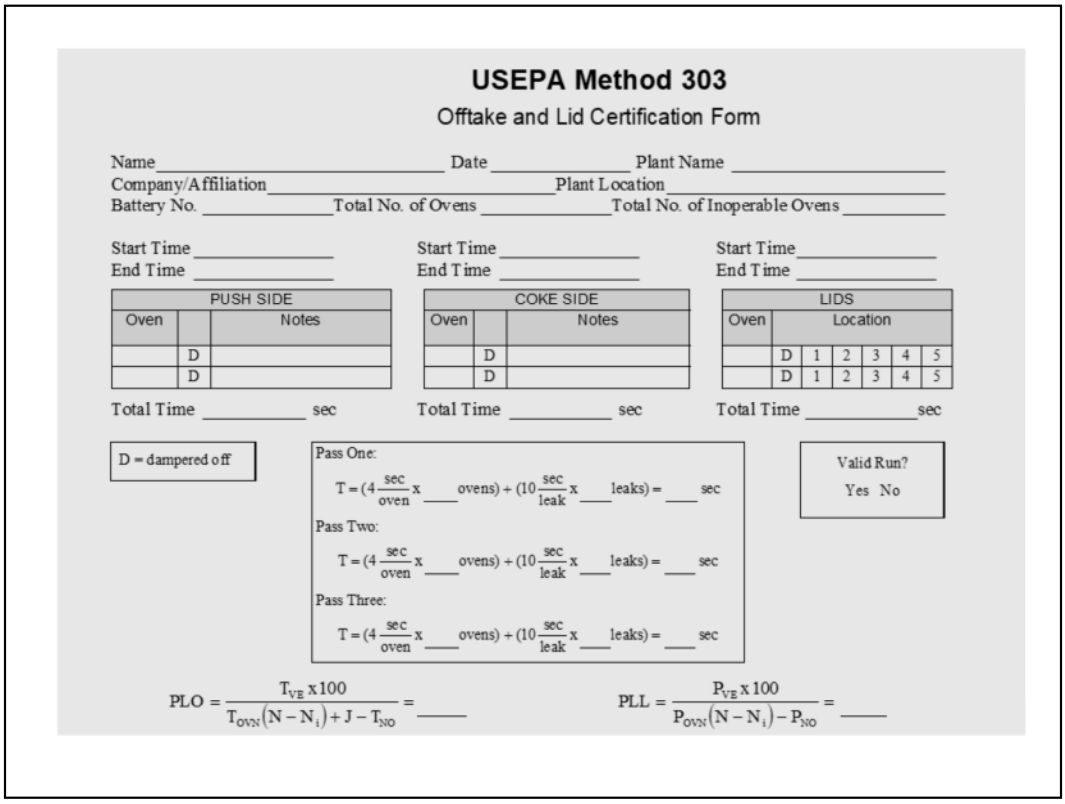
Calculating Percent Leaking Offtakes

$$PLO = \frac{T_{ve} \times 100}{T_{ovn}(N - N_i) + J - T_{no}}$$

where:

- PLO = percent leaking offtakes
- T_{ve} = number of leaking offtakes
- T_{ovn} = number of offtakes per oven
- N = total number of ovens in battery
- N_i = number of inoperative ovens
- T_{no} = number of offtakes not observed
- J = number of jumper pipes

The percent leaking offtakes for a daily observation is determined by dividing the number of leaking offtakes by the total number of offtakes observed, and then multiplying by 100. The result is rounded off to the nearest hundredth of 1 percent (x.xx percent). The total number of offtakes observed is simply the number of offtakes on operating ovens plus the number of permanently installed jumper pipes minus the number of offtakes that were not observed.



USEPA Method 303

Offtake and Lid Certification Form

Name _____ Date _____ Plant Name _____
Company/Affiliation _____ Plant Location _____
Battery No. _____ Total No. of Ovens _____ Total No. of Inoperable Ovens _____

Start Time _____ End Time _____

PUSH SIDE		
Oven		Notes
	D	
	D	

Total Time _____ sec

Start Time _____ End Time _____

COKE SIDE		
Oven		Notes
	D	
	D	

Total Time _____ sec

Start Time _____ End Time _____

LIDS						
Oven	Location					
	D	1	2	3	4	5
	D	1	2	3	4	5

Total Time _____ sec

D = dampered off

Pass One: $T = (4 \frac{sec}{oven} \times \_\_\_ ovens) + (10 \frac{sec}{leak} \times \_\_\_ leaks) = \_\_\_ sec$

Pass Two: $T = (4 \frac{sec}{oven} \times \_\_\_ ovens) + (10 \frac{sec}{leak} \times \_\_\_ leaks) = \_\_\_ sec$

Pass Three: $T = (4 \frac{sec}{oven} \times \_\_\_ ovens) + (10 \frac{sec}{leak} \times \_\_\_ leaks) = \_\_\_ sec$

Valid Run? Yes No

$$PLO = \frac{T_{VE} \times 100}{T_{OVN}(N - N_1) + J - T_{NO}} = \_\_\_\_$$

$$PLL = \frac{P_{VE} \times 100}{P_{OVN}(N - N_1) - P_{NO}} = \_\_\_\_$$

This is the form that is used to record lid and offtake inspection results during the training and certification sessions. One form is used for each battery inspection and should be filled out completely. Information on the battery number, the total number of ovens and any ovens that are inoperative will be provided by the panel. The push side, coke side and lids start and stop times listed above each table are used to record the clock times for the inspection. The traverse times from the accumulative stopwatch are entered below each table. The table is used to record leaking lids and offtakes and other information. Ovens that are dampered off from the collecting main may be indicated by circling D.

This form is set up to allow for three traverses on a double main battery. If one traverse is being made on a single main battery, it is suggested that the results of the inspection be entered in the table section corresponding to the side of the battery on which the collecting main is located. If two traverses are being made on a double main battery, it is suggested that the results of the inspection be entered in the push side and coke side table sections, as appropriate.

The box near the bottom of the form is used to calculate the allowable traverse times. Remember, this calculation is based on the total number of ovens, regardless of whether they are in service, and the total number of leaks observed. The allowable traverse time is calculated for each traverse made. Each of these times is compared to the corresponding actual traverse time from below each table to determine if the run is valid. A valid run is indicated by circling “Yes” in the box on the right side.

Finally, the percent leaking lids and percent leaking offtakes are calculated using the formulas at the bottom of the form, and the results are entered in the blank spaces.

Practice Problems

Practice Problems for Lids and Offtakes

1. True or False? Visible emissions from between brickwork on top of the battery are counted as lid leaks if viewed from the centerline during a topside traverse.
2. True or False? During an offtake traverse, an inspector sees visible emissions near a standpipe on oven 44, but is not sure it is a leak. The inspector stops the traverse and leaves the centerline of the battery to get a closer look, and determines that the suspected leak is actually steam. While standing close to the standpipe, the inspector sees a small leak from around the standpipe cap on the same oven. The inspector does not record a leak because the leak was not visible from the centerline traverse.
3. True or False? The inspector should stop the stopwatch to get the closer look described in Question 2, and then restart it upon returning to the centerline to complete the traverse.
4. Describe the conditions under which open standpipe caps are allowed?

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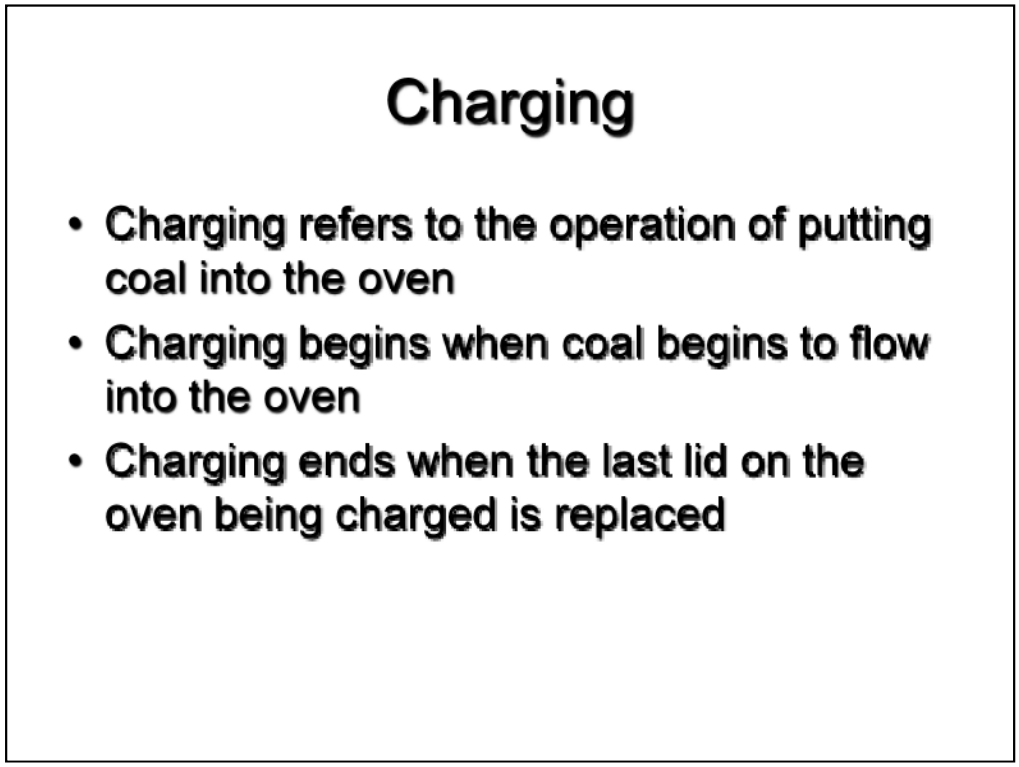
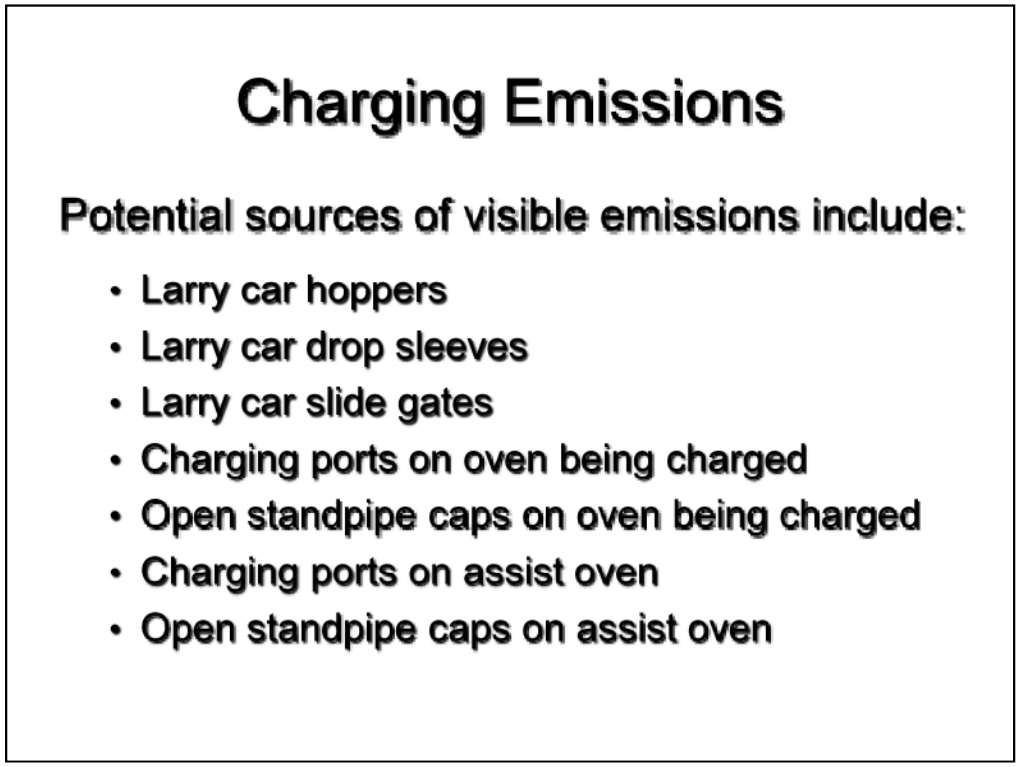
Charging Inspection

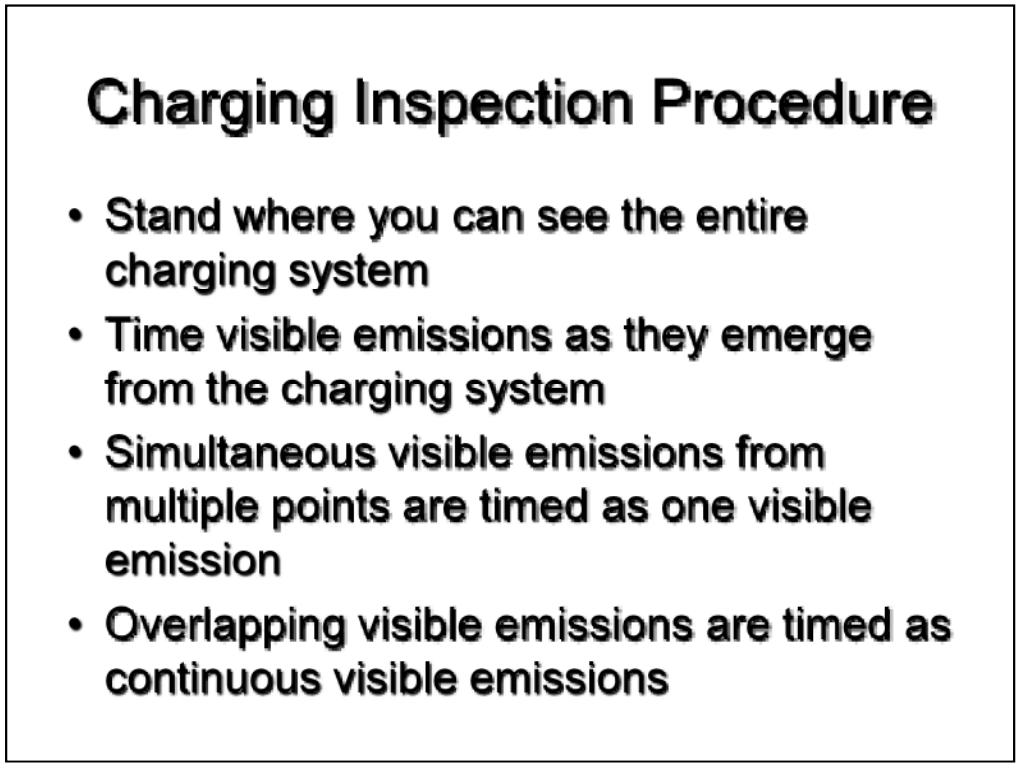


Charging is simply the operation of putting coal into the oven. For purposes of inspection, charging begins when coal starts to flow into the oven and ends when the last lid on the oven being charged is replaced, including the lid for a portable jumper pipe. During this period, the total time visible emissions are observed is determined using an accumulative stopwatch.



As with other battery emission sources, the emissions of concern are those that originate inside the battery. In charging operations, these emissions could escape from the larry car hoppers, the drop sleeves, or from the slide gates. Some larry cars use screw conveyors to control the delivery of the coal. These are sometimes vented and may also be sources of visible emissions.

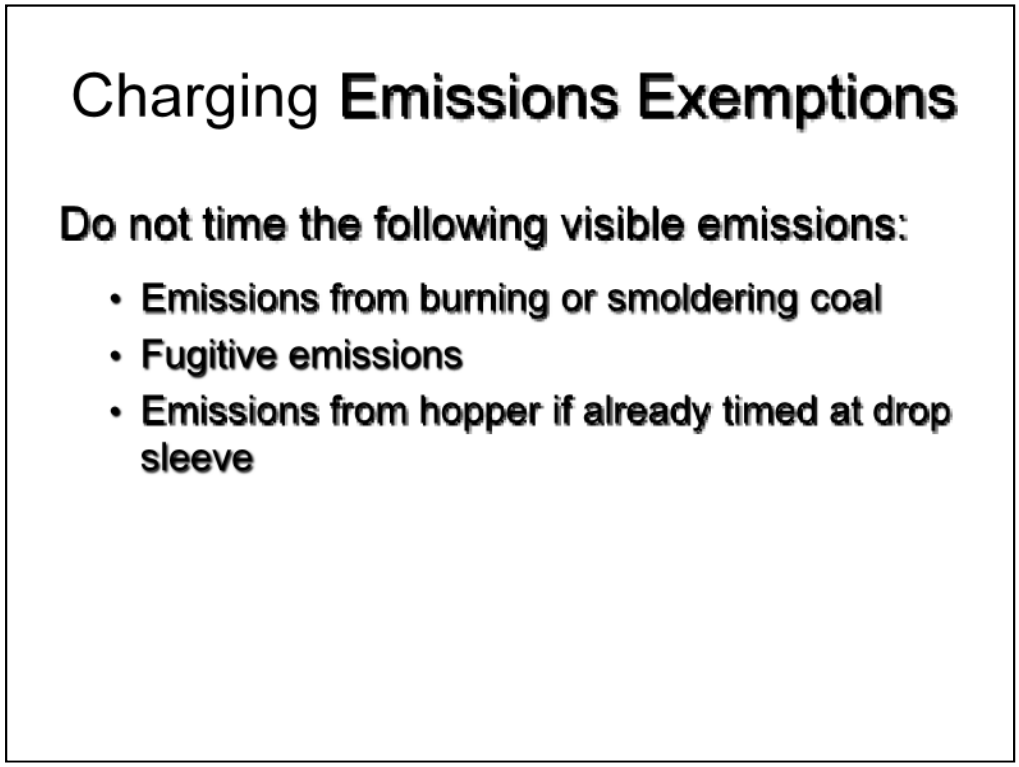
More typically, the emissions escape from the charging ports or open standpipe caps on the oven being charged and on any assist oven. Note that visible emissions from closed standpipe caps, the normal position during charging, are not counted as charging emissions.



The inspector should stand where the entire charging system can be seen. This includes the larry car hoppers, the drop sleeves, the slide gates, and the charging ports and standpipe caps on the oven being charged and on any assist oven. A distance of 8-12 ovens is typical.

The total time visible emissions are observed is determined with an accumulative stopwatch having unit divisions of at least 0.5 seconds. Start the stopwatch when visible emissions are seen emerging from any part of the charging system. Stop the stopwatch when visible emissions are no longer observed emerging, and restart the stopwatch when visible emissions reemerge. Continue to time visible emissions in this manner for the entire charging period. Record the accumulated time to the nearest 0.5 second.

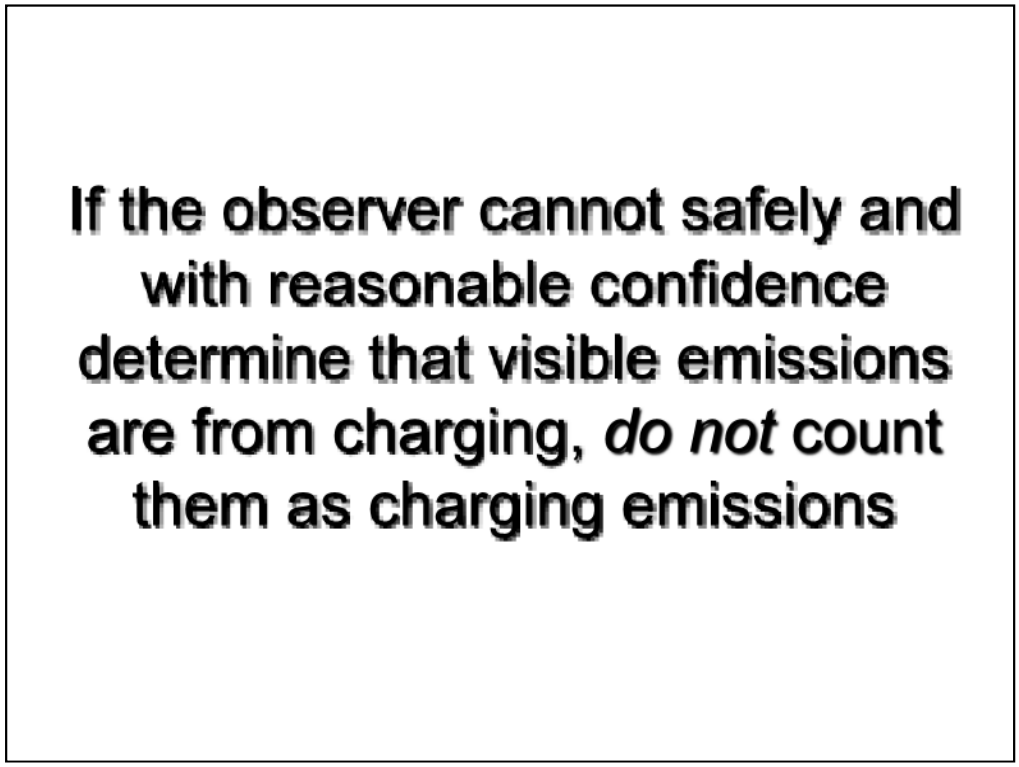
When visible emissions occur simultaneously from several points, time them as one visible emission. Similarly, overlapping visible emissions are timed as continuous visible emissions.



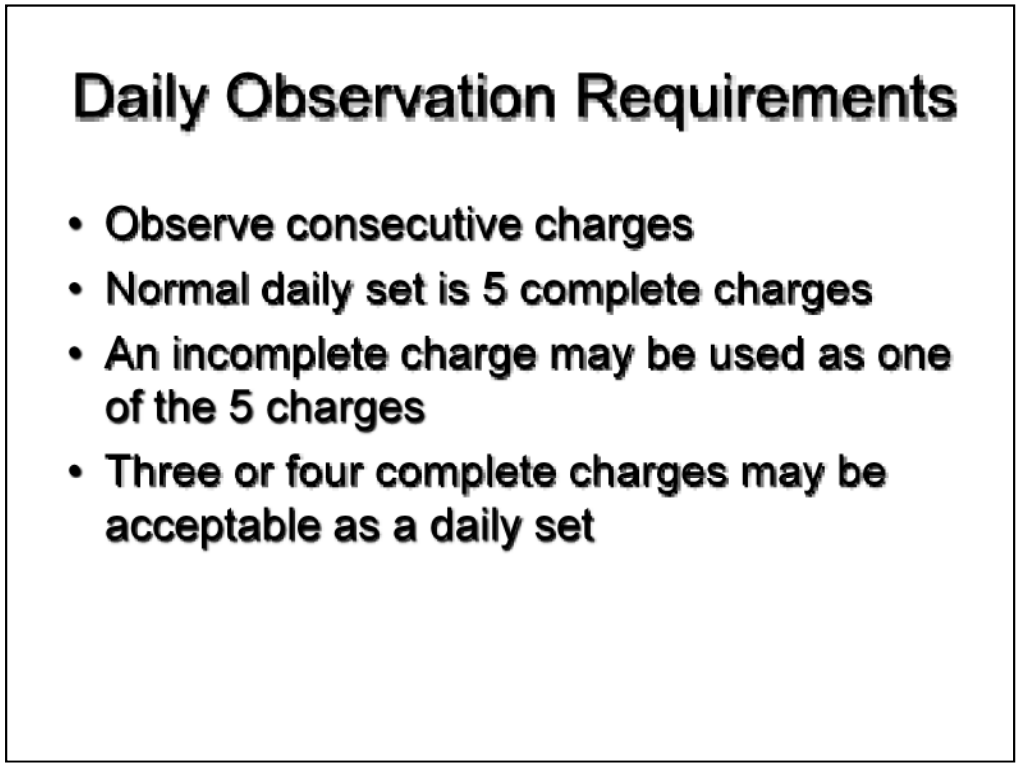
Visible emissions from burning or smoldering coal that is spilled on top of the oven, on a port lid, or on a larry car surface are not counted as charging emissions, nor are fugitive emissions that come from the doors or from the leveler bar.

When the hopper slide gate closes after coal has been added to the over, the seal may not be tight. Occasionally, a puff of smoke observed at the drop sleeve is forced past the slide gate and into the hopper and may drift from the top. Time these visible emissions either at the drop sleeve or the hopper, but not at both.

If the larry car hopper does not have a slide gate, or it is left more open, emissions may pass through the hopper without being observed at the drop sleeves, and will appear as a strong surge of smoke. Time these hopper emissions as charging emissions.

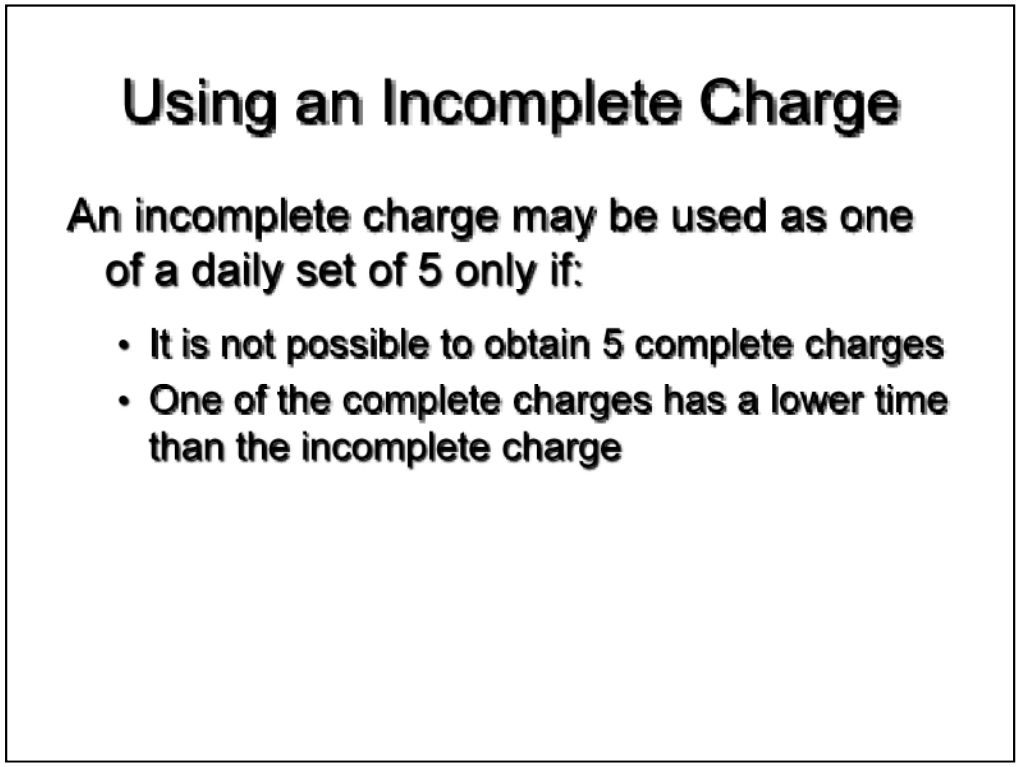


This statement was added to the method to address the concern that inspectors may inadvertently count emissions from smoldering coal as charging emissions. Coal that falls around the charging port during charging may smolder and emit a white plume. If the inspector sees white visible emissions and cannot tell where the emissions originate, they should not be counted as charging emissions.

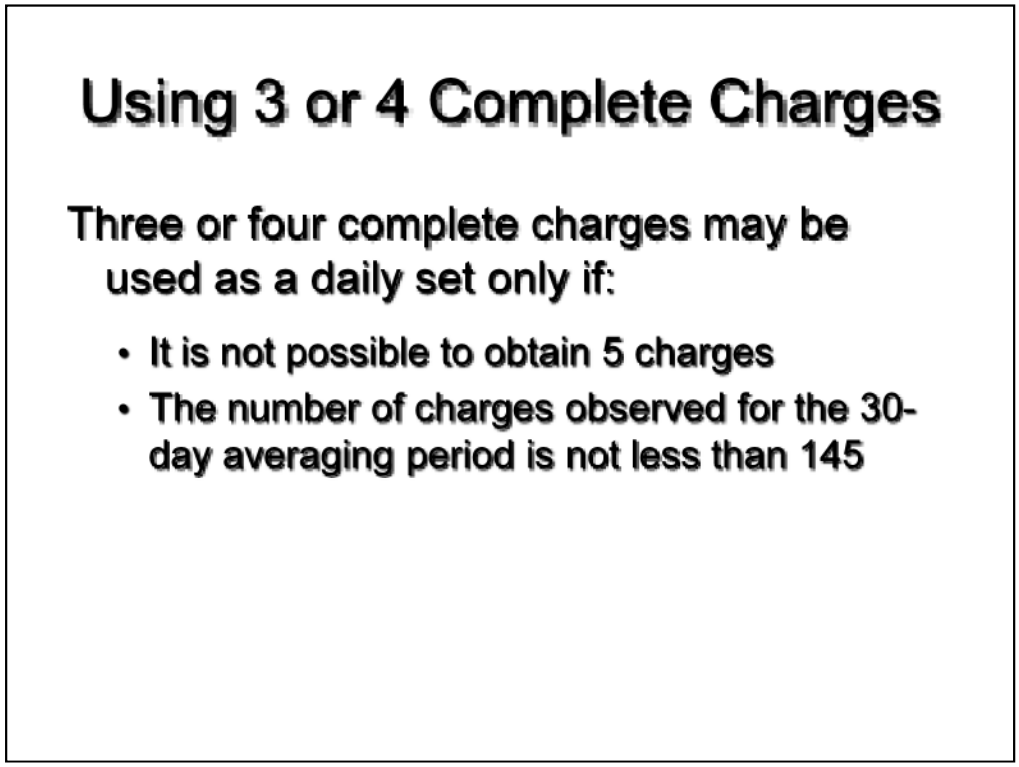


In the charging inspection, the inspector observes consecutive charges. A normal daily set is 5 complete charges. If the view becomes obstructed during an observation, the inspector stops the stopwatch, records the accumulated time and label the observation as an "incomplete charge." The inspector then times the next charge and continues in this manner until 5 compete charges are obtained.

If it is not possible to obtain 5 complete charges, then an incomplete charge may be used as one of the set. Also, 3 or 4 complete charges may be acceptable as a daily set.



An incomplete charge may be used as one of a daily set of 5 charges only if (1) it is not possible to obtain 5 complete charges, and (2) one of the complete charges has a lower accumulated time than the incomplete charge.



Three or four complete charges may be used as a daily set only if (1) it is not possible to obtain 5 charges, and (2) the number of charges observed for the 30-day averaging period is not less than 145.

Logarithmic Average

30-day log average time = $e^y - 1$

where:

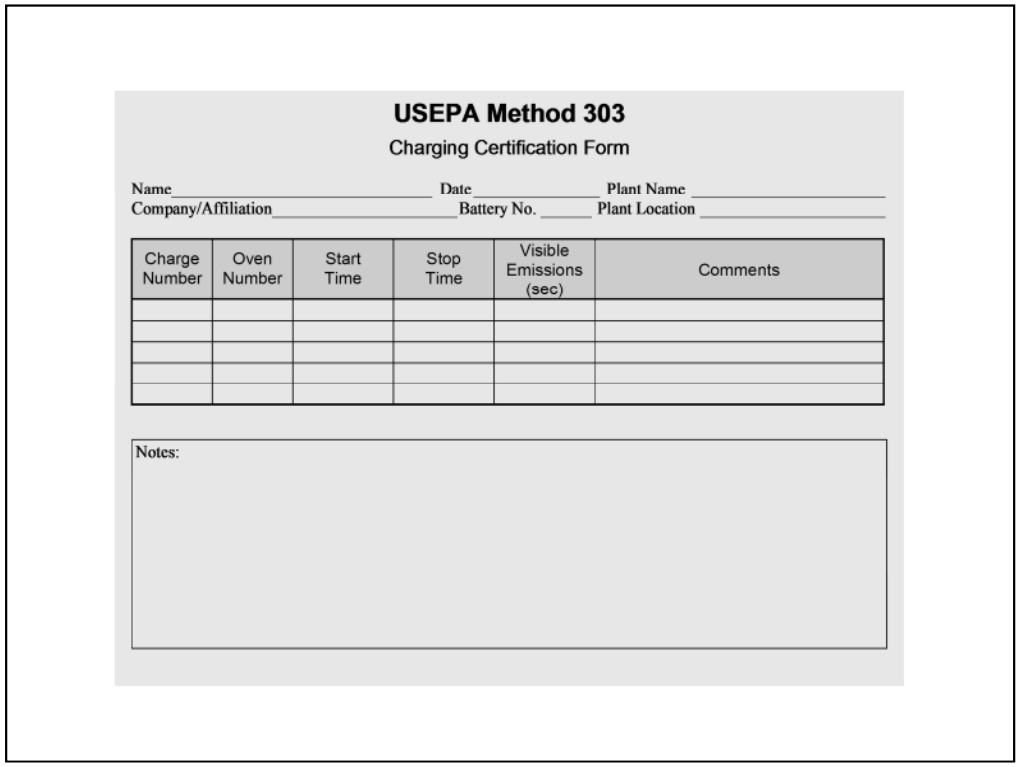
$y = [\ln(X_1 + 1) + \ln(X_2 + 1) + \ldots \ln(X_A + 1)]/A$

X_i = seconds of visible emissions per charge

A = total number of charges

The 30-day rolling averages for the percent leaking doors, lids and offtakes are calculated simply by adding the results from each day in the 30-day cycle and dividing the result by 30. This gives what is known as an arithmetic average. With this type of average, each daily reading is weighted equally.

For charging emissions, the 30-day rolling average is calculated as a logarithmic average. The time from each charge observed during the 30-day cycle is added to one and then it's natural logarithm is determined. These results are summed and divided by the total number of charges observed in order to determine "y." The 30-day rolling logarithmic average second of visible emissions is then give by $e^y - 1$. The logarithmic average reduces the relative contribution of high-time charges.



USEPA Method 303

Charging Certification Form

Name_____ Date_____ Plant Name _____
Company/Affiliation_____ Battery No. _____ Plant Location _____

Charge Number	Oven Number	Start Time	Stop Time	Visible Emissions (sec)	Comments

Notes:

This is the form that is used to record charging inspection results during the training and certification sessions. One form is used for all of the charging observations and should be filled out completely. Information on the battery number will be provided by the panel. The start time and stop time columns in the table are used to record the clock times for each observation. The visible emissions column is used to record the seconds of visible emissions, rounded to the nearest 0.5 second. Space for comments and notes is also provided.

Practice Problems

Practice Problems for Charging

1. Where does the inspector stand to observe a charge?

2. When does the charging period begin and end for an oven using a movable jumper pipe and an assist oven?

3. During a charge on a battery that uses a movable jumper pipe and an assist oven, do leaks from the lids on the assist oven counts as lid leaks or charging emissions?

4. What is an incomplete charge? Under what conditions can an incomplete charge be used to count as one of the daily charges?

5. What is the minimum number of charges to be timed in any 30 day rolling period? Under what conditions will less than 5 complete charges per day be allowed?

6. Give some examples of visible emissions that are not considered charging emissions.

7. The charging times for 5 charges are 1, 2, 3, 4 and 100 seconds. Calculate both the arithmetic and logarithmic averages for these times.

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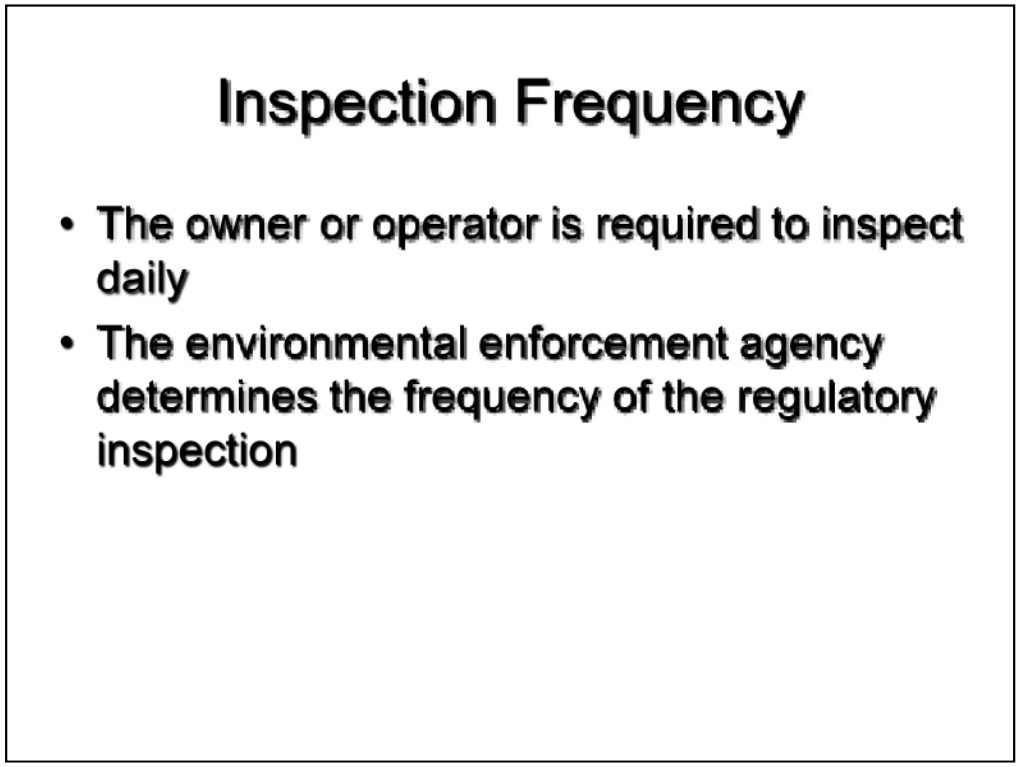
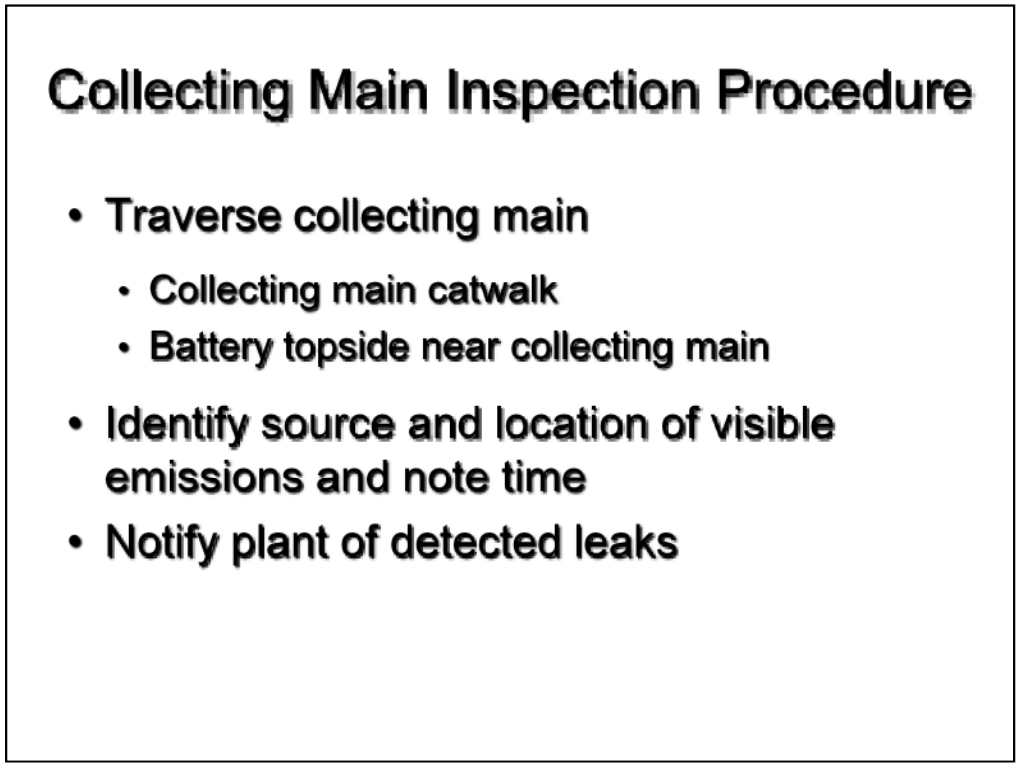
Collecting Main Inspection

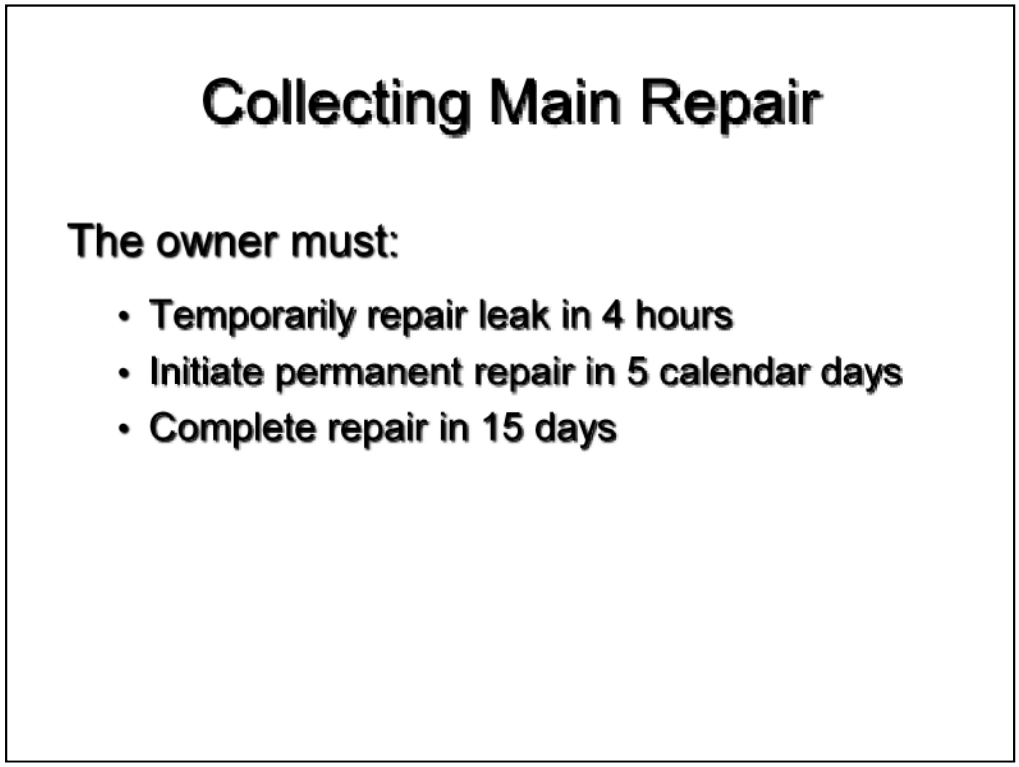


The owner or operator of the battery is required to inspect the collecting main on a daily basis. The environmental enforcement agency sets the frequency of the regulatory inspection.

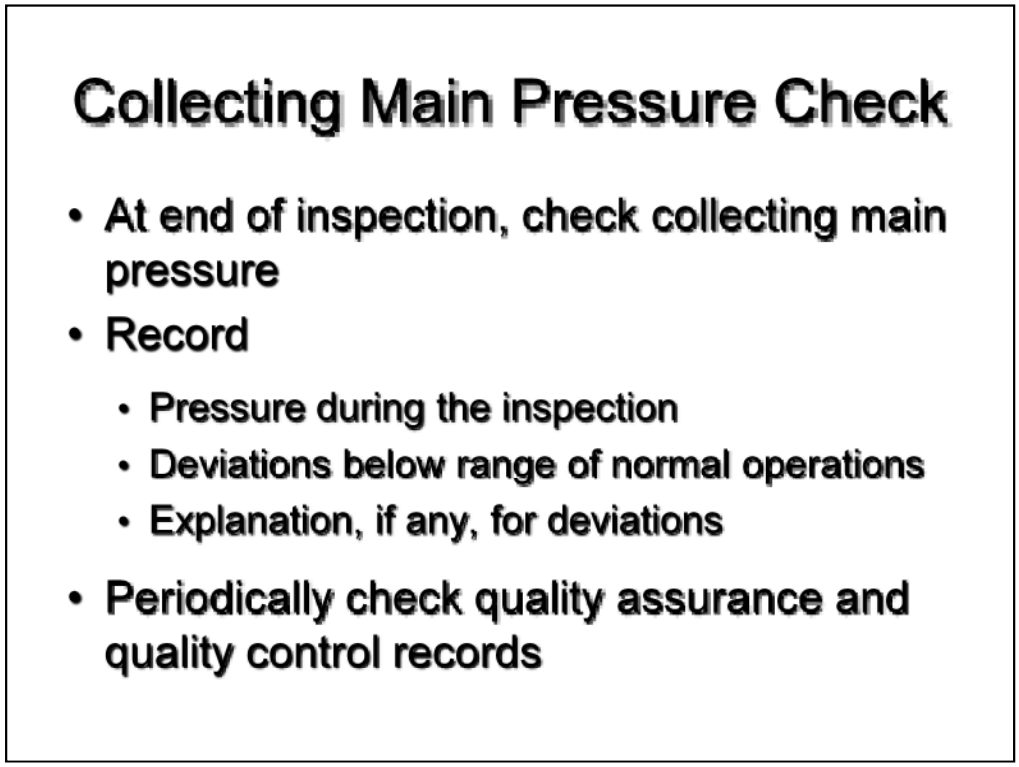


The inspection of the collecting main requires two untimed traverses. One traverse is performed along the top of the battery, near the collecting main. The other traverse is performed along the collecting main catwalk. The inspector should exercise care when moving onto the catwalk. Processing operations may result in the rapid and unexpected release of steam, hot gases and flames that can engulf areas of the catwalk.

The inspector should note the time, source and location of any visible emissions, and notify the plant of any detected leaks.



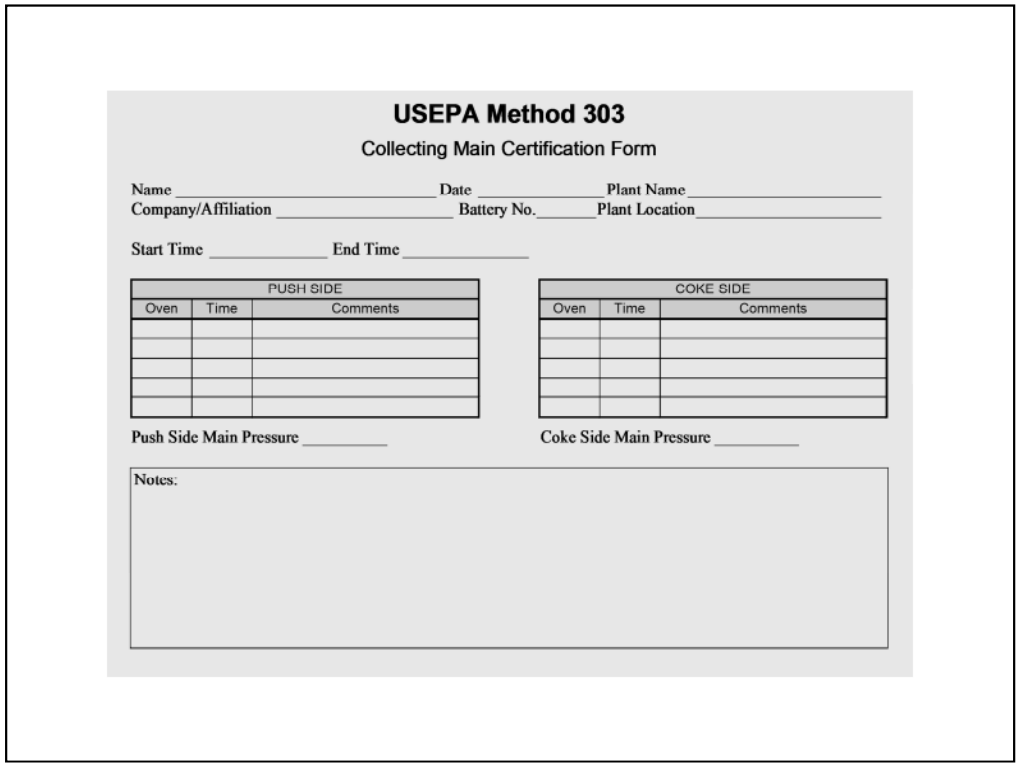
After notification regarding a collecting main leak, the owner must temporarily repair the leak in 4 hours and initiate permanent repair in 5 calendar days. The repair must be completed in 15 days.



The inspector must check the collecting main pressure after all other inspections have been completed. The pressure during the inspection should be recorded and compared to the values over the last 8 to 24 hours. Any deviations below the range of normal operations should be noted, and any explanation for the deviations offered by the operator should be recorded.

The battery is required to maintain the pressure recording equipment and conduct the quality assurance and quality control (QA/QC) necessary to ensure reliable pressure readings. The inspector should periodically check the QA/QC records to determine their completeness. The records must be provided within 1 hour of the inspector's request.

Section 5: Collecting Main Inspection



USEPA Method 303

Collecting Main Certification Form

Name _____ Date _____ Plant Name _____
Company/Affiliation _____ Battery No._____ Plant Location _____

Start Time _____ End Time _____

PUSH SIDE		
Oven	Time	Comments

COKE SIDE		
Oven	Time	Comments

Push Side Main Pressure _____ Coke Side Main Pressure _____

Notes:

This is the form that is used to record collecting main inspection results during the training and certification sessions. One form is used for each battery inspection and should be filled out completely. Information on the battery number will be provided by the panel. The start time and end time listed above the tables are for recording the clock times of the inspection. The oven number nearest the leak and the time are recorded in the appropriate table, along with any comments. The push side and coke side collecting main pressures are recorded below the tables. Space for notes is also provided.

The results of the daily inspection must be made available to the owner or operator and to the responsible enforcement agency by the end of the day. Rolling averages are to be provided as soon as practicable.


Practice Problems

Practice Problems for Collecting Main

1. True or False? The inspector may request the owner or operator of a battery to document that the pressure recording equipment is operating properly.
2. What kind of information is necessary to ensure that pressure recording equipment is producing reliable data?

3. True or False? The cetified inspector may not be required to inspect the collecting main every day, but the owner or operator is.
4. Describe the procedures for inspecting the collecting main.

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Appendix

40CFR63, Appendix A, Method 303

Method 303—Determination Of Visible Emissions From By-Product Coke Oven Batteries

NOTE: This method is not inclusive with respect to observer certification. Some material is incorporated by reference from other methods in appendix A to 40 CFR part 60. Therefore, to obtain reliable results, persons using this method should have a thorough knowledge of Method 9.

1.0 Scope and Application.

1.1 Applicability. This method is applicable for the determination of visible emissions (VE) from the following by-product coke oven battery sources: charging systems during charging; doors, topside port lids, and offtake systems on operating coke ovens; and collecting mains. This method is also applicable for qualifying observers for visually determining the presence of VE.

2.0 Summary of Method.

2.1 A certified observer visually determines the VE from coke oven battery sources. Certification procedures are presented. This method does not require that opacity of emissions be determined or that magnitude be differentiated.

3.0 Definitions.

3.1 *Bench* means the platform structure in front of the oven doors.

3.2 *By-product coke oven battery* means a source consisting of a group of ovens connected by common walls, where coal undergoes destructive distillation under positive pressure to produce coke and coke oven gas, from which by-products are recovered.

3.3 *Charge or charging period* means the period of time that commences when coal begins to flow into an oven through a topside port and ends when the last oven lid is recapped.

3.4 *Charging system* means an apparatus used to charge coal to a coke oven (e.g., a larry car for wet coal charging systems).

3.5 *Coke oven door* means each end enclosure on the pusher side and the coking side of an oven. The chuck, or leveler-bar, door is considered part of the push side door. The coke oven door area includes the entire area on the vertical face of a coke oven between the bench and the top of the battery between two adjacent buck stays.

3.6 *Coke side* means the side of a battery from which the coke is discharged from ovens at the end of -the coking cycle.

3.7 *Collecting main* means any apparatus that is connected to one or more offtake systems and that provides a passage for conveying gases under positive pressure from the by-product coke oven battery to the by-product recovery system.

3.8 *Consecutive charges* means charges observed successively, excluding any charge during which the observer's view of the charging system or topside ports is obscured.

3.9 *Damper-off* means to close off the gas passage between the coke oven and the collecting main, with no flow of raw coke oven gas from the collecting main into the oven or into the oven's offtake system(s).

3.10 *Decarbonization period* means the period of time for combusting oven carbon that commences when the oven lids are removed from an empty oven or when standpipe caps of an oven are opened. The period ends with the initiation of the next charging period for that oven.

3.11 *Larry car* means an apparatus used to charge coal to a coke oven with a wet coal charging system.

3.12 *Log average* means logarithmic average as calculated in Section 12.4.

3.13 *Offtake system* means any individual oven apparatus that is stationary and provides a passage for gases from an oven to a coke oven battery collecting main or to another oven. Offtake system components include the standpipe and standpipe caps, goosenecks, stationary jumper pipes, mini-standpipes, and standpipe and gooseneck connections.

3.14 *Operating oven* means any oven not out of operation for rebuild or maintenance work extensive enough to require the oven to be skipped in the charging sequence.

3.15 *Oven* means a chamber in the coke oven battery in which coal undergoes destructive distillation to produce coke.

3.16 *Push side* means the side of the battery from which the coke is pushed from ovens at the end of the coking cycle.

3.17 *Run* means the observation of visible emissions from topside port lids, offtake systems), coke oven doors, or the charging of a single oven in accordance with this method.

3.18 *Shed* means an enclosure that covers the side of the coke oven battery, captures emissions from pushing operations and from leacking coke oven doors on the coke side or push side of the coke oven battery, and routes the emissions to a control device or system.

3.19 *Standpipe cap* means an apparatus used to cover the opening in the gooseneck of an offtake system.

3.20 *Topside port lid* means a cover, removed during charging or decarbonizing, that is placed over the opening through which coal can be charged into the oven of a by-product coke oven battery.

3.21 *Traverse time* means accumulated time for a traverse as measured by a stopwatch. Traverse time includes time to stop and write down oven numbers but excludes time waiting for obstructions of view to clear or for time to walk around obstacles.

3.22 *Visible emissions or VE* means any emission seen by the unaided (except for corrective lenses) eye, excluding steam or condensing water.

4.0 Interferences. [Reserved]

5.0 Safety.

5.1 Disclaimer. This method may involve hazardous materials, operations, and equipment. This test method may not address all of the safety problems associated with its use. It is the responsibility of the user of this test method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to performing this test method.

5.2 Safety Training. Because coke oven batteries have hazardous environments, the training materials and the field training (Section 10.0) shall cover the precautions required to address health and safety hazards.

6.0 Equipment and Supplies. [Reserved]

7.0 Reagents and Standards. [Reserved]

8.0 Sample Collection, Preservation, Transport, and Storage. [Reserved]

9.0 Quality Control. [Reserved]

10.0 Calibration and Standardization.

10.1 Certification Procedures. This method requires only the determination of whether VE occur and does not-require the determination of opacity levels; therefore, observer certification according to Method 9 in appendix A to part 60 of this chapter is not required to obtain certification under this method. However, in order to receive Method 303 observer certification, the first-time observer (trainee) shall have attended the lecture portion of the Method 9 certification course. In

addition, the trainee shall successfully complete the Method 303 training course, satisfy the field observation requirement, and demonstrate adequate performance and sufficient knowledge of Method 303. The Method 303 training provider and course shall be approved by the Administrator and shall consist of classroom instruction, field training, and a proficiency test. In order to apply for approval as at Method 303 training provider, an applicant must submit their credentials and the details of their Method 303 training course to Leader, Measurement Technology Group (E143-02), Office of Air Quality Planning and Standards, US Environmental Protection Agency, Research Triangle Park, NC 27711. Those details should include, at a minimum:

a. A detailed list of the provider's credentials.
b. An outline of the classroom and the field portions of the class.
c. A copy of the written training and lecture materials, to include:

1. The classroom audio-visual presentation(s).
2. A classroom course manual with instructional text and practice questions and problems for each of the elements of the Method 303 inspection, i.e., charging, doors, lids and offtakes, and collecting mains. A copy of Method 303 and any related guidance documents should be included as appendices.
3. A copy of the Method 303 demonstration video, if not using the one available on the EPA website (www3.epa.gov/ttn/emc/methods/method303trainingvideo.mp4).
4. Multiple-choice certification tests, with questions sufficient to demonstrate knowledge of the method, as follows: one (1) initial certification test and three (3) third-year recertification tests (the questions on any one recertification test must be at least 25% different from those on the other recertification tests).
5. A field certification checklist and inspection forms for each of the elements of the Method 303 inspection, i.e., charging, doors, lids and offtakes, and collecting mains.
6. The criteria used to determine proficiency.
7. The panel members to be utilized (see Section 10.1.3) along with their qualifications.
8. An example certificate of successful course completion.

10.1.1 A trainee must verify completion of at least 12 hours of field observation prior to attending the Method 303 certification course. Trainees shall observe the operation of a coke oven battery as it pertains to Method 303, including topside operations, and shall also practice conducting Method 303 or similar methods. During the field observations, trainees unfamiliar with coke battery operations shall receive instruction from an experienced coke oven observer familiar with Method 303 or similar methods and the operation of coke batteries.

10.1.2 The classroom instruction shall familiarize the trainees with Method 303 through lecture, written training materials, and a Method 303 demonstration video. Successful completion of the classroom portion of the Method 303 training course shall be demonstrated by a perfect score on the initial certification test. Those attending the course for third-year recertification must compete one of the recertification tests, selected at random.

10.1.3 All trainees must demonstrate proficiency in the application of Method 303 to a panel of three certified Method 303 observers, including an ability to differentiate coke oven emissions from condensing water vapor and smoldering coal. The panel members will be EPA, state or local agency personnel, or industry contractors listed in 59 FR 11960 (March 15, 1994) or qualified as part of the training provider approval process of Section 10.1 of this method.

Each panel member shall have at least 120 days experience in reading visible emissions from coke ovens. The visible emissions inspections that will satisfy the experience requirement must be inspections of coke oven battery fugitive emissions from the emission

points subject to emission standards under subpart L of this part (i.e., coke oven doors, topside port lids, off take system (s) , and charging operations), using either Method 303 or predecessor State or local test methods. A "day's experience" for a particular inspection is a day on which one complete inspection was performed for that emission point under Method 303 or a predecessor State or local method. A "day's experience" does not mean 8 or 10 hours performing inspections, or any particular time expressed in minutes or hours that may have been spent performing them. Thus, it would be possible for an individual to qualify as a Method 303 panel member for some emission points, but not others (e.g., an individual might satisfy the experience requirement for coke oven doors, but not topside port lids). Until November 15, 1994, the EPA may waive the certification requirement (but not the experience requirement) for panel members. The composition of the panel shall be approved by the EPA.

The panel shall observe the trainee in a series of training runs and a series of certification runs. There shall be a minimum of 1 training run for doors, topside port-lids, and offtake systems, and a minimum of 5 training runs (i.e., 5 charges) for charging. During training runs, the panel can advise the trainee on proper procedures. There shall be a minimum of 3 certification runs for doors, topside port lids, and offtake systems, and a minimum of 15 certification runs for charging (i.e., 15 charges). The certifications runs shall be unassisted. Following the certification test runs, the panel shall approve or disapprove certification based on the trainee's performance during the certification runs. To obtain certification, the trainee shall demonstrate to the satisfaction of the panel a high degree of proficiency in performing Method 303. To aid in evaluating the trainees performance, a checklist, approved by the-EPA, will be used by the panel members.

10.1.4 Those successfully completing the initial certification or third-year recertification requirements shall receive a certificate showing certification as a Method 303 observer and the beginning and ending dates of the certification period.

10.1.5 The training provider will submit to EPA or their designee the following information for each trainee successfully completing initial certification or third-year recertification training: name, employer, address, telephone, cell and/or fax numbers, email address, beginning and ending dates of certification, and was training for 3-year certification, or 1-year recertification. This information must be submitted within 30 days of the course completion.

10.1.6 The training provider will maintain the following records, to be made available to EPA or their designee on request (within 30 days of a request):

a. A file for each Method 303 observer containing the signed certification checklists, certification forms and test results for their initial certification and any subsequent third-year recertifications. Initial certification records must also include documentation showing successful completion of the training prerequisites. Testing results from any interim recertifications must also be included, along with any relevant communications.

b. A searchable master electronic database of all persons for which initial certification, third-year recertification or interim recertification has been provided. Information contained therein must include the observers name, employer, address, telephone, cell and fax numbers and email address, along with the beginning and ending dates for each successfully completed initial, third-year and interim recertification.

10.1.7 Failure by the training provider to submit example training course materials and/or requested training records to the Administrator, may result in suspension of the approval of the provider and course.

10.2 Observer Certification/Recertification. The coke oven observer certification is valid for 1 year. The observer shall recertify annually by reviewing the training materials, viewing the training

video and answering all of the questions on the recertification test correctly. Every 3 years, an observer shall be required to pass the proficiency test in Section 10.1.3 in order to be certified. The years between proficiency tests are referred to as interim years.

10.3 An owner or operator of a coke oven battery subject to subpart L of this part may observe a training and certification program under this section.

11.0 Procedure.

11.1 Procedure for Determining VE from Charging Systems During Charging

11.1.1 Number of Oven Charges. Refer to §63.309(c)(1) of this part for the number of oven charges to observe. The observer shall observe consecutive charges. Charges that are nonconsecutive can only be observed when necessary to replace observations terminated prior to the completion of a charge because of visual interferences. (See Section 11.1.5).

11.1.2 Data Records. Record all the information requested at the top of the charging system inspection sheet (Figure 303-1). For each charge, record the identification number-of the oven being charged, the approximate beginning time of the charge, and the identification of the larry car used for the charge.

11.1.3 Observer Position. Stand in an area or move to positions on the topside of the coke oven battery with an unobstructed view of the entire charging system. For wet coal charging systems or non-pipeline coal charging systems, the observer should have an unobstructed view of the emission points of the charging system, including larry car hoppers, drop sleeves, and the topside ports of the oven being charged. Some charging systems are configured so that all emission points can only be seen from a distance of five ovens. For other batteries, distances of 8 to 12 ovens are adequate.

11.1.4 Observation. The charging period begins when coal begins to flow into the oven and ends when the last charging port is recapped. During the charging period, observe all of the potential sources of VE from the entire charging system. For wet coal charging systems or non-pipeline coal charging systems, sources of VE typically include the larry car hoppers, drop sleeves, slide gates, and topside ports on the oven being charged. Any VE from an open standpipe cap on the oven being charged is included as charging VE.

114.1.4.1 Using an accumulative-type stopwatch with unit divisions of at least 0.5 seconds, determine the total time VE are observed as follows. Upon observing any VE emerging from any part of the charging system, start the stopwatch. Stop the watch when VE are no longer observed emerging, and restart the watch when VE reemerges.

11.1.4.2 When VE occur simultaneously from several points during a charge, consider the sources as one. Time overlapping VE as continuous VE. Time single puffs of VE only for the time it takes for the puff to emerge from the charging system. Continue to time VE in this manner for the entire charging period. Record the accumulated time to the nearest 0.5 second under "Visible emissions, seconds" on Figure 303-1.

11.1.5 Visual Interference. If fugitive VE from other sources at the coke oven battery site (e.g. door leaks or condensing water vapor from the coke oven wharf) prevent a clear view of the charging system during a charge, stop the stopwatch and make an appropriate notation under Comments" on Figure 303-1. Label the observation an observation of an incomplete charge, and observe another charge to fulfill the requirements of Section 11.1.1.

11.1.6 VE Exemptions. Do not time the following VE:

11.1.6.1 The VE from burning or smoldering coal spilled on top of the oven, topside port lid, or larry car surfaces; **NOTE:** The VE from smoldering coal are generally white

or gray. These VE generally have a plume of less than 1 meter long. If the observer cannot safely and with reasonable confidence determine that VE are from charging, do not count them as charging emissions.

11.1.6.2 The VE from the coke oven doors or from the leveler bar; or

11.1.6.3 The VE that drift from the top of a larry car hopper if the emissions had already been timed as VE from the drop sleeve. **NOTE:** When the slide gate on a larry car hopper closes after the coal has been added to the oven, the seal may not be airtight. On occasions, a puff of smoke observed at the drop sleeves is forced past the slide gate up into the larry car hopper and may drift from the top; time these VE either at the drop sleeves or the hopper. If the larry car hopper does not have a slide gate or the slide gate is left open or partially closed, VE may quickly pass-through the larry car hopper without being observed at the drop sleeves and will appear as a strong surge of smoke; time these as charging VE.

11.1.7 Total Time Record. Record the total time that VE were observed for each charging operation in the appropriate column on the charging system inspection sheet.

11.1.8 Determination of Validity of a Set of Observations. Five charging observations (runs) obtained in accordance with this method shall be considered a valid set of observations for that day. No observation of an incomplete charge shall be included in a daily set of observations that is lower than the lowest reading for a complete charge. If both complete and incomplete charges have been observed, :the daily set of observations shall include the five highest values observed. Four or three charging observations (runs) obtained in accordance with this method shall be considered a valid set of charging observations only where it is not possible to obtain five charging observations, because of visual interferences (see Section 11.1.5) or inclement weather prevent a clear view of the charging system during charging. However, observations from three or four charges that satisfy these requirements shall not be considered a valid set of charging observations if use of such set of observations in a calculation under Section 12.4 would cause the value of A to be less than 145.

11.1.9 Log Average. For each day on which a valid daily set of observations is obtained, calculate the daily 30-day rolling log average of-seconds of visible emissions from the charging operation for each battery using these data and the 29 previous valid daily sets of observations, in accordance with Section 12.4.

11.2. Procedure for Determining VE from Coke Oven Door Areas. The intent, of this procedure is to determine VE from coke oven door areas by carefully observing the door area from a standard distance while walking at a normal pace.

11.2.1 Number of Runs. Refer to §63.309(c)(1) of this part for the appropriate number of runs.

11.2.2 Battery Traverse. To conduct a battery traverse,, walk the length of the battery on the outside of the pusher machine and quench car tracks at a steady, normal walking pace, pausing to make appropriate entries on the door area inspection sheet (Figure 303-2). A single test run consists of two timed traverses, one for the coke side and one for the push side. The walking pace shall not exceed an average rate of 4 seconds per oven door, excluding time spent moving around stationary obstructions or waiting for other obstructions to move from positions blocking the view of a series of doors. Extra time is allowed for each leak (a maximum of 10 additional seconds for each leaking door) for the observer to make the proper notation. A walking pace of 3 seconds per oven door has been found to be typical. Record, the actual traverse time with a stopwatch.

11.2.2.1 Include in the traverse time only the time spent observing the doors and recording door leaks. To measure actual traverse time, use an accumulative-type stopwatch

with unit divisions of 0.5 seconds or less. Exclude interruptions to the traverse and time required for the observer to move to positions where the view of the battery is unobstructed, or for obstructions, such as the door machine, to move from positions blocking the view of a series of doors.

11.2.2.2 Various situations may arise that will prevent the observer from viewing a door or a series of doors. Prior to the door inspection, the owner or operator may elect to temporarily suspend charging operations for the duration of the inspection, so that all of the doors can be viewed by the observer. The observer has two options for dealing with obstructions to view: (a) stop the stopwatch and wait for the equipment to move or the fugitive emissions to dissipate before completing the traverse; or (b) stop the stopwatch, skip the affected ovens, and move to a position to continue the traverse. Restart the stopwatch and continue the traverse. After the completion of the traverse, if the equipment has moved or the fugitive emissions have dissipated, inspect the affected doors. If the equipment is still preventing the observer from viewing the doors, then the affected doors may be counted as not observed. If option (b) is used because of doors blocked by machines during charging operations, then, of the affected doors, exclude the door from the most recently charged oven from the inspection. Record the oven numbers and make an appropriate notation under "Comments" on the door area inspection sheet (Figure 303-2).

11.2.2.3 When batteries have sheds to control emissions, conduct the inspection from outside the shed unless the doors cannot be adequately viewed. In this case, conduct the inspection from the bench. Be aware of special safety considerations pertinent to walking on the bench and follow the instructions of company personnel on the required equipment and operations procedures. If possible, conduct the bench traverse whenever the bench is clear of the door machine and hot coke guide.

11.2.3 Observations. Record all the information requested at the top of the door area inspection sheet (Figure 303-2), including the number of inoperable ovens. Record the clock time at the start of the traverse on each side of the battery. Record which side is being inspected (i.e., coke side or push side). Other information may be recorded at the discretion of the observer, such as the location of the leak (i.e., top of the door, chuck door, etc.), the reason for any interruption of the traverse, or the position of the sun relative to the battery and sky conditions (i.e., overcast, partly sunny, etc.).

11.2.3.1 Begin the test run by starting the stopwatch and traversing either the coke side or the push side of the battery. After completing one side, stop the watch. Complete this procedure on the other side. If inspecting more than one battery, the observer may view the push sides and the coke sides sequentially.

11.2.3.2 During the traverse, look around the entire perimeter of each oven door. The door is considered leaking if VE are detected in the coke oven door area. The coke oven door area includes the entire area on the vertical face of a coke oven between the bench and the top of the battery between two adjacent buck stays (e.g., the oven door, chuck door, between the masonry brick, buck stay or jamb, or other sources). Record the oven number and make the appropriate notation on the door area inspection sheet (Figure 303-2). **NOTE:** Multiple VE from the same door area (e.g., VE from both the chuck door and the push side door) are counted as only one emitting door, not as multiple emitting doors.

11.2.3.3 Do not record the following sources as door area VE:

11.2.3.3.1 VE from ovens with doors removed. Record the oven number and make an appropriate notation under "Comments;"

11.2.3.3.2 VE from ovens taken out of service. The owner or operator shall notify the observer as to which ovens are out of service. Record the oven number and make an appropriate notation under "Comments;" or

11.2.3.3.3 VE from hot coke that has been spilled on the bench as a result of pushing.

11.2.4 Criteria for Acceptance. After completing the run, calculate the maximum time allowed to observe the ovens using the equation in Section 12.2. If the total traverse time exceeds T, void the run, and conduct another run to satisfy the requirements of §63.309(c)(1) of this part.

11.2.5 Percent Leaking Doors. For each day on which a valid observation is obtained, calculate the daily 30-day rolling average for each battery using these data and the 29 previous valid daily observations, in accordance with Section 12.5.

11.3. Procedure for Determining VE from Topside Port Lids and Offtake Systems

11.3.1 Number of Runs. Refer to §63.309(c)(1) of this part for the number of runs to be conducted. Simultaneous runs or separate runs for the topside port lids and offtake systems may be conducted.

11.3.2 Battery Traverse. To conduct a topside traverse of the battery, walk the length of the battery at a steady, normal walking pace, pausing only to make appropriate entries on the topside inspection sheet (Figure 303-3). The walking pace shall hot exceed an average rate of 4 seconds per oven, excluding time spent moving around stationary obstructions or waiting for other obstructions to move from positions blocking the view. Extra time is allowed for each leak for the observer to make the proper notation. A walking pace of 3 seconds per oven is typical. Record the actual traverse time with a stopwatch.

11.3.3 Topside Port Lid observations. To observe lids of the ovens involved in the charging operation, the observer shall wait to view the lids until approximately 5 minutes after the completion of the charge. Record all the information requested on the topside inspection sheet (Figure 303-3). Record the clock time when traverses begin and end. If the observer's view is obstructed during the traverse (e.g., steam from the coke wharf, larry car, etc.), follow the guidelines given in Section 11.2.2.2.

11.3.3.1 To perform a test run, conduct a single traverse on the topside of the battery. The observer shall walk near the center of the battery but may deviate from this path to avoid safety hazards (such as open or closed charging ports, luting buckets, lid removal bars, and topside port lids that have been removed) and any other obstacles. Upon noting VE from the topside port lid(s) of an oven, record the oven number and port number, then resume the traverse. If any oven is dampered-off from the collecting main for decarbonization, note this under "Comments" for that particular oven. **NOTE:** Count the number of topside ports, not the number of points, exhibiting VE, i.e., if a topside port has several points of VE, count this as one port exhibiting VE.

11.3.3.2 Do not count the following as topside port lid VE:

11.3.3.2.1 VE from between the brickwork and oven lid casing or VE from cracks in the oven brickwork. Note these VE under "Comments;"

11.3.3.2.2 VE from topside ports involved in a charging operation. Record the oven number, and make an appropriate notation (i.e., not observed because ports open for charging) under "Comments;"

11.3.3.2.3 Topside ports having maintenance work done. Record the oven number and make an appropriate notation under "Comments;" or

11.3.3.2.4 Condensing water from wet-sealing material. Ports with only visible condensing water from wet-sealing material are counted as observed but not as having VE.

11.3.3.2.5 Visible emissions from the flue inspection ports and caps.

11.3.4 Offtake Systems Observations. To perform a test run, traverse the battery as in Section 11.3.3.1. Look ahead and back two to four ovens to get a clear view of the entire offtake system for each oven. Consider visible emissions from the following points as offtake system VE: (a) the flange, between the gooseneck and collecting main ("saddle"), (b) the junction point of the standpipe and oven ("standpipe base"), (c) the other parts of the offtake system (e.g., the standpipe cap), and (d) the junction points with ovens and flanges of jumper pipes.

11.3.4.1. Do not stray from the traverse line in order to get a "closer look" at any part of the offtake system unless it is to distinguish leaks from interferences from other sources or to avoid obstacles.

11.3.4.2 If the centerline does not provide a clear view of the entire offtake system for each oven (e.g., when standpipes are longer than 15 feet), the observer may conduct the traverse farther from (rather than closer to) the offtake systems.

11.3.4.3 Upon noting a leak from an offtake system during a traverse, record the oven number. Resume the traverse. If the oven is dampered-off from.the collecting main for decarbonization and VE are observed, note this under "Comments" for that particular oven.

11.3.4.4 If any part or parts of an offtake system have VE, count it as one emitting offtake system. Each stationary jumper pipe is considered a single offtake system.

11.3.4.5 Do not count standpipe caps open for a decarbonization period or standpipes of an oven being charged as source of offtake system VE. Record the oven number and write "Not observed" and the reason (i.e., decarb or charging) under "Comments." **NOTE:** VE from open standpipes of an oven being charged count as charging emissions. All VE from closed standpipe caps count as offtake leaks.

11.3.5 Criteria for Acceptance. After completing the run (allow 2 traverses for batteries with double mains), calculate the maximum time allowed to observe the topside port lids and/or offtake systems using the equation in Section 12.3. If the total traverse time exceeds T, void the run and conduct another run to satisfy the requirements of §63.309(c)(1) of this part.

11.3.6 In determining the percent leaking topside port lids and percent leaking offtake systems, do not include topside port lids or offtake systems with VE from the following ovens:

11.3.6.1 Empty ovens, including ovens undergoing maintenance,. which are properly dampered off from the main.

11.3.6.2 Ovens being charged or being pushed.

11.3.6.3 Up to 3 full ovens that have been dampered off from the main prior to pushing.

11.3.6.4 Up to 3 additional full ovens in the pushing sequence that have been dampered off from the main for offtake system cleaning, for decarbonization, for safety reasons, or when a charging/pushing schedule involves widely separated ovens (e.g., a Marquard system); or that have been dampered off from the main for maintenance near the end of the coking cycle. Examples of reasons that ovens are dampered off for safety reasons are to avoid exposing workers in areas with insufficient

clearance between standpipes and the larry car, or in areas where workers could be exposed to flames or hot gases from open standpipes, and to avoid the potential for removing a door on an oven that is not dampered off from the main.

11.3.7 Percent Leaking Topside Port Lids and Offtake Systems. For each day on which a valid observation is obtained, calculate the daily 30-day rolling average for each battery using these data and the 29 previous valid daily observations, in accordance with Sections 12.6 and 12.7.

11.4. Procedure for Determining VE from Collecting Mains

11.4.1 Traverse. To perform a test run, traverse both the collecting main catwalk and the battery topside along the side closest to the collecting main. If the-battery has a double main, conduct two sets of traverses for each run, i.e., one set for each main.

11.4.2 Data Recording. Upon noting VE from any portion of a collection main, identify the source and approximate location of the source of VE and record the time under "Collecting main" on Figure 303-3; then resume the traverse.

11.4.3 Collecting Main Pressure Check. After the completion of the door traverse, the topside port lids, and offtake systems,compare the collecting main pressure during the inspection to the collecting main pressure during the previous 8 to 24 hours. Record the following: (a) the pressure during inspection, (b) presence of pressure deviation from normal operations, and (c) the explanation for any pressure deviation from normal operations, if any, offered by the operators. The owner or operator of the coke battery shall maintain the pressure. recording equipment and conduct the quality assurance/quality control (QA/QC) necessary to ensure reliable pressure readings and shall keep the QA/QC records for at least 6 months. The observer may periodically check the QA/QC records to determine their completeness. The owner or operator shall provide access to the records within 1 hour of an observer's request.

12.0 Data Analysis and Calculations.

12.1 Nomenclature.

A = 150 or the number of valid observations (runs). The value of A shall not be less than 145, except for purposes of determinations under §63.306(c) [work practice plan implementation] or §63.306(d) [work practice plan revisions] of this part. No set of observations shall be considered valid for such a recalculation that otherwise would not be considered a valid set of observation for a calculation under this paragraph.

D_i = Number of doors on non-operating ovens.

D_{no} = Number of doors not observed.

D_{ob} = Total number of doors observed on operating ovens.

D_t = Total number of oven doors on the battery.

e = 2.72

J = Number of stationary jumper pipes.

L = Number of doors with VE.

L_b = Yard-equivalent reading.

L_s = Number of doors with VE observed from the bench under sheds.

L_y = Number of doors with VE observed from the yard.

L_y = Number of doors with VE observed from the yard on the push side.

ln = Natural logarithm.

N = Total number of ovens in the battery.

N_i = Total number of inoperable ovens.

P_{no} = Number of ports not observed.

P_{ovn} = Number of ports per oven.

P_{VE} = Number of topside port lids with VE.

PLD = Percent leaking coke oven doors for the test run.

PLL = Percent leaking topside port lids for the run.

PLO = Percent leaking offtake systems.

T = Total time allowed for traverse, seconds.

T_{ovn} = Number of offtake systems (excluding jumper pipes per oven).

T_{no} = Number of offtake systems not observed.

T_{VE} = Number of offtake systems with VE.

X_i = Seconds of VE during the i^{th} charge.

Z = Number of topside port lids or offtake systems with VE.

12.2 Criteria for Acceptance for VE Determinations from Coke Oven Door Areas. After completing the run, calculate the maximum time allowed to observe the ovens using the following equation:

$$T = (4 \times D_t) + (10 \times L) \quad \text{Eq. 303-1}$$

12.3 Criteria for Acceptance for VE Determinations from Topside Port Lids and Offtake Systems. After completing the run (allow 2 traverses for batteries with double mains), calculate the maximum time allowed to observe the topside port lids and/or offtake systems by the following equation:

$$T = (4 \times N) + (10 \times Z) \quad \text{Eq. 303-2}$$

12.4 Average Duration of VE from Charging Operations. Use Equation 303-3 to calculate the daily 30-day rolling log average of seconds of visible emissions from the charging operation for each battery using these current day's observations and the 29 previous valid daily sets of observations.

$$\text{logarithmic average} = e^{y} - 1 \quad \text{Eq. 303-3}$$

where $y = \dfrac{\ln(X_1 + 1) + \ln(X_2 + 1) + \ldots \ln(X_i + 1)}{A}$

12.5 Percent Leaking Doors (PLD). Determine the total number of doors for which observations were made on the coke oven battery as follows:

$$D_{ob} = (2 \times N) - (D_i + D_{no}) \quad \text{Eq. 303-4}$$

12.5.1 For each test run (one run includes both the coke side and the push side traverses), sum the number of doors with door area VE. For batteries subject to an approved alternative standard under §63.305 of this part, calculate the push side and the coke side PLD separately.

12.5.2 Calculate percent leaking doors by using Equation 303-5:

$$PLD = \frac{L_y}{D_{ob}} \times 100 \quad \text{Eq. 303-5}$$

12.5.3 When traverses are conducted-from the bench under sheds, calculate the coke side and the push side separately. Use Equation 303-6 to calculate a yard-equivalent reading:

$$L_b = L_s - (N \times 0.06) \quad \text{Eq. 303-6}$$

If L_b is less than zero, use zero for L_b in Equation 303-7 in the calculation of PLD.

12.5.3.1 Use Equation 303-7 to calculate PLD:

$$PLD = \frac{L_b + L_y}{D_{ob}} \times 100 \quad \text{Eq. 303-7}$$

Round off PLD to the nearest hundredth of 1 percent and record as the percent leaking coke oven doors for the run.

12.5.3.2 Average Percent Leaking Doors. Use Equation 303-8 to calculate the daily 30-day rolling average for each battery using these current day's observations and the 29 previous valid daily sets of observations.

$$PLD_{30-day} = \frac{(PLD_1 + PLD_2 ... + PLD_{30})}{30} \quad \text{Eq. 303-8}$$

12.6 Topside Port Lids. Determine the percent leaking topside port lids for each run as follows:

$$PLL = \frac{P_{VE}}{P_{ovn}(N - N_i) - P_{no}} \times 100 \quad \text{Eq. 303-9}$$

12.6.1 Round off this percentage to the nearest hundredth of 1 percent and record this percentage as the percent leaking topside port lids for the run.

12.6.2 Average Percent Leaking Topside Port Lids. Use Equation 303-10 to calculate the daily 30-day rolling average for each battery using these current day's observations and the 29 previous valid daily sets of observations.

$$PLL_{30-day} = \frac{(PLL_1 + PLL_2 + ... + PLL_{30})}{30} \quad \text{Eq. 303-10}$$

12.7 Offtake Systems. Determine the percent leaking offtake systems for the run as follows:

$$PLO = \frac{T_{VE}}{T_{ovn}(N - N_i) + J - T_{no}} \times 100 \quad \text{Eq. 303-11}$$

12.7.1 Round off this percentage to the nearest hundredth of 1 percent and record this percentage as the percent leaking offtake systems for the run.

12.7.2 Average Percent Leaking Offtake Systems. Use Equation 303-12 to calculate the daily 30-day rolling average for each battery using these current day's observations and the 29 previous valid daily sets of observations.

$$PLO_{30-day} = \frac{PLO_1 + PLO_2 + ... PLO_{30}}{30} \quad \text{Eq. 303-12}$$

13.0 Method Performance. [Reserved]

14.0 Pollution Prevention. [Reserved]

15.0 Waste Management. [Reserved]

16.0 References.

1. Missan, R., and A. Stein. Guidelines for Evaluation of Visible Emissions Certification, Field Procedures, Legal Aspects, and Background Material. U. S. Environmental Protection Agency. EPA Publication No. EPA-340/1-75-007. April 1975.
2. Wohlschlegel, P., and D. E. Wagoner. Guideline for Development of a Quality Assurance Program: Volume IX - Visual Determination of Opacity Emission from Stationary Sources. U.S. Environmental Protection Agency. EPA Publication No. EPA-650/4-005i. November 1975.
3. U.S. Occupational Safety and Health Administration. *Code of Federal Regulations*. Title 29, Chapter XVII, Section 1910.1029 (g). Washington, D.C. Government Printing Office. July 1, 1990.
4. U. S. Environmental Protection Agency. National Emission Standards for Hazardous Air Pollutants; Coke Oven Emissions from Wet-Coal Charged By-Product Coke Oven Batteries; Proposed Rule and Notice of Public Hearing. Washington, D.C. Federal Register. Vol. 52, No. 78 (13586). April 23, 1987.

17.0 Tables, Diagrams, Flowcharts, and Validation Data.

Company name :_____

Battery no. :_____

Date :_____

Run no. :_____

City, State :_____

Observer name :_____

Company representative(s) :_____

Charge no.	Oven no.	Clock time	Visible Emissions, seconds	Comments

Figure 303-1. Charging System Inspection

Company name :_____

Battery no. :_____

Date :_____

City, State :_____

Total no. of ovens in battery :_____

Observer name :_____

Certification expiration date :_____

Inoperable ovens :_____

Company representative(s) :_____

Traverse time CS :_____

Traverse time PS :_____

Valid run (Y or N) :_____

Time traverse started/completed	PS/CS	Door Number	Comments (no. of blocked doors, interruptions to traverse, etc.)

Figure 303-2 Door Inspection.

Company name :_____

Battery no. :_____

Date :_____

City, State :_____

Total no. of ovens in battery :_____

Observer name :_____

Certification expiration date :_____

Inoperable ovens :_____

Company representative(s) :_____

Total no. of lids :_____

Total no. of offtakes :_____

Total no. of jumper pipes :_____

Ovens not observed :_____

Total traverse time :_____

Valid run (Y or N) :_____

Time traverse started/completed	Type of inspection (lids, offtakes, collecting main)	Location of VE (Oven #/Port #)	Comments

Figure 303-3. Topside Inspection