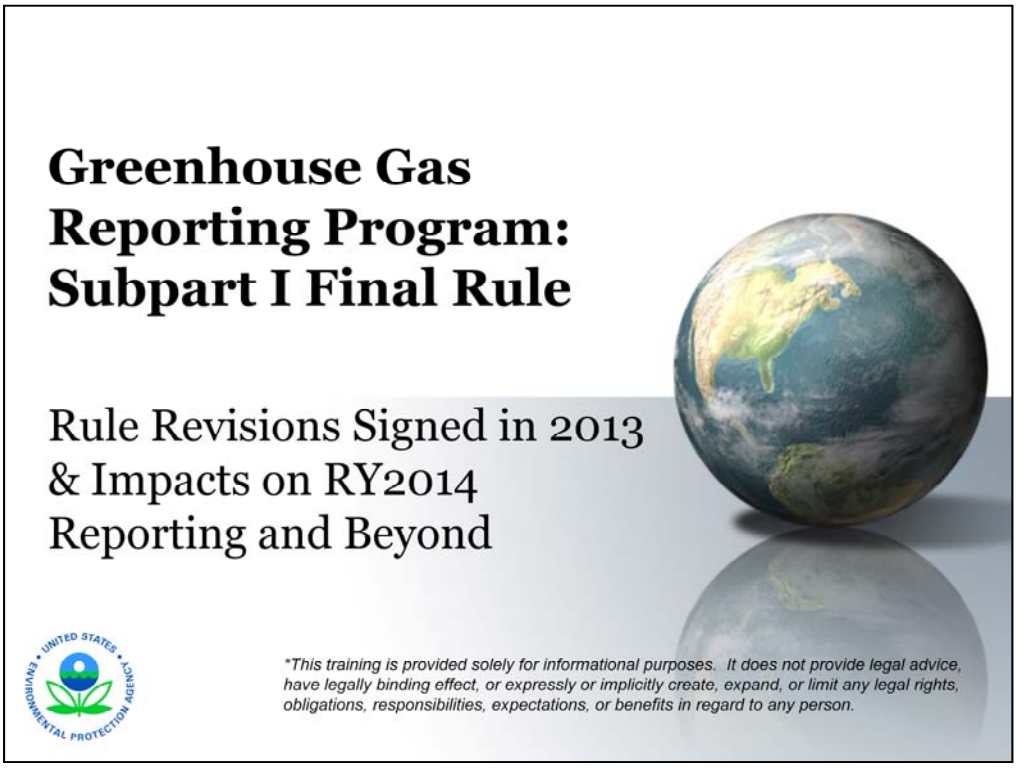


Welcome to the U.S. Environmental Protection Agency's Greenhouse Gas Reporting Rule online training. This training covers the 2013 Final Amendments to subpart I, which were published in the Federal Register on November 13, 2013. A copy of the Federal Register Final rule notice is available on our website – http://www.epa.gov/ghgreporting.

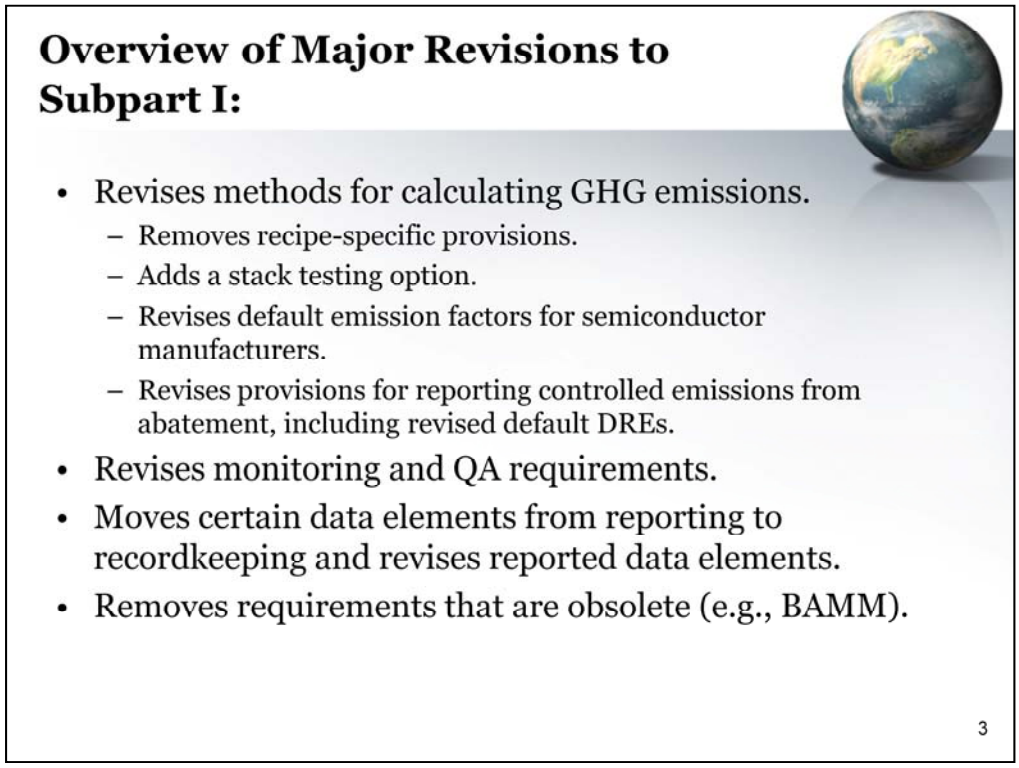
Disclaimer: This training is provided solely for informational purposes. It does not provide legal advice, have legally binding effect, or expressly or implicitly create, expand, or limit any legal rights, obligations, responsibilities, expectations, or benefits in regard to any person.

A brief history:

Subpart I was promulgated December 1, 2010 (75 FR 74818). The final rule was challenged by industry members in a petition filed January 31, 2011 ("Petition for Reconsideration and Request for Stay Pending Reconsideration of Subpart I of the Final Rule for Mandatory Reporting of Greenhouse Gases", available in Docket EPA-HQ-OAR-2009-0927). EPA published five subsequent rulemakings to extend Best Available Monitoring Method (BAMM) provisions, amend calculation methodologies to provide flexibility, clarify provisions for heat transfer fluids, and establish confidentiality determinations for certain data elements. See http://www.epa.gov/ghgreporting/reporters/subpart/i.html.

The October 16, 2012 (77 FR 63538) proposal revised calculation and monitoring methodologies, data reporting, and recordkeeping requirements to address all remaining industry concerns. EPA received comments on the proposed rule from both industry and environmental groups. The final rule amendments were published in the Federal Register on November 13, 2013. A copy of the final rule notice from the Federal Register is available at EPA's Greenhouse Gas Reporting Program website (http://www.epa.gov/ghgreporting/).

The final amendments are effective on January 1, 2014 and reporters will follow the estimation, monitoring, recordkeeping, and reporting requirements for reporting year 2014 (RY2014) for reports submitted in early 2015. Reports for RY2013 will continue to follow the requirements that predated these final rule amendments.



This slide gives an overview of the major revisions to subpart I according to the final rule amendments. We will explain these in more detail in the next slides. For a more comprehensive listing, as well as EPA's rationale, please review the preambles to the proposed and final rules, and the response to comments document for the final rule.

The final rule revises methods for calculating GHG emissions.

-Removes recipe-specific provisions and allows for use of separate estimation methods for separate fabs within a single facility.

-Adds a stack testing option for development of fab-specific emission factors.

-Revises default emission factors for semiconductor manufacturers.

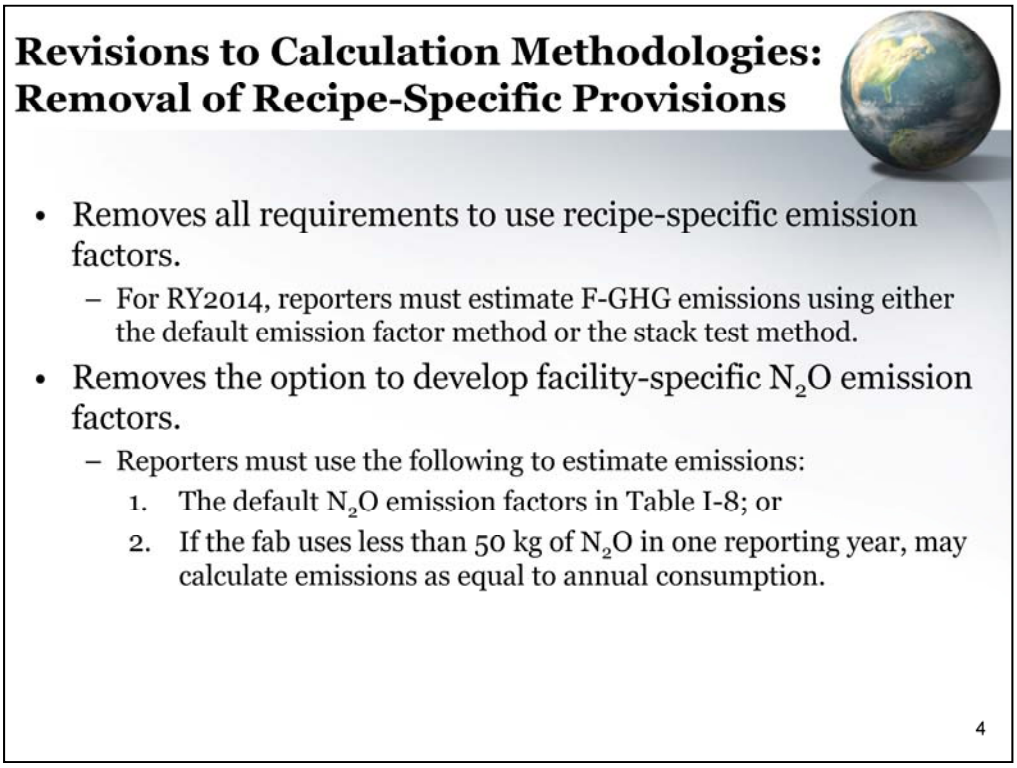
-Revises provisions for reporting controlled emissions from abatement, including revised default DREs for certain F-GHGs.

Calculation revisions also include: changes to equations and definitions used to determine applicability (e.g., reporters must sum the annual manufacturing across each fab to determine facility capacity); removes the requirement for semiconductor manufacturers to calculate and report their F-GHG emissions using recipe-specific emission factors (which previously depended on the annual manufacturing capacity of the facility and the size of wafers that the facility is manufacturing); and removes the option to measure and use facility-specific N2O emission factors.

The rule also revises monitoring and quality assurance requirements, including revisions to accuracy and precision requirements for measuring devices; clarification of when to recalculate the facility-wide gas specific heel factor; and changes to apportioning model verification.

The amendments move certain data elements from reporting to recordkeeping and revises reported data elements. It adds a provision to allow electronics manufacturers to report R&D emissions as part of total facility emissions for flexibility. It also adds a requirement for certain higher-emitting facilities to submit a triennial report to address technology and process changes.

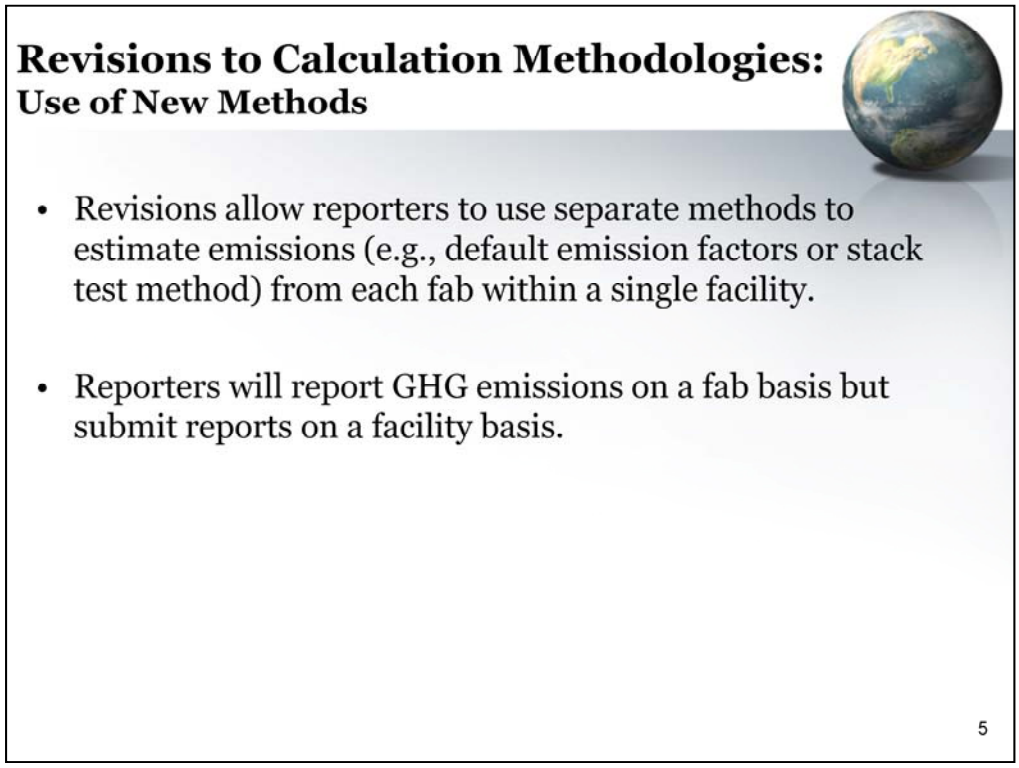
The final rule removes requirements that are obsolete (e.g., BAMM) as of January 1, 2014.



EPA has removed all rule requirements related to the use of recipe-specific emission factors [40 CFR 98.93(a)(2)(ii)(A), (a)(3), (a)(4), and (a)(6)]. The mandatory use of these emission factors was deferred until December 31, 2013 (76 FR 59542, September 27, 2011). No reporter submitted recipe-specific data for RY2011 or RY2012; however, reporters may still use the recipe-specific methods for estimating 2013 emissions reported in 2014.

For reports submitted in early 2015 (RY2014), reporters must choose between the default emission factor method (40 CFR 98.93(a)(1),(a)(2), and (a)(6)), or the stack test method (40 CFR 98.93(i)). EPA has revised 40 CFR 98.93(a)(6) to remove the option to develop recipe-specific emission factors for F-GHG and process combinations for which no default factors are available. Under the final amendments, reporters using the default emission factor method must assume that F-GHG emissions are equal to consumption for gas and process type combinations without default emission factors.

EPA also removed the option to develop and use facility-specific N2O emission factors [40 CFR 98.93(b)(1)(i) and (b)(2)(i)]. To date, no reporters have used facility-specific N2O emission factors. For reports submitted in early 2015 (RY2014), reporters must use the default N2O emission factors in Table I-8 to estimate emissions; or, optionally assume that emissions equal consumption if the fab uses less than 50 kg of N2O in one reporting year. EPA did not revise the current default N2O emission factors in the final amendments.

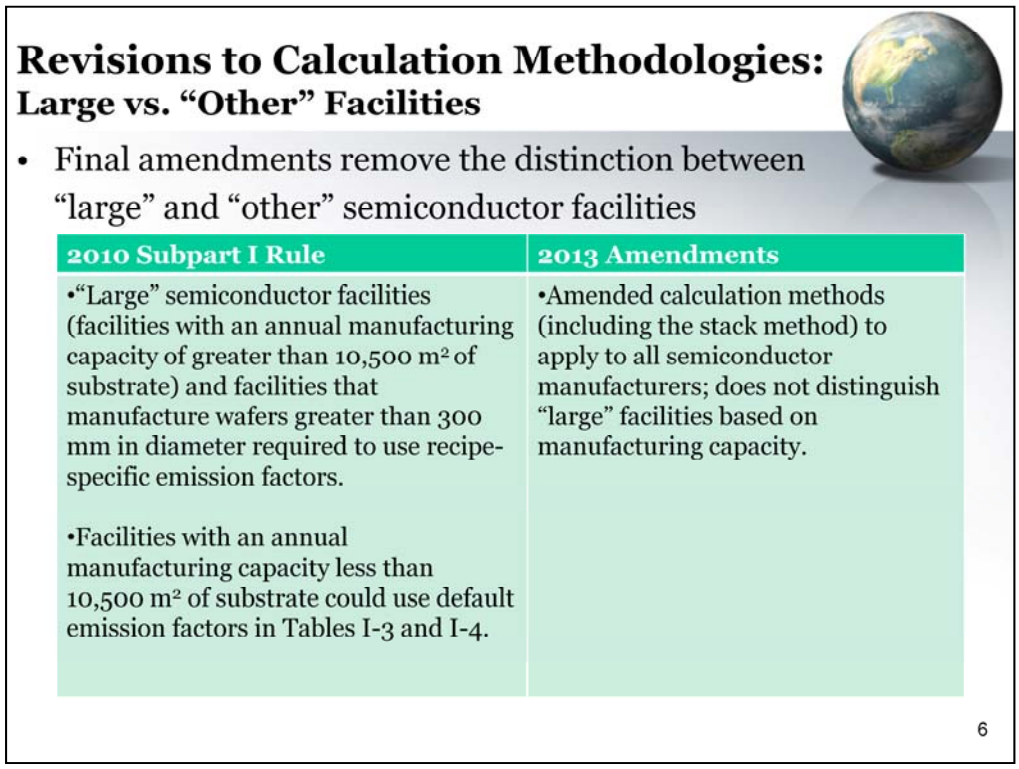


Although the EPA has removed the recipe-specific method, the rule still allows the use of the default emission factor method and the stack test method. The final rule allows all reporters, regardless of the product manufactured, the option to use separate estimation methods for each fab within a single facility. A reporter must use only a single method for each fab.

"Fab" is defined as *"the portion of an electronics manufacturing facility located in a separate physical structure that began manufacturing on a certain date."*

"*Facility*" is defined as "*any physical property, plant, building, structure, source, or stationary equipment located on one or more contiguous or adjacent properties in actual physical contact or separated solely by a public roadway or other public right-of-way and under common ownership or common control, that emits or may emit any greenhouse gas. Operators of military installations may classify such installations as more than a single facility based on distinct and independent functional groupings within contiguous military properties*."

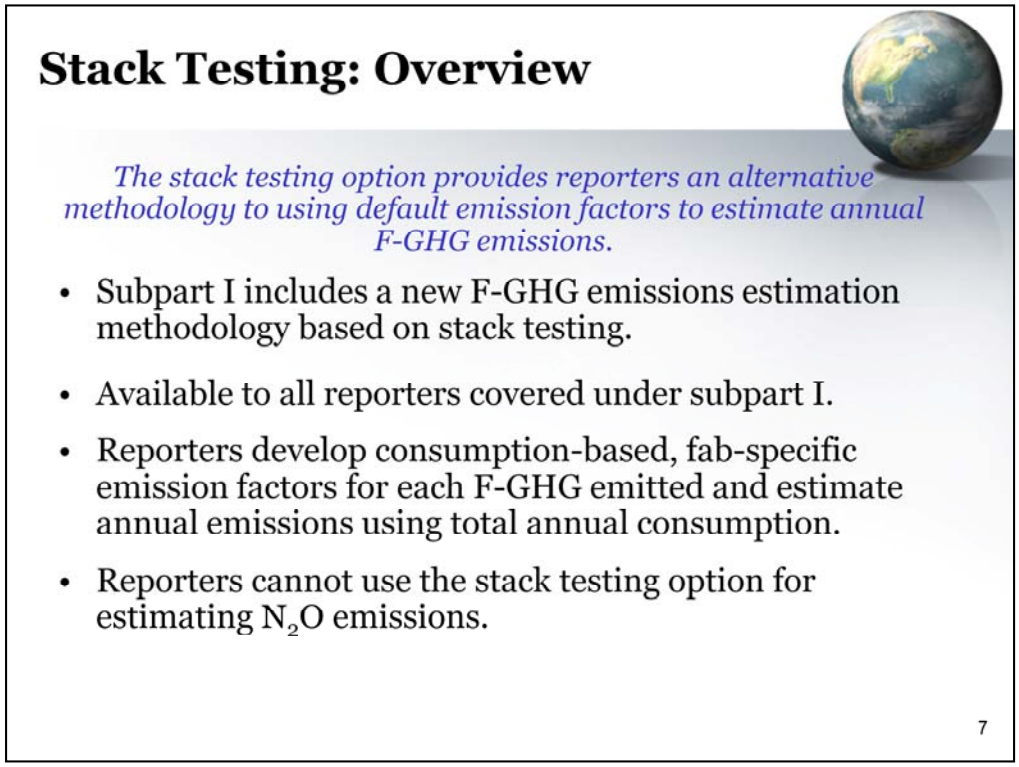
Reporters will report GHG emissions on a fab basis but submit reports on a "facility" basis. There may be one or more fabs at each facility that are detailed in the annual report.



The rule also removes the distinction between large and other semiconductor facilities, such that all reporters may use the default emission factors in Tables I-3 and I-4, independent of facility size or wafer size.

In the 2010 subpart I rule, "large" semiconductor facilities (facilities with an annual manufacturing capacity of greater than 10,500 m^2 of substrate) and facilities that manufacture wafers greater than 300mm in diameter were required to develop and use recipe-specific emission factors [40 CFR 98.93(a)(2)(ii)(A) and (a)(4)]. Facilities with an annual manufacturing capacity less than 10,500 m^2 of substrate could use default emission factors in Tables I-3 and I-4.

In the final rule amendments, EPA removed the distinction between large and other semiconductor facilities, such that all reporters may use default emission factors or the new stack testing method, regardless of wafer size or manufacturing capacity.

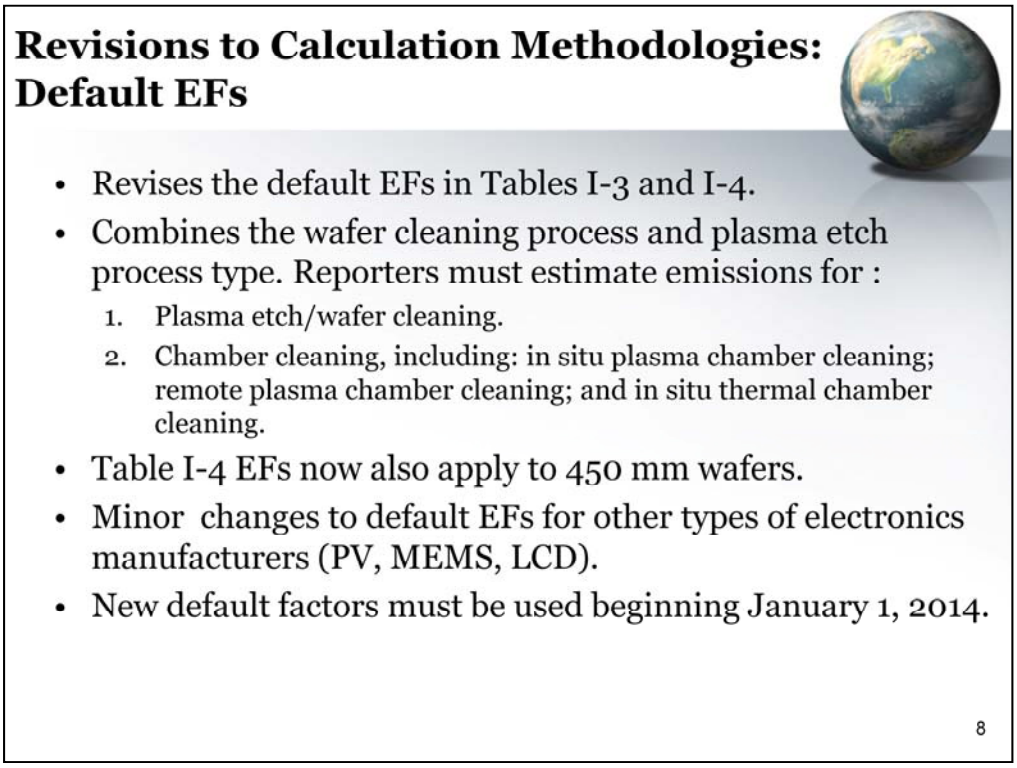


The stack testing option [40 CFR 98.93(i)] is available to all reporters subject to subpart I, including semiconductor, MEMS, LCD, and PV manufacturers.

The stack testing option is based on the conclusion that F-GHG emissions are a direct and reasonably constant function of gas consumption. Under the stack testing option, reporters measure emissions of F-GHGs from their fab and use the gas consumption during the emissions test to develop fab-specific F-GHG emission factors. Reporters then multiply those fab-specific F-GHG emission factors by the annual gas consumption to determine their total annual F-GHG emissions.

Reporters cannot use the stack testing option to estimate annual N2O emissions. An EPA review of industry stack test data revealed inconsistent results for stack measurements of N2O emissions. Because EPA could not be isolate a cause for the inconsistencies, the reliability of estimating N2O emissions using stack testing could not be determined.

The stack testing method will be covered in a separate webinar **on November 7th, 2013 at 3:00 PM**.



EPA has revised the default plasma etch and chamber cleaning emission factors in Tables I-3 and I-4 for semiconductor manufacturers. All reporters, regardless of manufacturing capacity or facility size, have the option to calculate F-GHG emissions using the default factors, or they may use the stack testing alternative. As mentioned earlier, the revised rule has removed the requirement for certain reporters to use recipe-specific emission factors, after these were made optional in earlier rule amendments. No reporters that reported for 2011 or 2012 used the recipe-specific emission factors.

The revised default emission factors are based on an expanded data set provided by semiconductor manufacturing facilities and are still based on wafer size, gas, and process type/sub-type. The revised default emission factors also include new factors for gas and process combinations that were not included previously. Therefore, reporters will be less likely to have to assume that the gas utilization rate and by-product formation rates are zero for gas and process combinations that are not included in Tables I-3 and I-4.

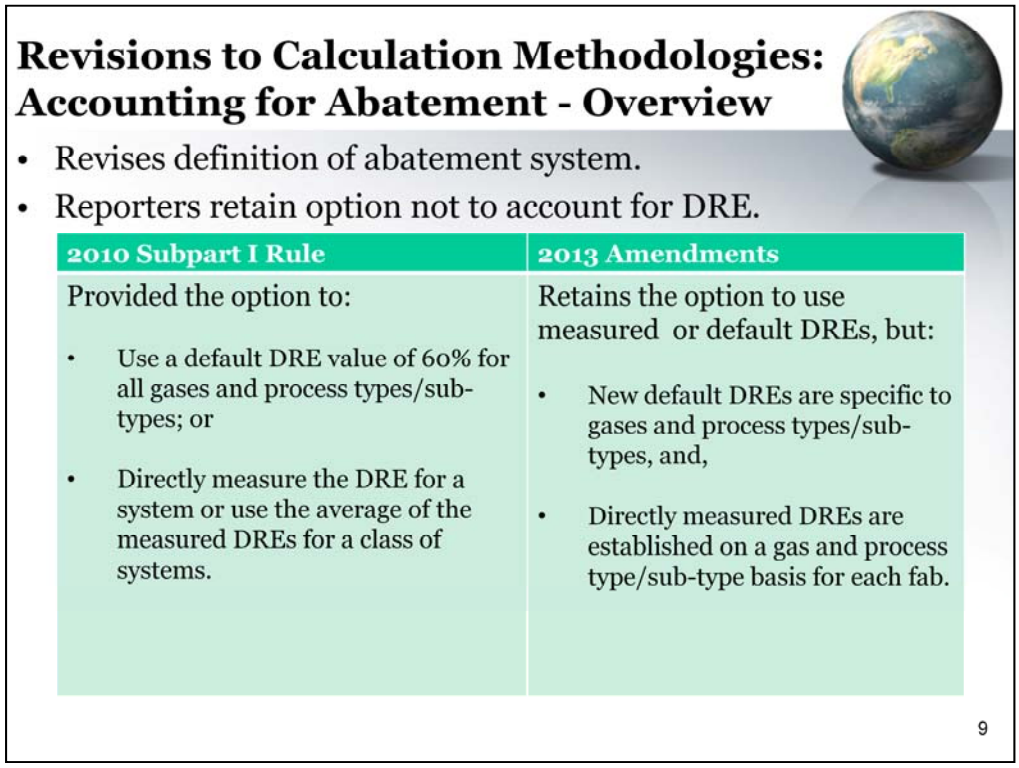
The revised emission factors combine the plasma etching and wafer cleaning process types and no longer have separate emission factors for the wafer cleaning process type. Tables I-3 and I-4 include default emission factors for the following process types/sub-types: Plasma etch/wafer cleaning; Chamber cleaning, including in situ plasma chamber cleaning; remote plasma chamber cleaning; and in situ thermal chamber cleaning.

For the final amendments, reporters using wafers greater than 300 mm diameter (e.g., 450 mm wafers) will use the same default emission factors as those using 300 mm wafers in Table I-4.

If emission factors are not available for a gas/process combination in Tables I-3 or I-4 of subpart I, reporters must assume that the utilization and by-product formation rates are zero (i.e., assume that emissions of a gas equals consumption of that gas, if there is no abatement), as in the current rule.

The final rule includes minor changes to the default emission factors for the chamber cleaning process type for PV, MEMS, and LCD (Tables I-5 to I-7), but no new gas and process type combinations.

Beginning January 1, 2014, reporters must use the new default emission factors and can no longer use the emission factors in the current rule.

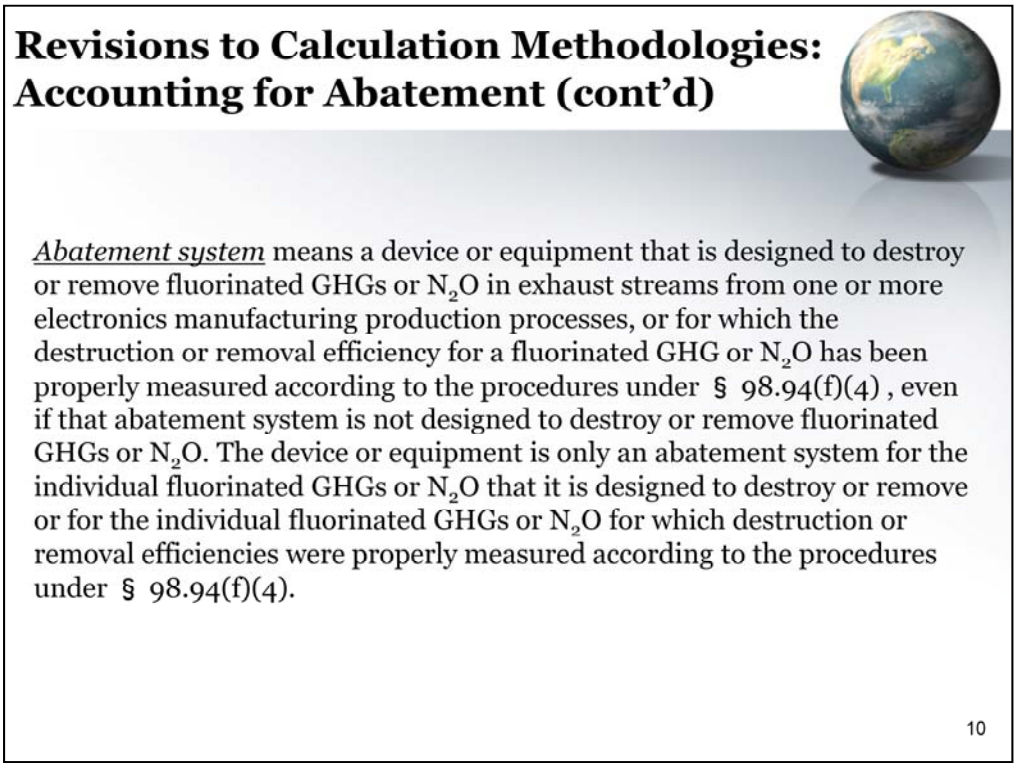


The amended rule revises the definition of abatement system to be more specific about what should be considered a F-GHG abatements system (see next slide).

As in the current rule, the revised rule still provides reporters with the option to not account for DRE in emission calculations.

The final amendments retain the option to use a measured DRE value or default DRE factors.

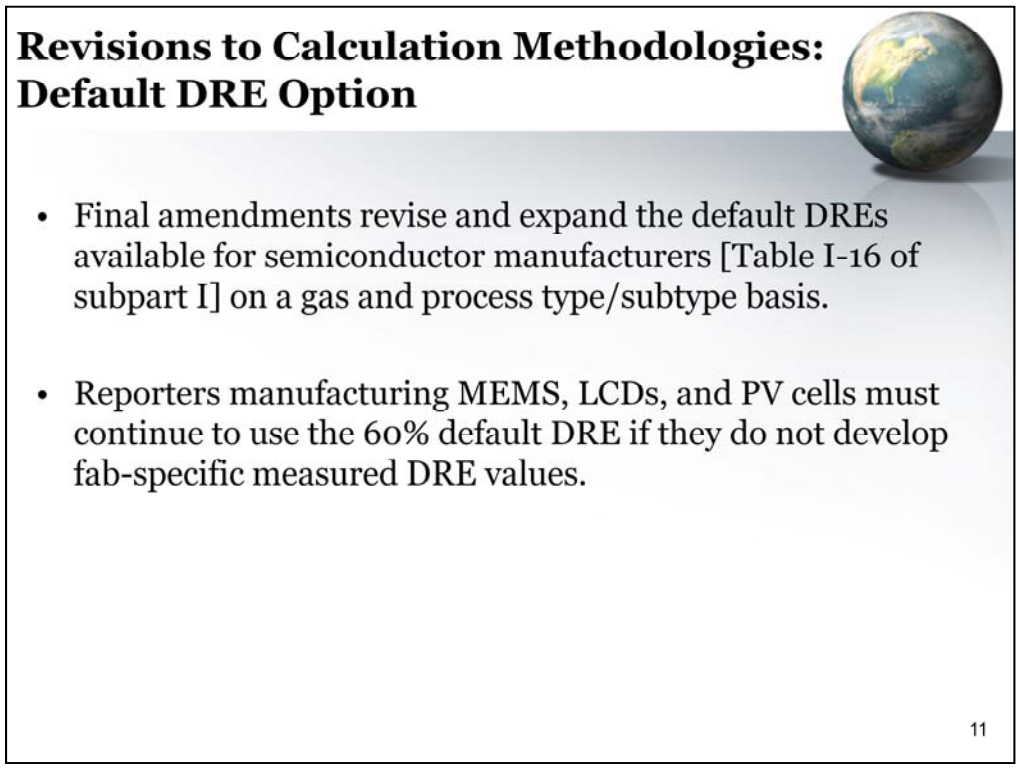
Reporters may use a combination of measured and default DRE values; however, if a reporter develops a measured DRE value for a specific gas/ process type combination for a fab, the default DRE factor cannot be used for that gas/ process type combination for that fab.



The final rule revises the definition of abatement system. The new definition includes only devices that were specifically designed to remove F-GHG and N2O, and those devices for which the DRE was measured according to the EPA's DRE protocol referenced in 40 CFR 98.94 (including the DRE protocol modifications included in Appendix A to Subpart I). This provision allows reporters to account for incidental control of F-GHGs or N2O from systems designed to control other types of air pollution.

Reporters that account for DRE in their emission calculations using either default or measured DREs will be required to certify these systems according to the applicable requirements of 40 CFR 98.94(f), and meet the recordkeeping requirements of 40 CFR 98.97 for abatement systems.

Even if a reporter does not account for the DRE in emission calculations, they must still include all F-GHG and N2O abatement systems in the abatement system inventory included in the annual report (40 CFR 98.96(q)).



The final rule revises the default DRE values that are applicable to semiconductor manufacturing, but does not revise the default DRE factors for manufacturers of MEMS, LCDs, and PV cells.

The revised default DREs are based on additional DRE measurements that were provided by semiconductor industry members.

Revisions to Calculation Methodologies: Revised Default DREs from Table I-16

Manufacturing Type/Process Type/Gas	Default DRE
MEMS, LCDs, and PV Manufacturing	60%
Semiconductor Manufacturing	
Plasma Etch/Wafer Clean Process Type	
CF4	75%
CH3F	97%
CHF3	97%
CH2F2	97%
C2F6	97%
C3F8	97%
C4F6	97%
C4F8	97%
C5F8	97%
SF6	97%
NF3	96%
All other carbon-based plasma etch/wafer clean fluorinated GHG	60%
Chamber Clean Process Type	
NF3	88%
All other chamber clean fluorinated GHG	60%
N2O Processes	
CVD and all other N2O-using processes	60%

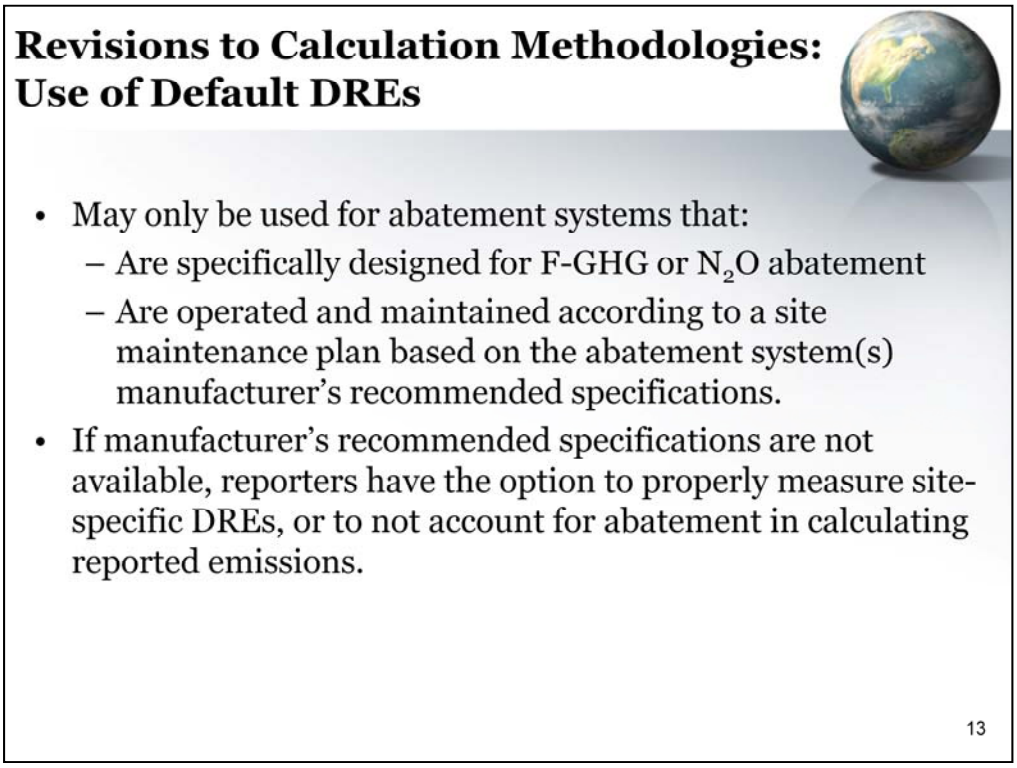
12

Table I-16 in the final rule provides the revised default DRE values.

The final rule does not revise default DRE factors for MEMS, LCDs, and PV cells, and the default DRE for these manufacturing processes is still 60%.

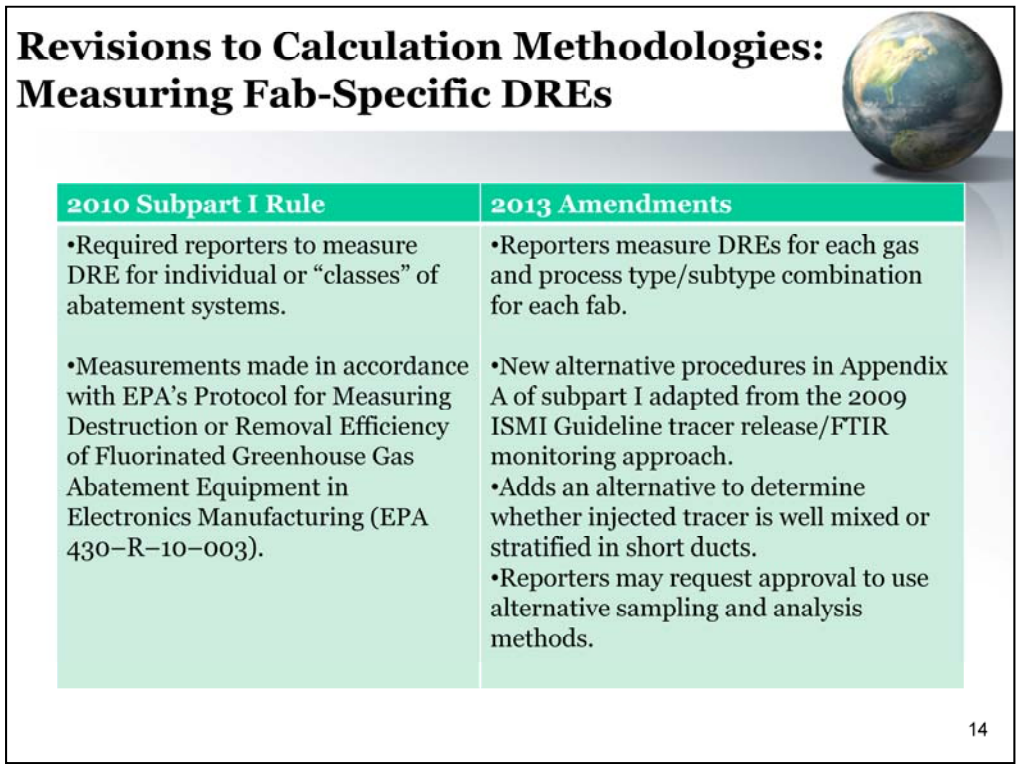
The default DRE for gas and process combinations for semiconductor manufacturing for which no new data were available to EPA also remain at 60%.

However, the revised default DREs more accurately reflect actual DRE values for F-GHG abatement systems and reduce the need for reporters to do site-specific DRE measurements. Reporters still have the option to perform site-specific DRE measurements if they wish to use DRE values other than the default values.



The default DREs in Table I-16 may only be used for abatement systems that (1) are specifically designed for F-GHG or N2O abatement; and (2) are installed, operated, and maintained according to a site maintenance plan that is based on the abatement system(s) manufacturer's recommended specifications for installation, operation, and maintenance.

If manufacturer's recommended specifications are not available or not followed, reporters may NOT use the default DRE factors found in Table I-16 but do have the option to properly measure site-specific DREs following the requirements of 40 CFR 98.94(f)(4), or to not account for abatement in calculating reported emissions.



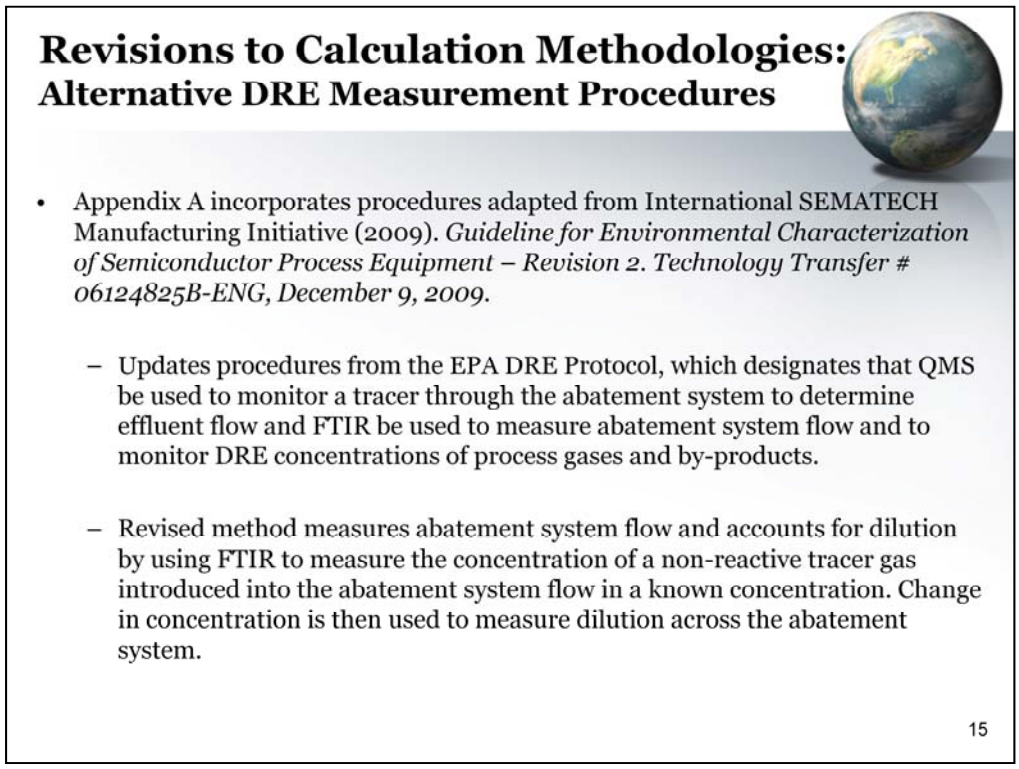
This slide compares the old and new DRE measurement requirements.

Reporters may measure DREs for any abatement system, including those that are not designed to abate F-GHGs or N2O.

The final rule allows reporters to establish a measured DRE value for gas and process type combinations, rather than for each abatement system or "class" of abatement systems.

Reporters will continue to use EPA's DRE Protocol (EPA 430–R–10–003) to measure the fab-specific DREs, but the rule is amended to add alternative procedures adapted from the 2009 ISMI Guidelines and EPA Method 7E. These procedures are outlined in new Appendix A.

Reporters may request approval to use alternative sampling and analysis methods (details are discussed later).



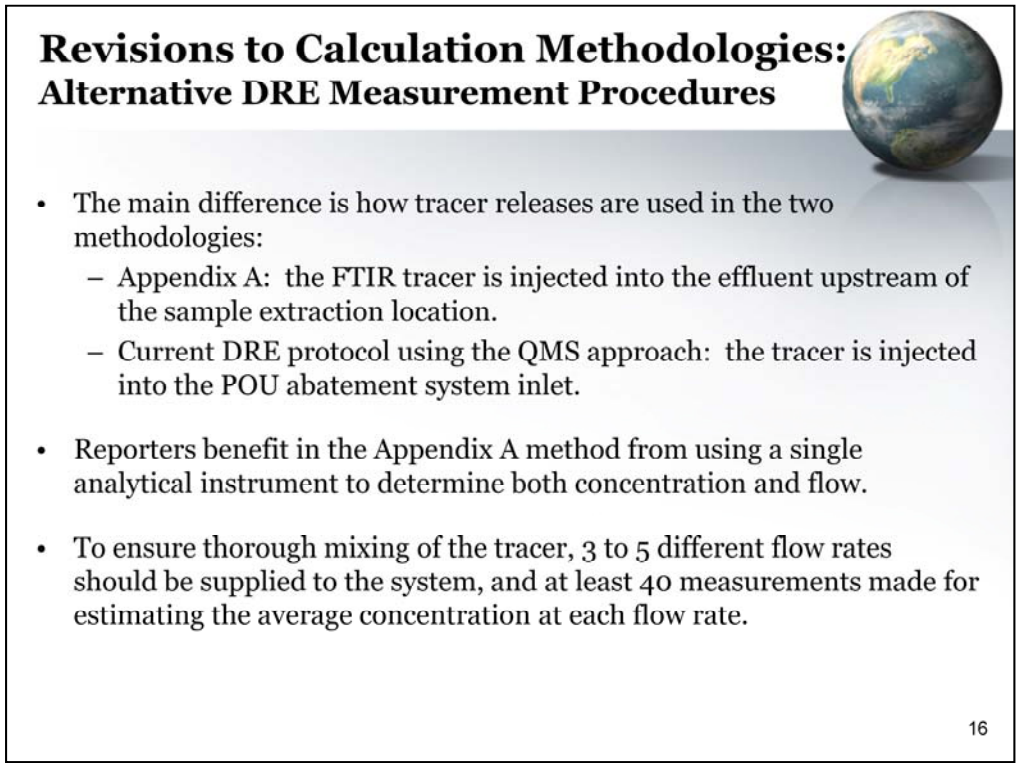
The final rule allows reporters to measure DRE using the current EPA DRE protocol, or to use the EPA DRE protocol with modifications that are included in Appendix A to subpart I.

These modifications are based on, but are not identical to, the 2009 SEMI Guideline for Environmental Characterization of Semiconductor Process Equipment.

The current EPA DRE protocol procedures designate that quadrupole mass spectrometry (QMS) be used to monitor a tracer through the abatement system to determine effluent flow and FTIR be used to measure abatement system flow and to monitor DRE concentrations of process gases and by-products.

The revised method measures abatement system flow and accounts for dilution by using FTIR to measure the concentration of a non-reactive tracer gas introduced into the abatement system flow in a known concentration. The change in concentration is then used to measure dilution across the abatement system.

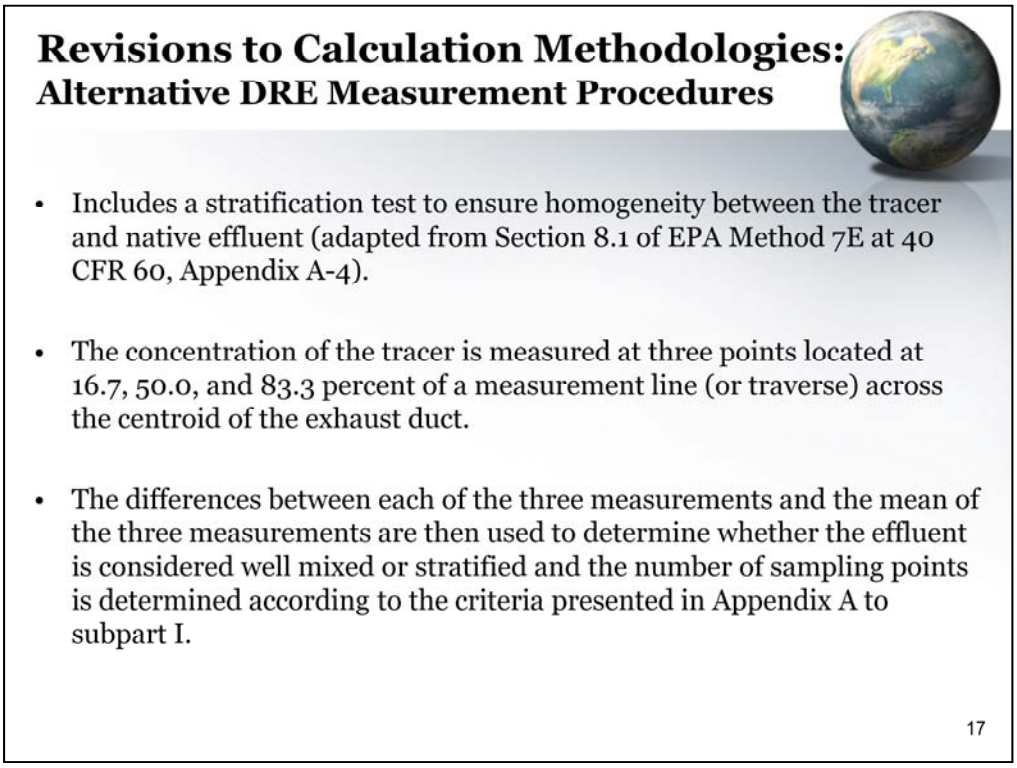
Reporters have to follow either the current DRE protocol or the procedures that are specified in Appendix A to subpart I for measuring DRE, or they may apply for EPA approval to use an alternative method.



The main difference between the current EPA DRE protocol and the changes allowed by Appendix A of subpart I relate to how the tracer releases are used in the two methodologies.

In Appendix A, the FTIR tracer is injected into the effluent upstream of the sample extraction location. In the current DRE protocol using the QMS approach, the tracer is injected into the POU (point of use) abatement system inlet. The benefit of this change is that reporters may use a single analytical instrument (FTIR) to determine both concentration and flow.

To ensure thorough mixing of the tracer, reporters should supply 3 to 5 different flow rates to the system, and make at least 40 measurements for estimating the average concentration at each flow rate.



Appendix A also include a procedure to account for the use of short ducts in abatement systems in which gases may not be thoroughly mixed.

The 2009 ISMI Guideline requires reporters to measure the concentration of the tracer at least eight duct diameters downstream of the injection site. Because of the presence of short ducts in POU abatement systems, it can be difficult to meet those criteria.

Therefore, Appendix A also allows reporters to use an adaptation of Section 8.1 of EPA Method 7E at 40 CFR 60, Appendix A-4 as an alternative to determine whether the injected tracer is well mixed in the duct system or is stratified (i.e., poorly mixed), and to adjust the sampling if it is stratified.

The detailed procedure is as follows:

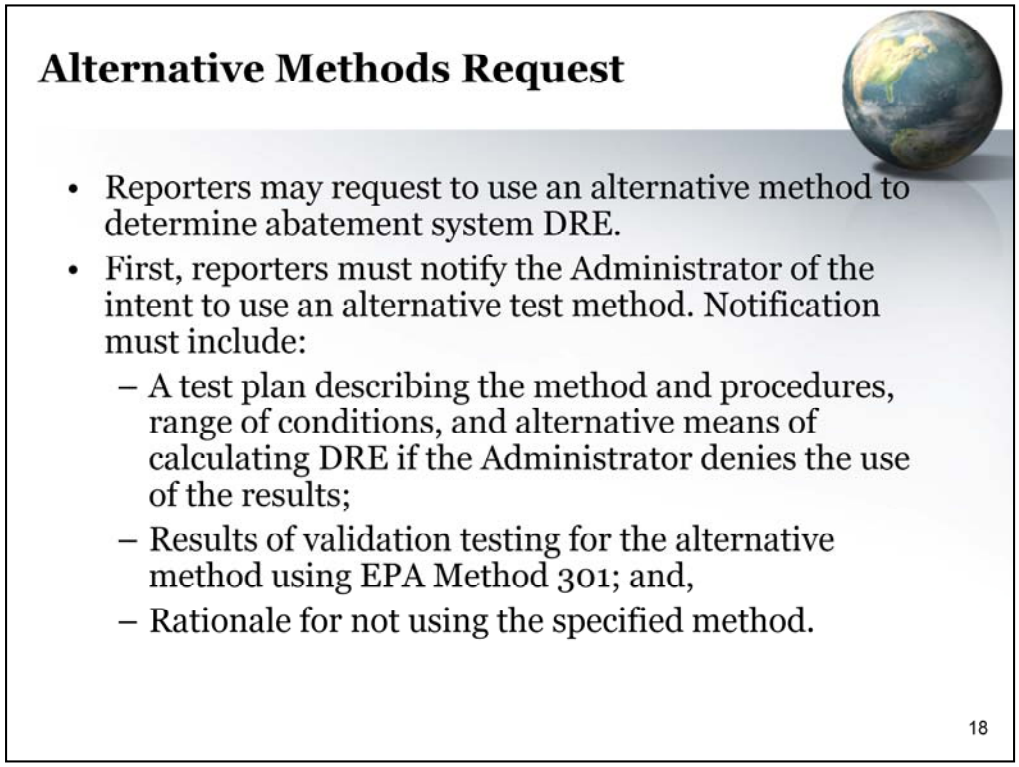
Measure the concentration of the tracer at 3 traverse points:

If the tracer gas concentration at each traverse point differs from the mean concentration for all traverse points by no more than ±5.0%, reporters may collect samples from a single point that most closely matches the mean.

If the 5.0% criterion is not met but the concentration at each traverse point differs from the mean by no more than ±10.0 %, take samples from 2 points and use the average of the 2 measurements.

If the concentration at each traverse point differs from the mean by more than ±10.0% but less than ±20.0%, take samples from 3 points from the measurement line and use the average of the 3 measurements.

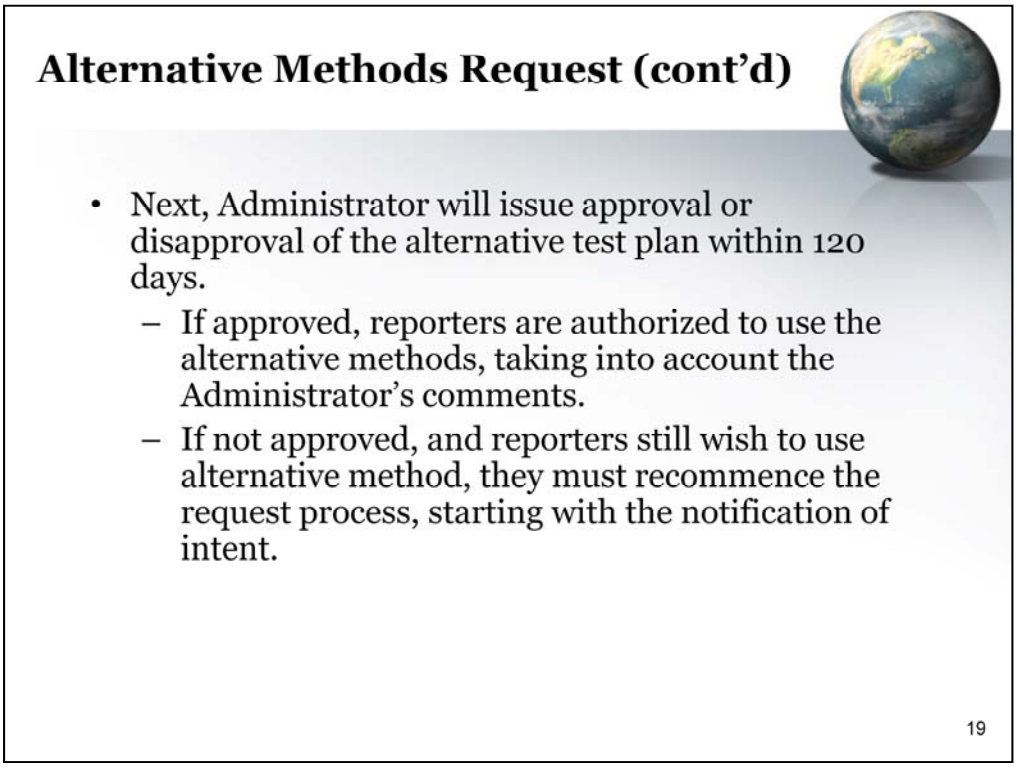
If the gas stream is stratified (±20.0 percent criterion for the three-point test is not met), locate and take samples according to Sections 11.2 and 11.3 of EPA Method 1 at 40 CFR part 60, appendix A-1.



In the final rule amendments, reporters may request to use an alternative method to determine abatement system DRE by adhering to the requirements in 40 CFR 98.94(k)(1) through (k)(6).

An alternative method is any method of sampling and analyzing for a fluorinated GHG or N2O, or the determination of parameters other than concentration (e.g., flow measurements) that is not a method specified in subpart I and that has been demonstrated to the Administrator's satisfaction, using Method 301 in appendix A of part 63, to produce results adequate for the Administrator's determination that it may be used in place of a method specified elsewhere in subpart I.

Reporters must first notify the Administrator (or authorized representative) of the intent to use an alternative test method. The notification must include a test plan describing the alternative method and procedures, the range of conditions over which the validation is intended to be applicable, and an alternative means of calculating the abatement system DRE if the Administrator denies the use of the results of the alternative method. The reporter must validate the alternative method using EPA Method 301 and submit the results of the Method 301 validation process along with the notification of intention and a rationale for not using the specified method.



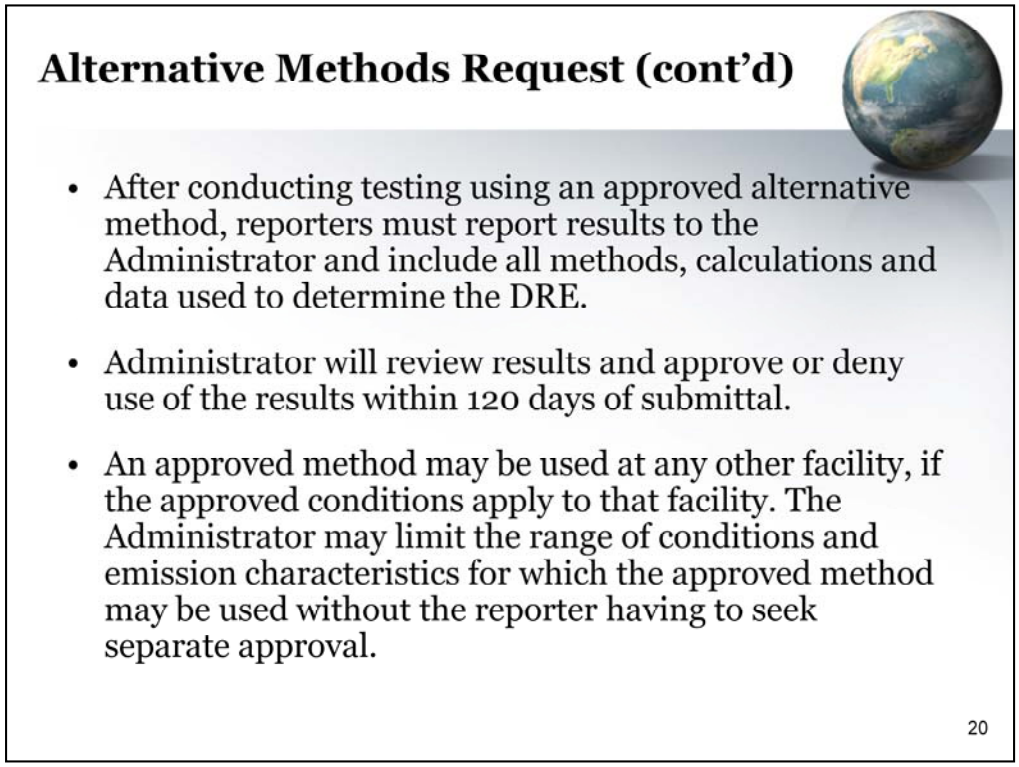
The Administrator will review the submission and issue an approval or disapproval of the alternative test plan within 120 days of the reporter's notification.

The reporter is required to respond to any of the Administrator's questions on the test plan before obtaining approval and take into account the Administrators comments on the test plan in conducting the test using the alternative method.

The reporter must respond to questions or requests for additional information during the 120 day review period and the Administrator's questions or request for additional information will not extend that review period. Therefore, it is the reporter's obligation to respond in a timely manner.

If the alternative test plan is not approved and the reporter still wishes to use an alternative method, the reporter must restart the process with the notification of intent.

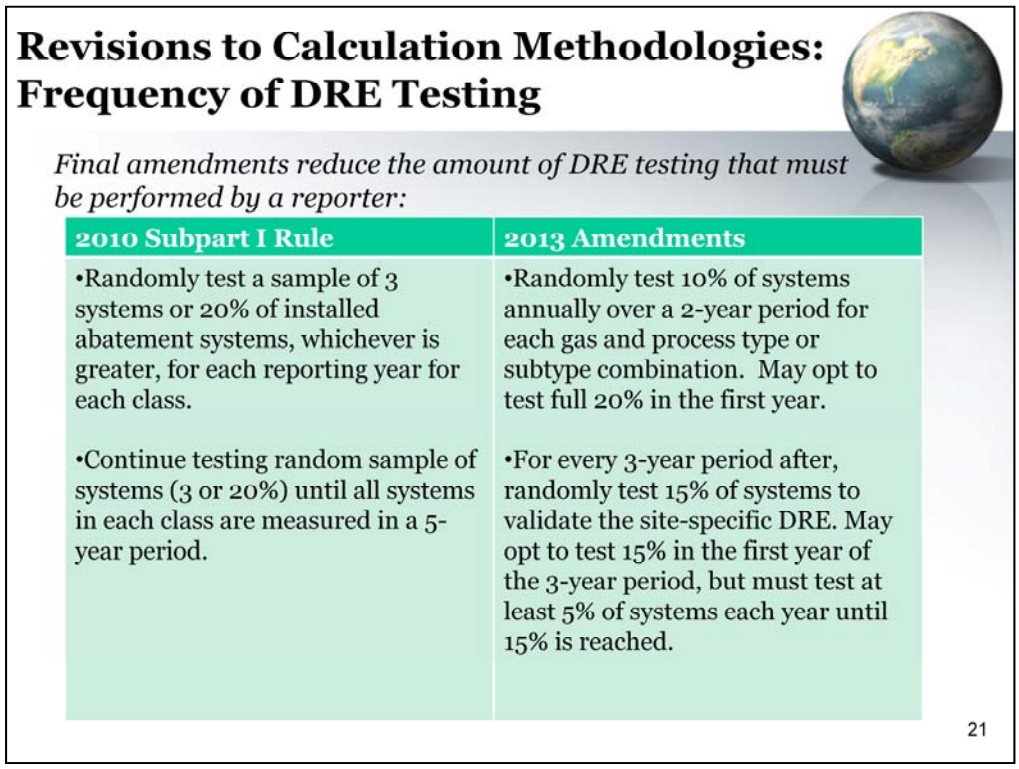
(The rule has similar provisions to request the use of alternative methods in the stack testing alternative, and these are discussed in the separate stack testing webinar.)



The reporter must report the results of the abatement system DRE measurement using the alternative method and procedure specified in the approved test plan. The report must include all methods, calculations and data used to determine the abatement system DRE.

The Administrator will review the results of the test using the alternative methods and procedure and then approve or deny the use of the results of the alternative test method and procedure no later than 120 days after they are submitted. During this 120-day period, the reporter is required to respond to any of the Administrator's questions on the test report before obtaining approval of the final test results using the alternative method. If the Administrator finds reasonable grounds to dispute the results obtained by the alternative method, the Administrator may require the use of the method specified in subpart I instead of the alternative method.

Once the Administrator approves the use of the alternative method, that method may be used by any other facility for the same F-GHGs and types of abatement systems, if the approved conditions apply to that facility. In granting approval, the Administrator will limit the range of test conditions and emission characteristics for which that approval is granted and under which the alternative method may be used without seeking further approval. The Administrator will specify those limitations, if any, in the approval of the alternative method.

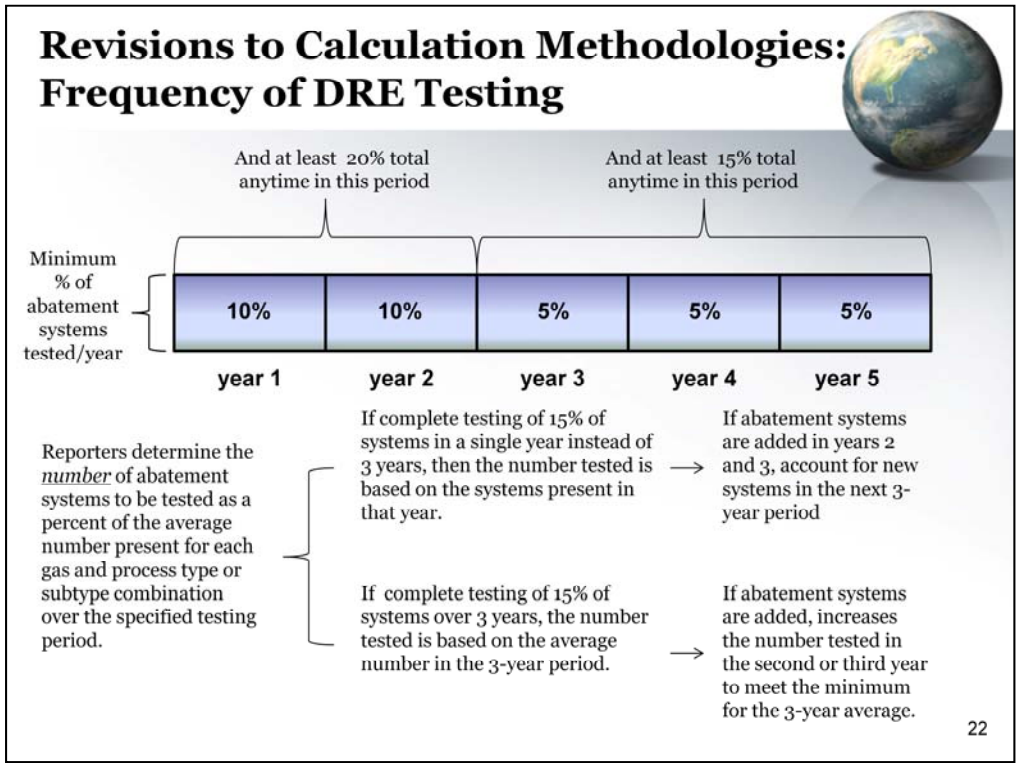


This slide and the next two slides review the changes in the abatement system testing that must be completed to determine a fab-specific DRE.

The first major change is that the representative number of abatement systems for testing are determined for each gas and process type or subtype combination, instead of based on each class of abatement system.

The second major change is that fewer abatement systems need to be tested. In the current rule, 20% of systems in a class would be tested each year until all systems in a class are measured in a 5-year period. In the revised rule, 10% of systems for each gas and process combination are tested in each year in the first two years (20% tested in total), and then 5% are tested per year in each of the next three years (15% total).

These two changes will result in fewer numbers of abatement systems being tested at facilities using site-specific measured DREs, compared to the current rule.



This slide illustrates the percent of systems that must be tested each year. If the required % of the total number of abatement systems to be tested does not equate to a whole number, the reporter must round up to the nearest integer.

Reporters must:

-Randomly test 10% of systems for a gas and process type or subtype combination annually over a 2-year period (20% total).

May opt to test full 20% in the first year.

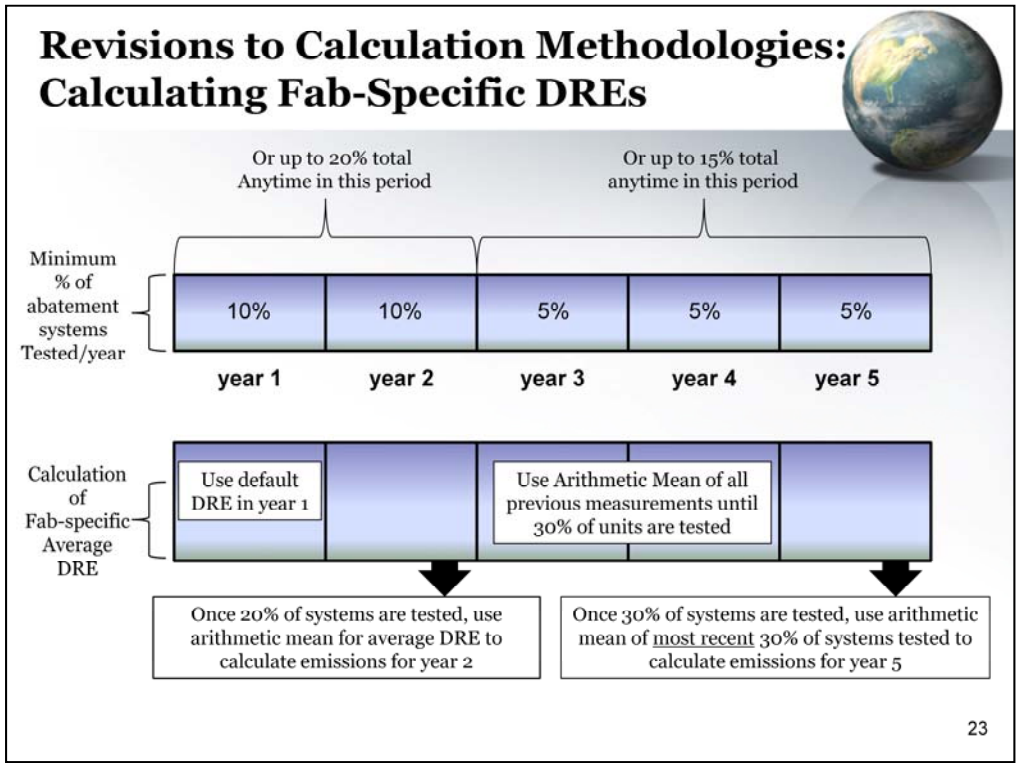
-For every 3-year period after, the reporter must randomly test 15% of systems to validate the site-specific DRE.

The reporter may opt to test 15% in the first year of the 3-year period, but must test at least 5% of systems each year until 15% is reached.

-For each 3-year period, the reporter must determine the number of abatement systems to be tested based on the average number of abatement systems in service over the 3-year period.

The number of abatement systems that must be tested in each period is determined based on the average number of systems in place over that period. If systems are added after testing is completed, additional testing may be required to ensure that the minimum percent of systems are tested for that period.

If testing of a particular randomly selected abatement system would be disruptive to production, the reporter can replace that system with another randomly selected system and return the other to the sampling pool for subsequent testing. A system cannot be returned to the random testing pool for more than 3 consecutive selections. Alternatively, the reporter may specifically include a returned system in one of the next two sampling years to avoid potential disruption of future operations.



This slide illustrates how the testing schedule selected by a reporter affects when they can begin to use measured DRE values instead of the default DRE values, and which data are used to calculate the measured DRE values.

Reporters must not take credit for the fab-specific abatement system DRE before completing testing on 20% of the abatement systems for that gas and process type combination. Until 20% of systems are tested, the reporter must use default DREs for the gas/process type to calculate emissions.

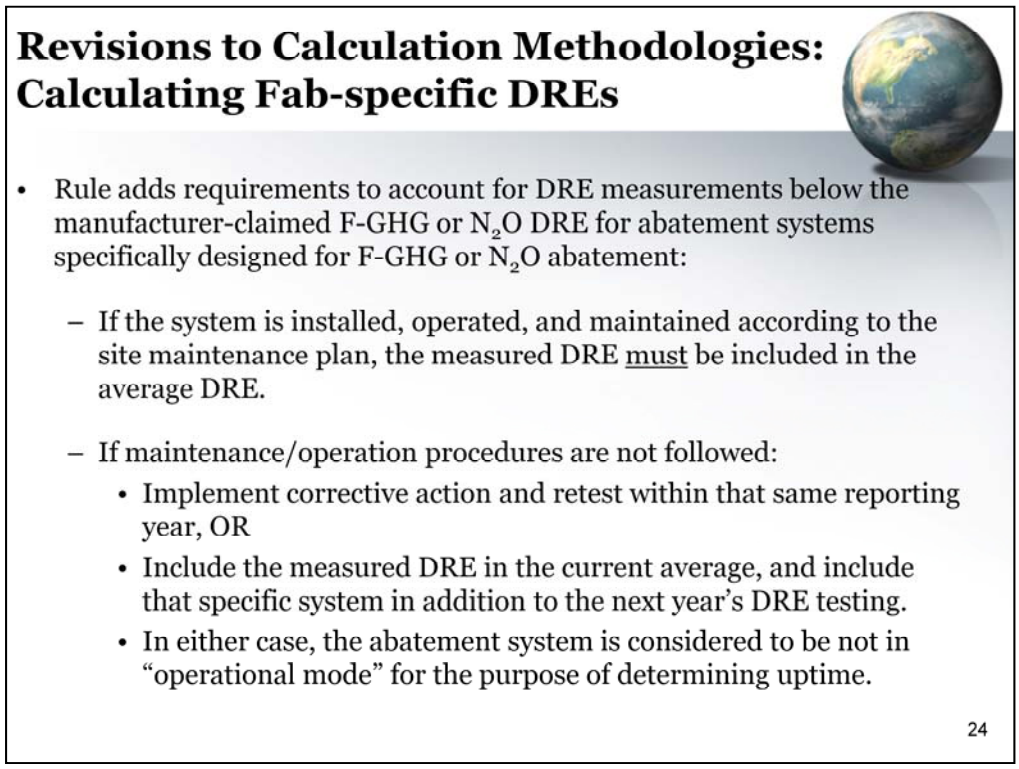
Once 20% of systems are tested for a gas and process sub-type or process type combination, reporters may use the arithmetic mean for the DRE for that gas and process sub-type or process type combination in lieu of a default DRE.

For example, if a reporter tests only 10% of systems per year, they would use the default DRE for the first year, but use the measured mean DRE for the second year. If they measure 20% of systems in the first year, they would use the measured mean DRE for both the first and second year.

Following testing on 20% of abatement systems for that gas and process combination, reporters must calculate the average DRE as the arithmetic mean of all test results for that gas and process combination, until they have tested at least 30 percent of all abatement systems for each gas and process combination.

Once 30% of systems for a gas and process are tested, the average DRE is calculated as the mean of the most recent 30% of systems tested. Therefore, a reporter who completes tests on an additional 10% of systems by the end of year 3 (for a total of 30% testing) would use the arithmetic mean of the 30% of systems tested in their annual report for that year.

A reporter would continue to test 15% of systems in each subsequent three year period (for example in years 6 through 8), and use the mean of the most recent 30% of systems tested (in this case, from years 3 to 8) as the measured DRE to calculate emissions.



The revised rule includes provisions to address a situation in which an abatement system designed for F-GHG or N2O abatement may not achieve the manufacturer's claimed minimum DRE.

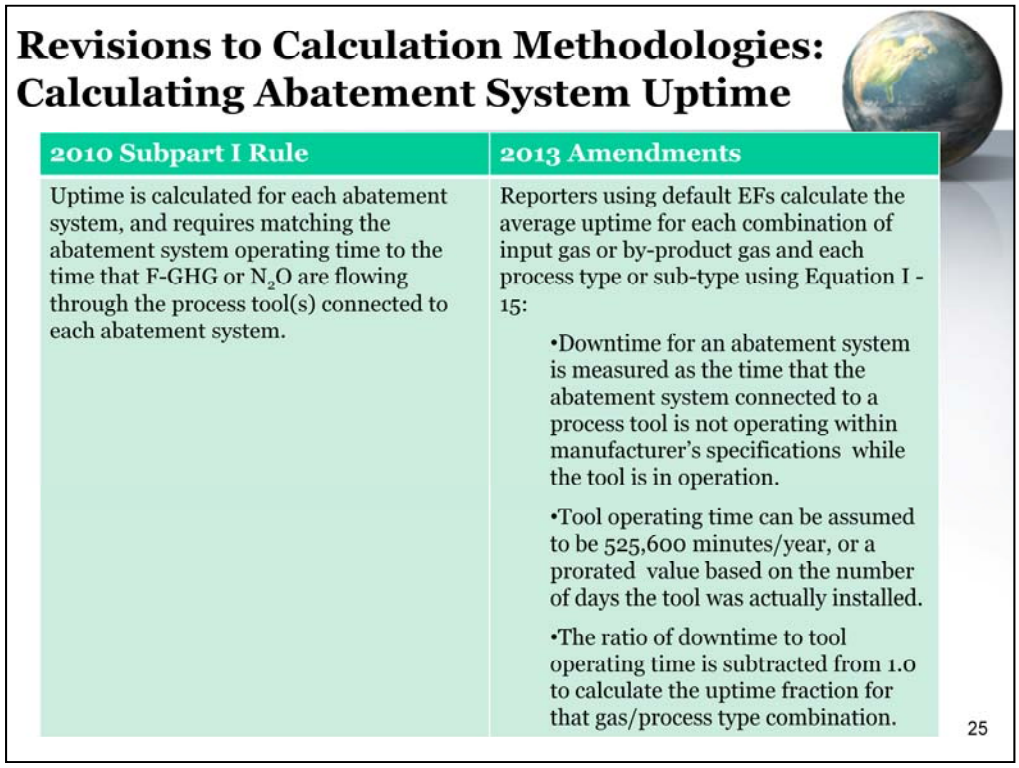
If the manufacturer's specifications for installation, operation, and maintenance were followed, then the reporter must include the measured DRE in the average DRE.

If the manufacturer's specifications were not followed, then the reporter has the following two options:

1. Implement corrective action and perform a retest to replace the measured value within the reporting year; OR

2. Include the DRE in the average DRE, and include the same device in the next year's testing in addition to the testing of randomly selected devices for that year. (After retesting, the reporter can replace the previous DRE value with the new DRE value in the DRE average.)

In both cases, the affected abatement system is considered to be not in "operational mode" as defined in 40 CFR 98.98 for the purposes of determining abatement system uptime in the emissions calculations.



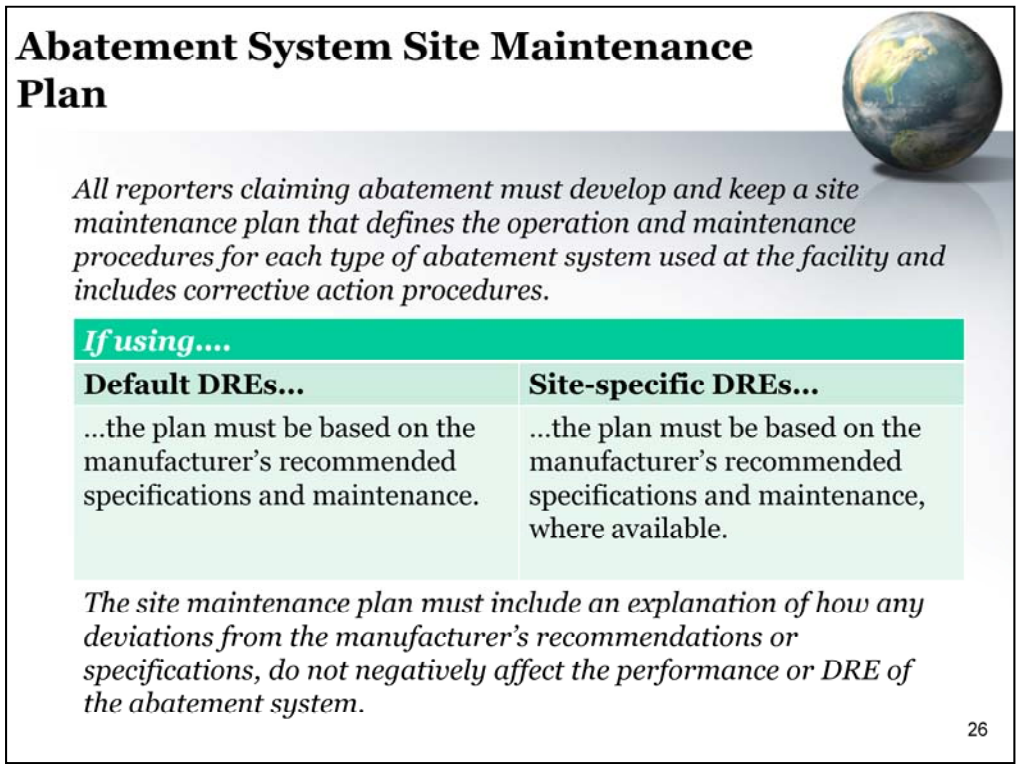
The final rule revises the methodology for calculating abatement system uptime.

The 2010 current rule presented two issues for calculating uptime. The first is that uptime had to be calculated for each separate abatement system. The second is that the uptime of the abatement system needed to be counted only for the time when F-GHG or N2O was flowing through the tool(s) connected to the abatement system.

The revised rule simplifies the calculation of abatement system uptime for reporters using the default emission factors. First, the revised rule calculates an average uptime for all the abatement systems for each combination of input gas or by-product gas and each process type or sub-type for which F-GHG use and emissions are calculated. The same uptime factor is used for input gases and their associated by-product gases for a given process type.

Second, the operating time of each tool associated with an abatement system is assumed to be 525,600 minutes per year (8,760 hours per year) or an amount prorated based on the number of days per year a tool was actually installed.

These two changes remove the need to match the operating time of each abatement system to the time that gas is actually flowing through the tool connected to that abatement system, and reduces the number of different uptime values that must be determined and used in the emission calculations.

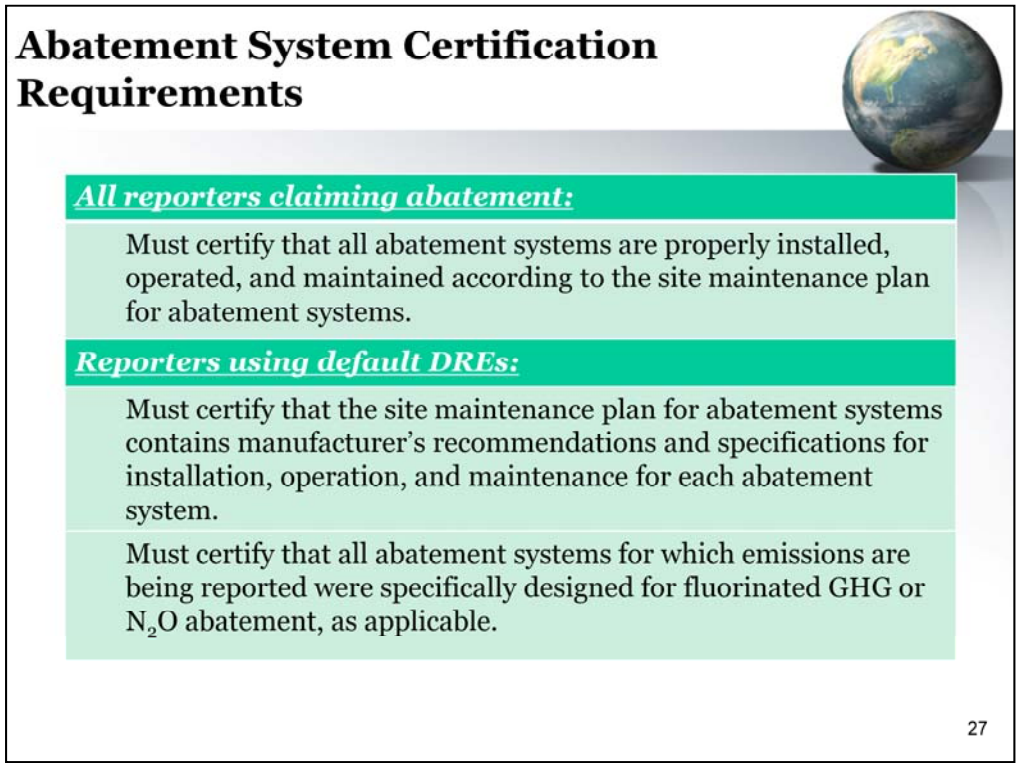


All reporters claiming abatement must develop and keep a site maintenance plan for the abatement systems [40 CFR 98.97(d)(9)].

The site maintenance plan must be based on the manufacturer's recommended specifications and maintenance when the default DREs are being used.

If a reporter is using site-specific measured DREs, the plan must be based on the manufacturer's recommended specifications and maintenance, where available.

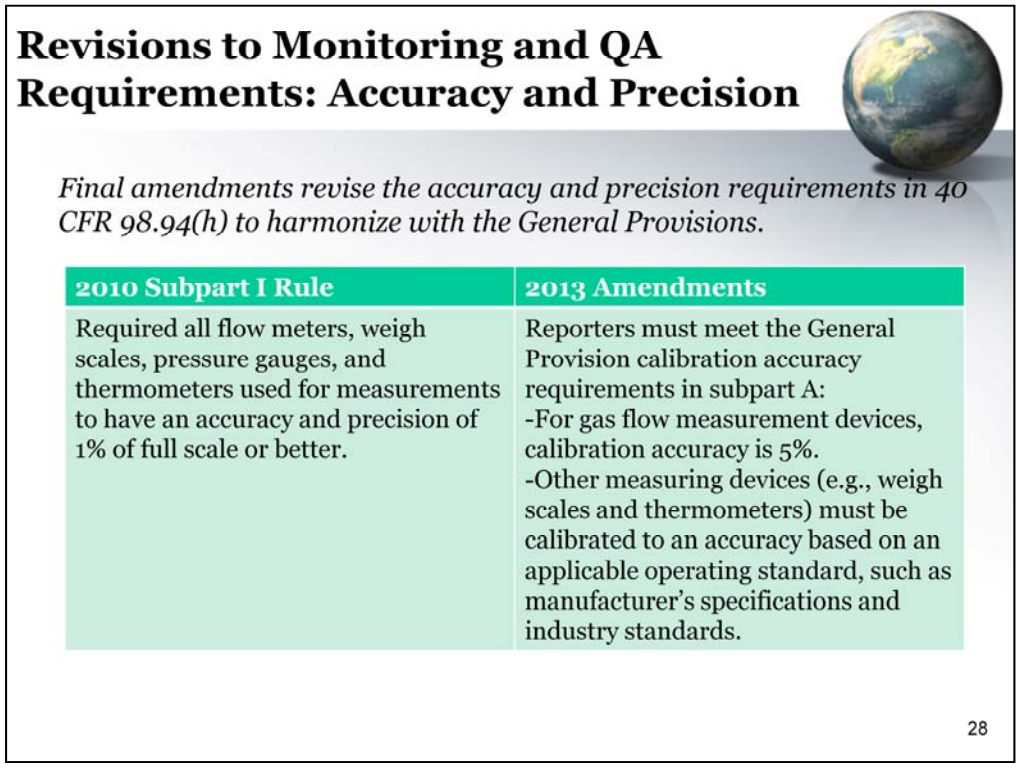
In either case, if the site maintenance plan deviates from the manufacturer's recommendations or specifications, the site maintenance plan must include an explanation of how the deviations do not negatively affect the performance or destruction or removal efficiency of the abatement system.



Under the final rule, any reporters that claim abatement must certify that the abatement systems are properly installed, operated, and maintained according to the site maintenance plan for abatement systems. The maintenance plan is developed and maintained in the reporter's records as specified in 40 CFR 98.97(d)(9).

If a reporter uses default DRE values in emissions calculations (either using default factors or the stack testing method), the site maintenance plan for abatement systems must be based on the abatement system manufacturer's recommendations and specifications for installation, operation, and maintenance. The reporter must also certify and document that the abatement systems for which default DRE values are being used are specifically designed for F-GHG or N2O abatement, as applicable.

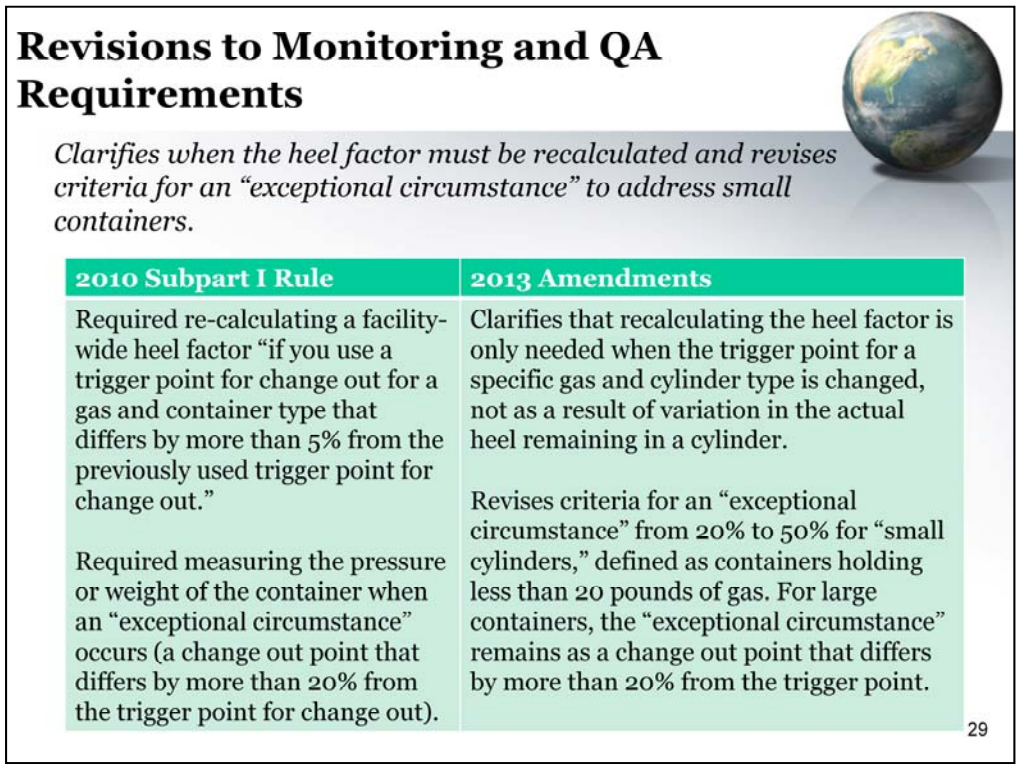
(The rule has additional certification requirements for abatement systems used in the stack testing alternative, and these are discussed in the separate stack testing webinar.)



The final rule amendments revise the accuracy and precision requirements in 40 CFR 98.94(h) to harmonize with the general provisions in subpart A [40 CFR 98.3(i)].

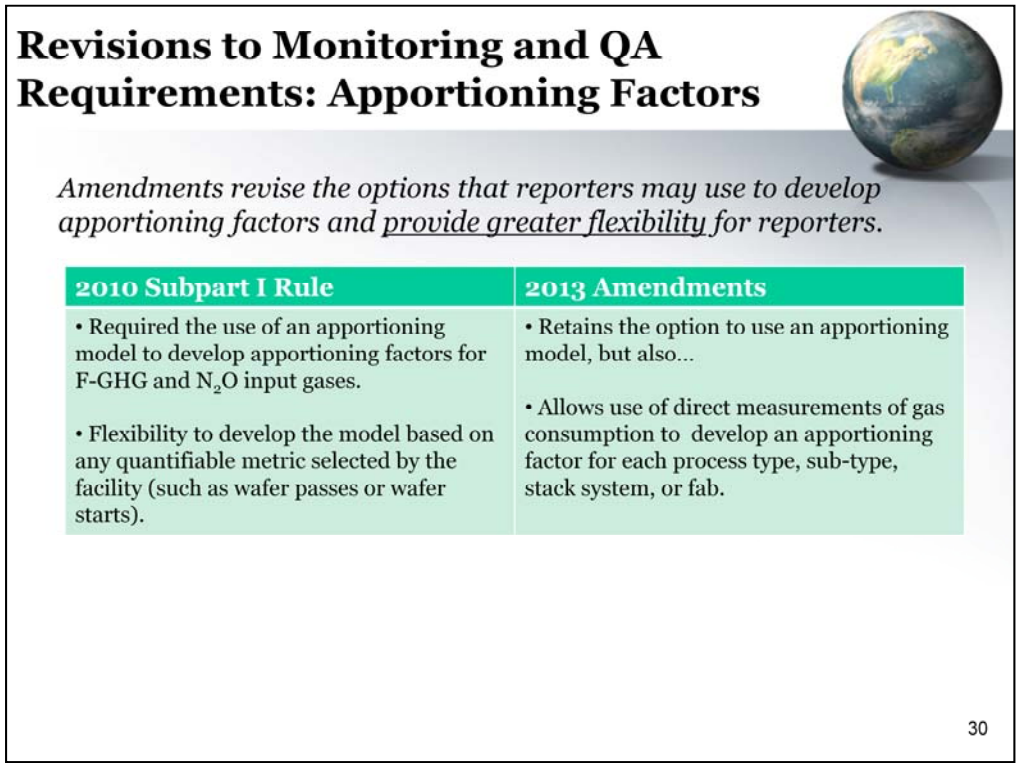
In the 2010 subpart I rule, all flow meters, weigh scales, pressure gauges, and thermometers were required to have an accuracy and precision of 1% of full scale or better.

In the final rule amendments, reporters must instead meet the General Provision calibration accuracy requirements in subpart A [40 CFR 98.3(i)]. The calibration accuracy requirements for gas flow measurement devices are 5 percent. Other measuring devices (e.g., weigh scales and thermometers) are required to be calibrated to an accuracy based on an applicable operating standard, including, but not limited to, device manufacturer's specifications and industry standards (40 CFR 98.3(i)(1)(i)).



The final rule clarifies when a reporter needs to recalculate a facility wide heel factor. It clarifies that reporters need to recalculate the heel factor only when the trigger point for a specific gas and cylinder type is changed, not as a result of variation in the actual heel remaining in a cylinder when it is returned to the gas supplier.

The final rule also revises the criteria for an "exceptional circumstance" as they relate to the heel factor. The criteria have been revised for small cylinders from a change out point that differs by 20% from the trigger point to a difference of 50% from the trigger point. A small cylinder is defined as a container holding less than 20 pounds of gas. For large containers, the "exceptional circumstance" remains as a change out point that differs by more than 20 percent from the trigger point. Reporters must still measure the heel in all cases where the cylinder change out meets the criteria for an exceptional circumstance.

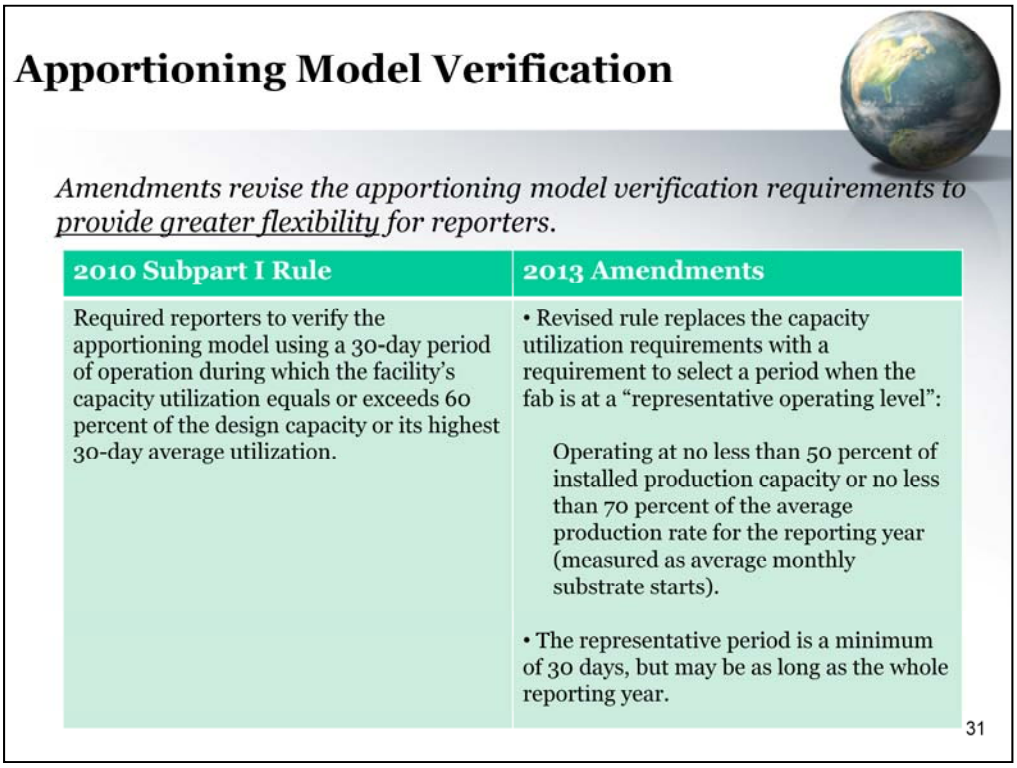


The final rule amends the apportioning model verification requirements.

In the 2010 subpart I rule, reporters were required to use an apportioning model to develop apportioning factors for F-GHG and N2O input gases. The apportioning model was based on a quantifiable metric, such as wafer passes or wafer starts.

To provide an additional level of flexibility for reporters, the final rule allows reporters the option to use direct measurements of gas consumption (instead of an apportioning model) to develop apportioning factors for each process type, sub-type, stack system, or fab.

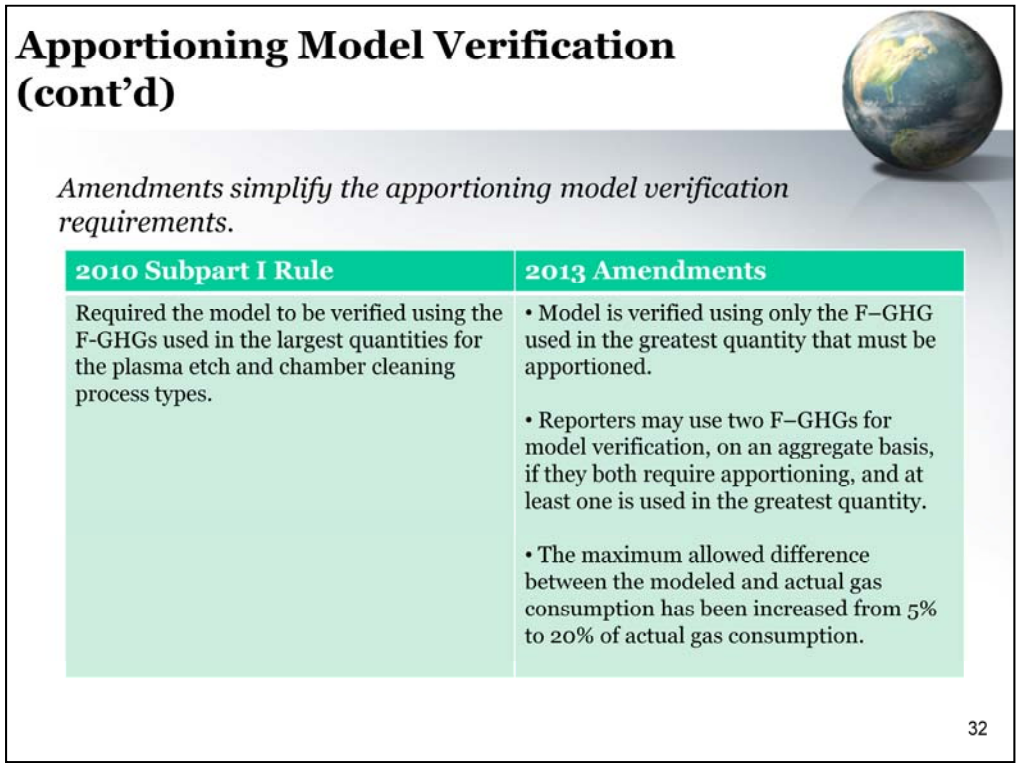
The final rule retains the option to use an apportioning model, but incorporates a few changes to the model verification requirements, which are discussed in the next few slides.



The first change is to the model verification period.

The original subpart I required that reporters analyze at least a 30-day period of operation during which the capacity utilization equals or exceeds 60 percent of its design capacity or its highest 30-day average utilization.

The revised rule allows reporters to select a period of the reporting year when the fab is at a "representative operating level," as defined in 40 CFR 98.98. The representative operating level is defined based on installed production capacity (instead of design capacity) or the average monthly production rate for the year. The period used for model validation must be at least 30 days, but could last as long as the whole reporting year, allowing the reporter to compare actual and predicted gas consumption for whatever period is considered most representative.



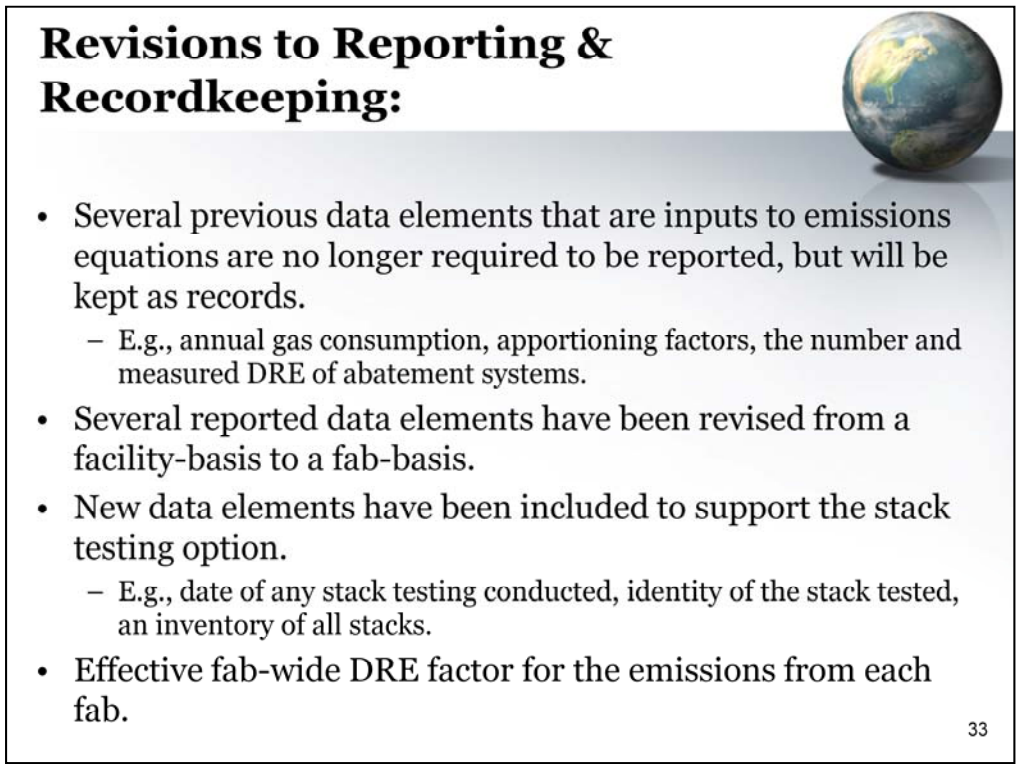
The 2013 amendments simplified the apportioning model verification requirements and also revised the criteria for the model to be considered acceptable. First, the reporters must select for comparison only a single F-GHG (instead of separate gases for etch and chamber clean).

The gas selected must be the largest quantity consumed, on a mass basis.

The verification criteria have also been revised to clarify that the model only needs to be verified using a gas that actually has to be apportioned.

Reporters may alternatively verify the model for two F-GHGs on an aggregate use basis if one of the gases selected is used in the largest quantity at the fab and both need to be apportioned. In this option, the verification criteria is also applied to the total mass consumed of the two gases combined.

Finally, the maximum allowed difference between the modeled and actual gas consumption has been increased from 5% to 20% of actual gas consumption.



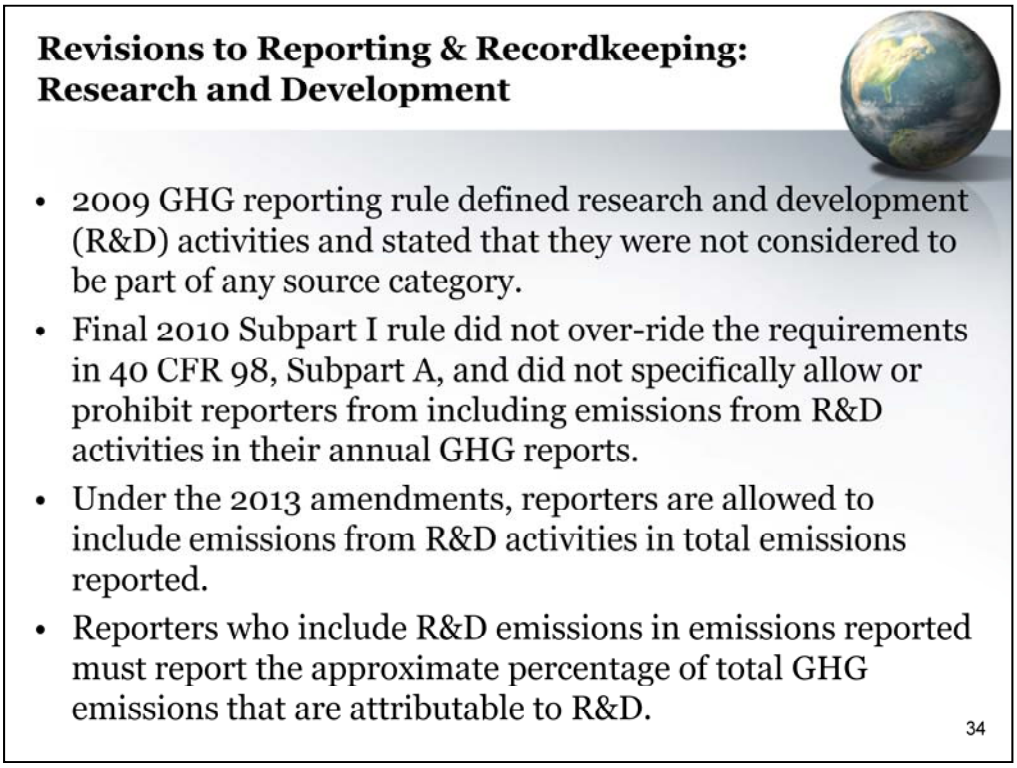
The final rule includes several changes to the reporting and recordkeeping requirements; these changes are also listed in detail in the preamble to the final rule.

1. Several data elements have been moved from reporting to recordkeeping. These were numerical inputs to emissions equations that were deferred for reporting until 2015 and listed in Table A-7 to subpart A; instead of being reported in 2015, they have been moved to recordkeeping if they are still needed.

2. Several reported data elements have been revised from a facility-basis to a fab-basis to reflect changes in the basis of the emission calculations.

3. Several data elements were added to the reporting and recordkeeping requirements as a result of the addition of the stack test method.

4. Finally, the revised rule also adds a new reporting requirement to calculate and report an effective fab-wide DRE factor for the emissions from the electronics manufacturing processes at each fab (calculated using Equations I-26, I-27, and I-28). This calculation provides EPA with information on the relative level of abatement being used without reporting inputs to emissions equations or sensitive information on abatement systems.



The final rule provides additional flexibility with the reporting of emissions from R&D activities.

The general provisions in subpart A to the GHG reporting rule stated that R&D activities were not considered part of any source category.

The 2010 subpart I rule did not include any provisions to address emissions from R&D activities, and several industry members noted that they could not segregate their R&D emissions from the total facility emissions because the R&D activities were integrated with their normal production activities.

As a result, the 2013 amendments specifically allow electronics manufacturing facilities covered by subpart I to report R&D emissions with their total facility emissions.

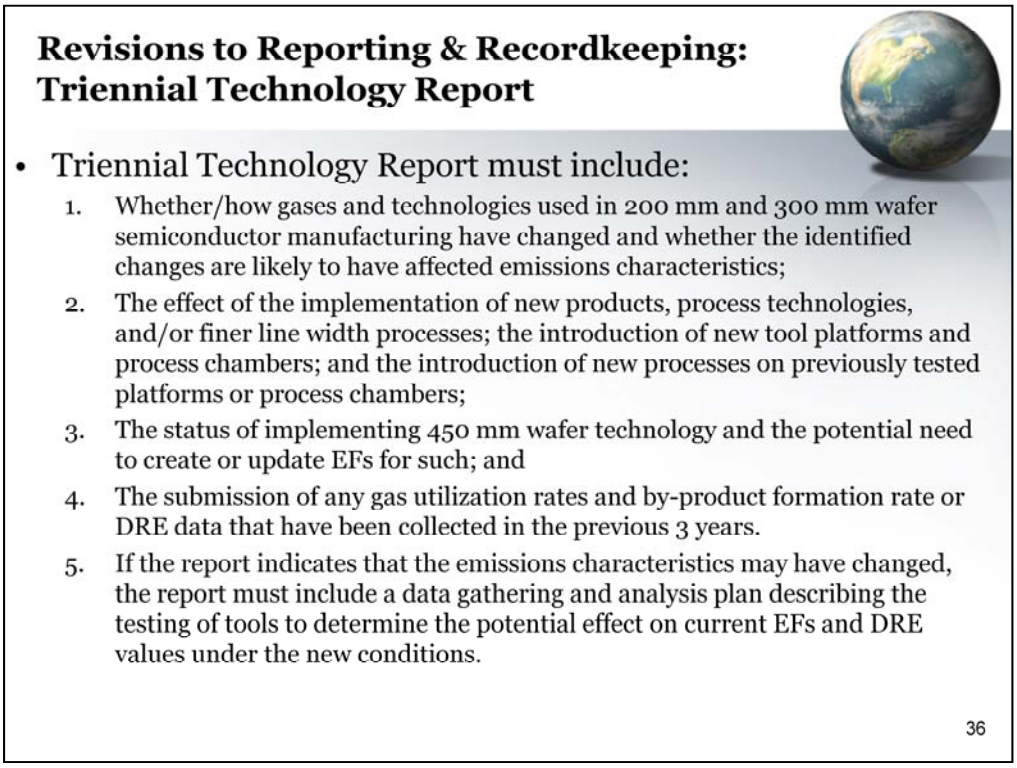
However, they are required to identify that emissions associated with R&D activities are included in their overall emissions estimates. They are also required to report the approximate percentage of total emissions that are attributed to R&D using ranges specified in the rule.

The final rule includes a requirement for a triennial technology report submitted to EPA.

The triennial technology report is a mechanism for collecting information on changes in the semiconductor industry that potentially affect emissions and new data that could be used for the updating of default gas utilization rates and by-product formation rates, and abatement system DRE values.

The first report will be due in 2017 and is based on the facility's emissions reported for 2015. Only semiconductor manufacturing facilities that emit more than 40,000 metric tons CO2e per year from subpart I processes must submit a report; however, facilities with lower emissions can voluntarily prepare and submit a report.

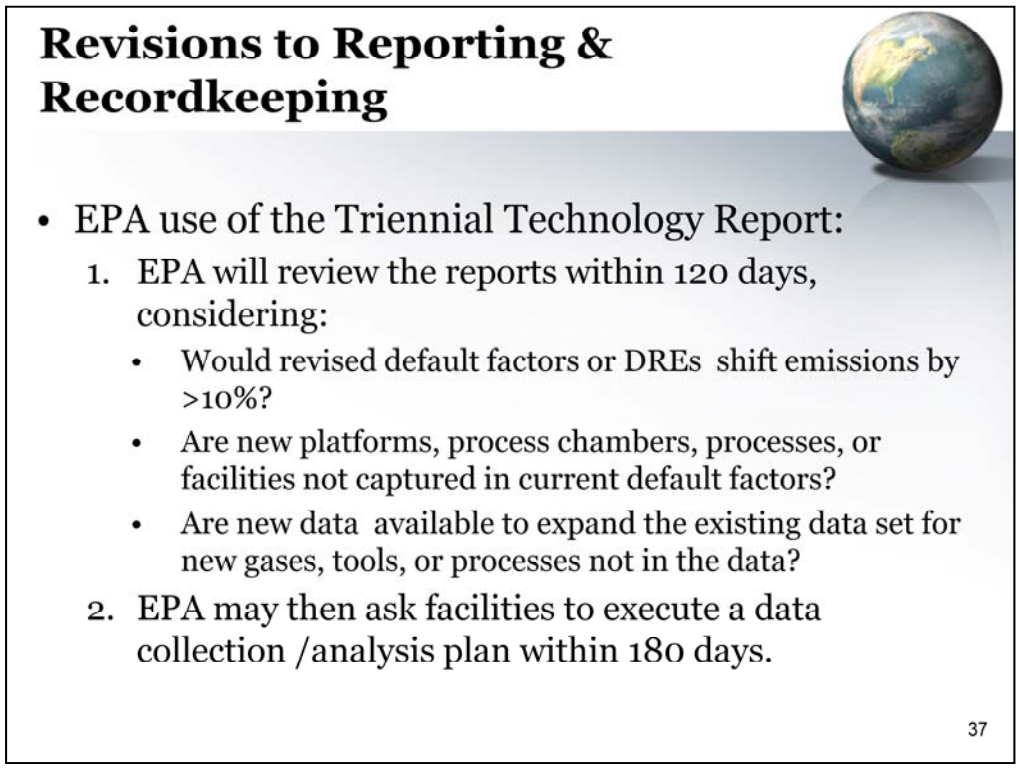
To reduce burden, multiple semiconductor manufacturing facilities (regardless of whether they are owned by the same parent company) may submit a single consolidated 3-year report, as long as each company represented is identified in the report.



The 3-year report must address the following four items:

1. Whether/how gases and technologies used in 200 mm and 300 mm wafer semiconductor manufacturing have changed and whether the identified changes are likely to have affected emissions characteristics;
2. The effect of the implementation of new products, process technologies, and/or finer line width processes; the introduction of new tool platforms and process chambers; and the introduction of new processes on previously tested platforms or process chambers;
3. The status of implementing 450 mm wafer technology and the potential need to create or update EFs for that wafer size; and
4. The submission of any gas utilization rates and by-product formation rate or DRE data that have been collected in the previous 3 years.

If the report indicates that the emissions characteristics of semiconductor manufacturing processes or abatement DRE values may have changed, the report must include a data gathering and analysis plan describing the testing of tools to determine the potential effect on current gas emission factors and DRE values under the new conditions, and a planned analysis of the effect on overall facility emissions using a representative gas-use profile for a 200 mm, 300 mm, or 450 mm fab (depending on which technology is under consideration).



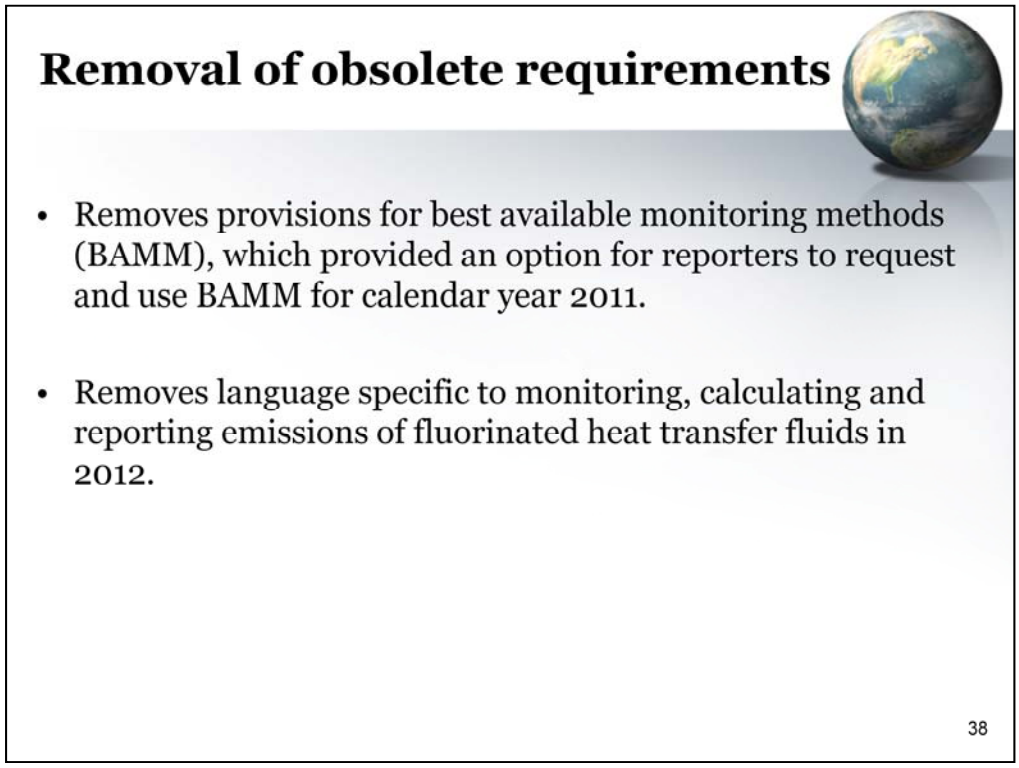
The EPA will review the reports within 120 days and notify the facilities that submitted the reports whether the Agency determined it was appropriate to update the default emission factors and/or default DRE values. The EPA will decide if updates are necessary based on the following:

(1) Whether the revised default emission factors and DRE values would result in a projected shift in emissions of 10 percent or greater for each gas and process type or subtype;

(2) Whether data from new platforms, process chambers, processes, or facilities that are not captured in the current default factors should be included in the revised values; and

(3) Whether new data are available that would expand the existing data set to include new gases, tools, or processes not included in the existing data set (i.e., gases, tools, or processes for which no data are currently available).

If the EPA determines it is necessary to update the default emission factors and/or DRE values, facilities would then have 180 days following the date they receive notice to execute the data collection and analysis plan described in the report and submit those data to the EPA. The EPA will then determine whether to issue a proposal to amend the rule to update the default emission factors and/or DRE values using the newly submitted data.

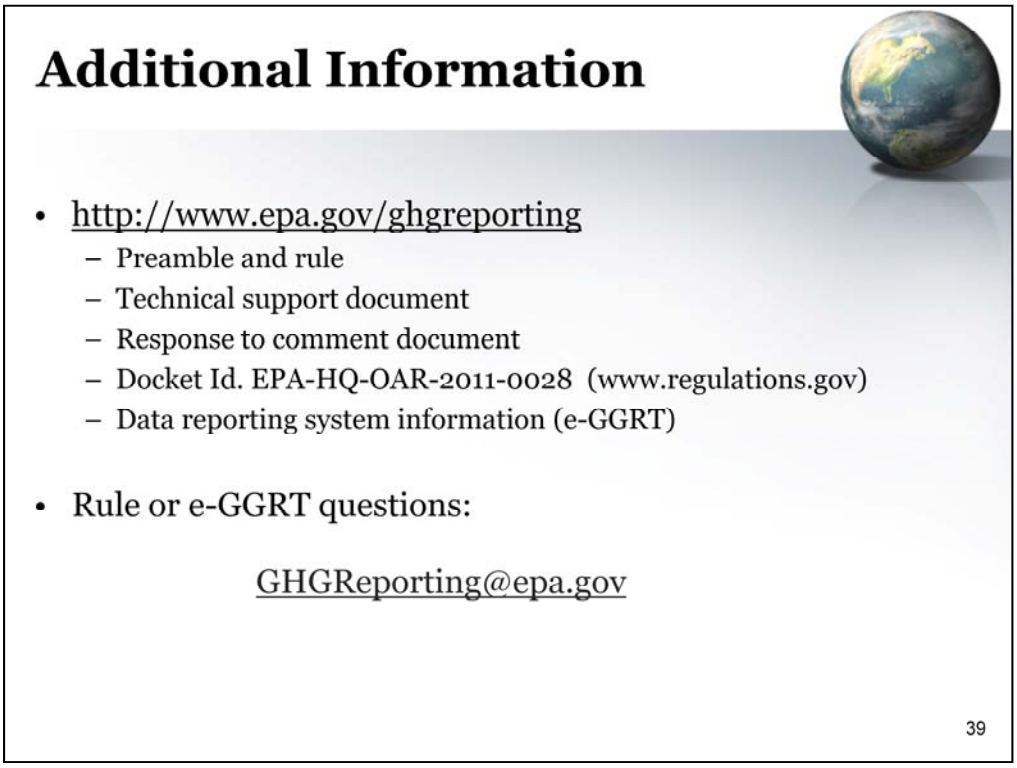


The final amendments remove certain provisions that are obsolete after January 1, 2014.

The provisions in 40 CFR 98.94(a) for best available monitoring methods, or "BAMM." The BAMM provisions allowed reporters to request and use BAMM for monitoring parameters that could not be reasonably measured according to the monitoring and quality assurance/quality control methods provided in subpart I. The use of BAMM was allowed for 2011 and could be requested for years 2012 and 2013. The final amendments remove all the BAMM provisions because they will be no longer applicable beginning January 1, 2014.

The final amendments do not contain any new BAMM provisions because the EPA expects that all facilities will be in compliance with the monitoring and QA/QC methods required under subpart I for the 2014 calendar year.

The final amendments also remove 40 CFR 98.93(h)(2), which allowed reporters to delay the monitoring of fluorinated heat transfer fluids with vapor pressures less than 1 mm Hg until March 31, 2012. The amendments also remove the corresponding monitoring and QA language in 40 CFR 98.94(h)(3) and the reporting requirement at 40 CFR 98.96(v). These provisions are no longer applicable as of the effective date of the final amendments, since all three provisions were specific to only 2012.



This slide lists resources that can be used for more information on the GHGRP and subpart I in particular.

From the link in the first bullet, you can go the resources for GHG reporting facilities, and then find information by subpart. For subpart I, you can find all of the Federal Register notices for subpart I, including the preamble and final rule amendments.

You can also find the technical support documents for the proposed and final rule, the EPA's response to public comments document for the final rule, information on the docket (which is located at www.regulations.gov), and information on the electronic greenhouse gas reporting tool.

From this site you can also find a link to information on EPA training opportunities. A copy of this webinar with the speaker notes will be posted on that page for future reference.

Reporters can contact the EPA with further questions on the rule or on the reporting tool at the e-mail address listed.