

Slide 1: Diurnal Emission Requirements for Marine Spark-Ignition Vessels



**Diurnal Emission Requirements for
Marine Spark-Ignition
Vessels**

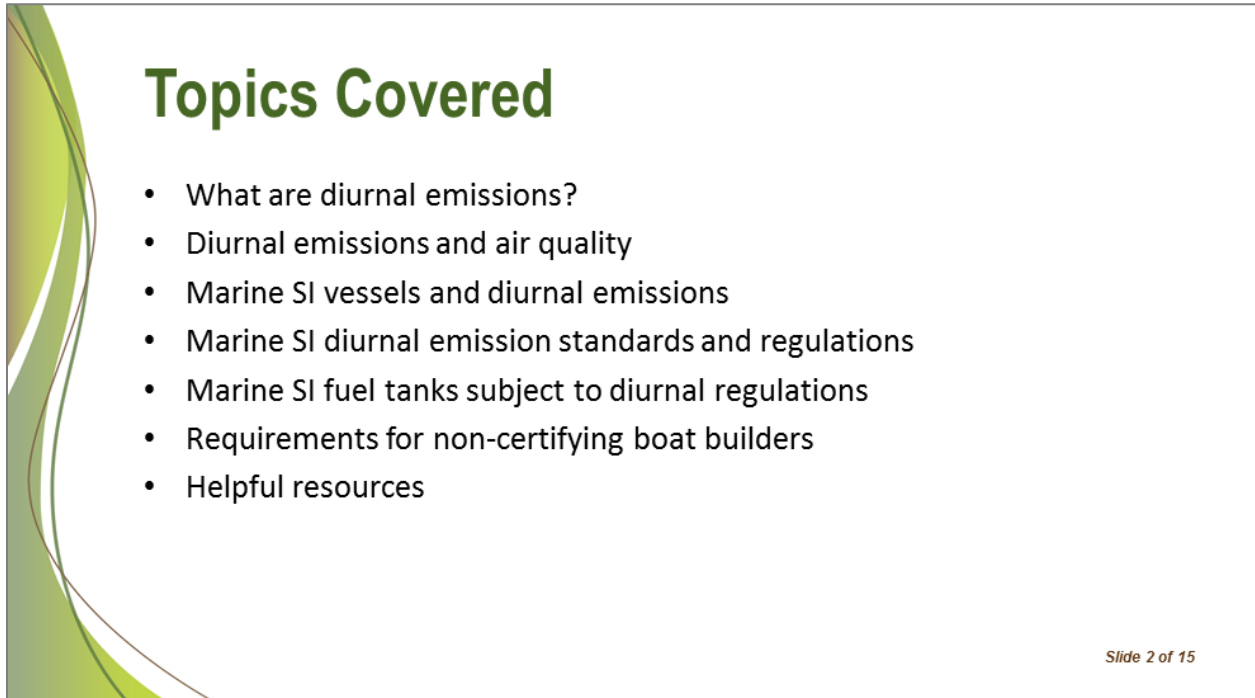
DISCLAIMER: This tutorial provides an overview of EPA compliance and test procedures that are set forth in the *Code of Federal Regulations* (CFR). This overview does not replace or substitute for the CFR or rules published in the *Federal Register*. Any representation made in this tutorial counter to the language or intent of the regulations shall be void. Legal statutory and regulatory authority rests in the regulations contained in the CFR. The information in this tutorial is not exclusive of all the requirements under the regulations. Please see the appropriate regulatory sections in the CFR for more detailed and specific instructions relating to your regulatory requirements.

This U.S. Environmental Protection Agency (EPA) tutorial provides an overview of EPA's requirements for controlling diurnal emissions from marine vessels powered by spark-ignition (SI) engines.

Please use the buttons on your screen to play, pause, or stop the tutorial or access closed captioning. Note that all links referenced in the tutorial are listed at the end of the presentation. You will be able to click these links and open them in a new window where you can bookmark them.

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Slide 2: Topics Covered

A presentation slide with a decorative green and white wavy graphic on the left side. The title "Topics Covered" is in a large, bold, green font. Below the title is a bulleted list of seven topics. In the bottom right corner, there is a small text label "Slide 2 of 15".

Topics Covered

- What are diurnal emissions?
- Diurnal emissions and air quality
- Marine SI vessels and diurnal emissions
- Marine SI diurnal emission standards and regulations
- Marine SI fuel tanks subject to diurnal regulations
- Requirements for non-certifying boat builders
- Helpful resources

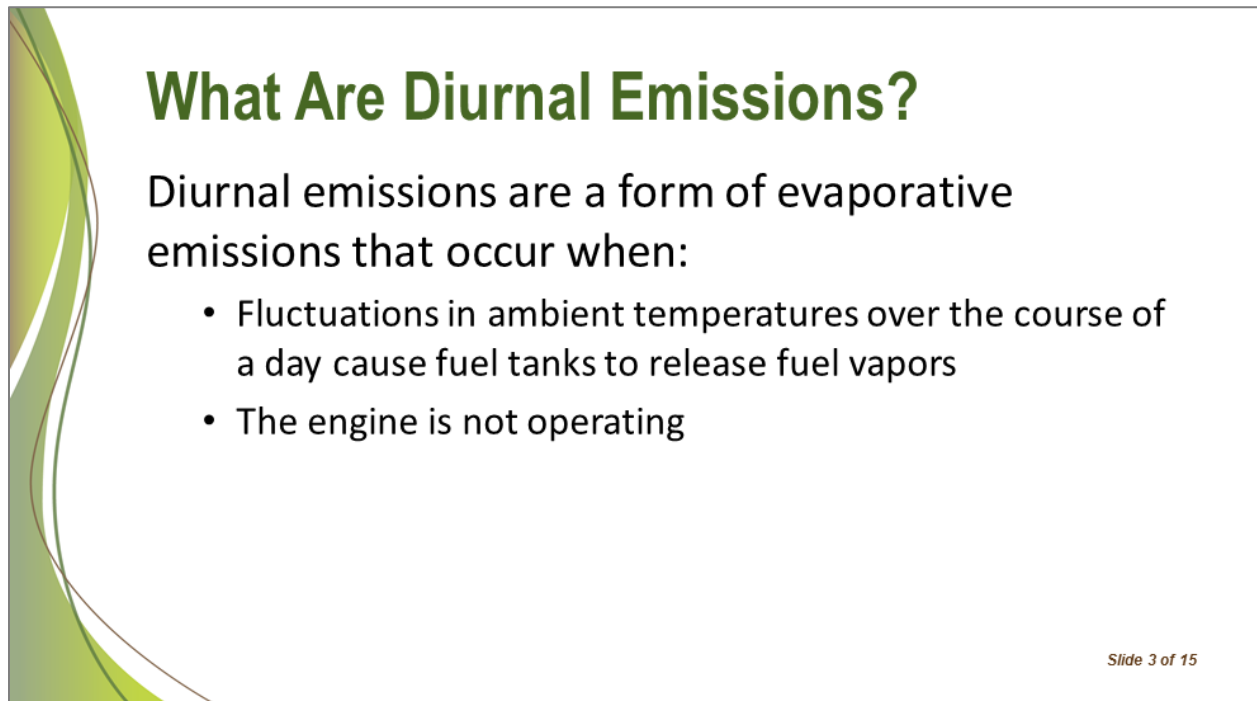
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This tutorial:

- explains what diurnal emissions are;
- identifies how diurnal emissions can affect air quality;
- describes how marine SI vessels can release diurnal emissions;
- reviews marine SI diurnal emission standards and regulations;
- lists the marine SI fuel tanks subject to diurnal regulations; and
- summarizes the requirements for non-certifying boat builders.

For additional information related to diurnal emissions, please refer to the helpful resources section of this tutorial.

Slide 3: What are diurnal emissions?



What Are Diurnal Emissions?

Diurnal emissions are a form of evaporative emissions that occur when:


- Fluctuations in ambient temperatures over the course of a day cause fuel tanks to release fuel vapors
- The engine is not operating

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- Fluctuations in ambient temperatures over the course of a day cause fuel tanks to release fuel vapors; and
- The engine is not operating.

Slide 4: Diurnal Emissions and Air Quality



Diurnal Emissions and Air Quality

Diurnal emissions impact on air quality:


- Vessel tanks vent polluting fuel vapors to the atmosphere
- Hydrocarbons in fuel vapors contribute to the formation of ground level ozone or smog
- Ground level ozone has a negative impact on public health and the environment

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Diurnal emissions impact air quality for the following reasons.

- Vessel tanks vent polluting fuel vapors to the atmosphere.
- Hydrocarbons in fuel vapors contribute to the formation of ground level ozone or smog.
- Ground level ozone has a negative impact on public health and the environment.

Slide 5: Marine SI Vessels and Diurnal Emissions



Marine SI Vessels and Diurnal Emissions

Diurnal emissions from marine vessels occur because:

- Increase in ambient temperature causes fuel in the vessel's fuel tank to heat up
- The hot fuel evaporates
- Fuel vapor is driven out of the tank into the atmosphere

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- The Increase in ambient temperature causes the fuel in the vessel's fuel tank to heat up;
- The hot fuel evaporates; and
- Fuel vapor is driven out of the tank into the atmosphere.

Slide 6: Marine SI Diurnal Regulations


Marine SI Diurnal Regulations

- EPA regulations establish diurnal emission standards to reduce amount of diurnal or daily emissions that escape through a vessel's fuel tank system
- Diurnal emission regulations for marine SI vessels are located in 40 CFR parts 1045 and 1060
- Electronic versions of EPA regulations can be found under Title 40 at www.ecfr.gov

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EPA regulations establish diurnal emission standards to reduce the amount of diurnal or daily emissions that escape through a vessel's fuel tank system. The diurnal emission regulations for marine SI vessels are located in 40 CFR parts 1045 and 1060. Part 1045 covers spark-ignition propulsion marine engines and vessels and Part 1060 covers evaporative emissions from new and in-use non-road and stationary equipment. Electronic versions of EPA regulations can be found under Title 40 at <http://www.ecfr.gov>.

Slide 7: Marine SI fuel systems under diurnal regulations



Marine SI Fuel Systems Under Diurnal Regulations

The following marine SI fuel systems are subject to diurnal emission regulations as stated in 40 CFR 1060.105(a)(1):


- Portable marine fuel tanks
- Personal watercrafts (PWCs) and all other vessels with installed fuel tanks (including engine-mounted fuel tanks)

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The diurnal emissions regulations apply to the following marine fuel tank systems as stated in 40 CFR 1060.105(a)(1).

- Portable marine fuel tanks; and
- Personal watercrafts (PWCs) and all other vessels with installed fuel tanks, including vessels with engine-mounted fuel tanks and sterndrive and inboard vessels with installed tanks.

Slide 8: What are portable marine fuel tanks?



What Are Portable Marine Fuel Tanks?


Portable marine fuel tanks are:

- Used to supply fuel to a marine engine during operation
- Not permanently installed on the vessel

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Portable marine fuel tanks are used to supply fuel to a marine engine during operation and are not permanently installed on the vessel and therefore can be transported to and from the vessel.

Slide 9: Portable Marine Fuel Tanks Requirements



Portable Marine Fuel Tank Requirements

Portable marine fuel tanks must meet design requirements to control diurnal emissions per 40 CFR 1060.105 (c), (d), and (f):


- Must be self-sealing when detached from engine
- Must not vent to atmosphere when attached to engine
- Manual vent allowed - to temporarily relieve pressure
- Must remain sealed up to positive pressure of 24.5 kilopascals (kPa) or 3.5 pounds per square inch gauge pressure (psig)
- No air outlets that vent to the atmosphere at pressures below 34.5 kPa or 5.0 psig
- Detachable fuel lines for use with portable marine fuel tanks must be self-sealing when not attached to engine or fuel tank

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Portable marine fuel tanks must meet design requirements to control diurnal emissions per 40 CFR 1060.105 (c), (d), and (f) which state that portable marine fuel tanks and associated fuel-system components must meet the following requirements.

- Portable marine fuel tanks must be self-sealing when detached from the engine.
- The tanks may not vent to the atmosphere when attached to an engine.
- An integrated or external manually activated device may be included in the fuel tank design to temporarily relieve pressure before refueling or connecting the fuel tank to the engine. However, the default setting for such a vent must be consistent with the requirements in 40 CFR 1060.105 (c).
- Portable marine fuel tanks must remain sealed up to a positive pressure of 24.5 kilopascals (or kPa) or 3.5 pounds per square inch of gauge pressure (or psig); however, they may contain air inlets that open when there is a vacuum pressure inside the tank.
- Such fuel tanks may not contain air outlets that vent to the atmosphere at pressures below 34.5 kPa (5.0 psig).
- Detachable fuel lines that are intended for use with portable marine fuel tanks must have connection points that are self-sealing when not attached to the engine or fuel tank.

Slide 10: What are installed marine fuel tanks?



What Are Installed Marine Fuel Tanks?

Installed marine fuel tanks:

- Deliver fuel to a marine SI engine
- Do not fit definition of a portable marine fuel tanks
- Are installed on trailerable and nontrailerable vessels
 - Trailerable vessels can be transported by a trailer
 - Nontrailerable vessels are:
 - Large vessels that stay in water throughout boating season
 - 26.0 feet or more in length, or more than 8.5 feet in width
- Are found on sterndrive/inboard vessels and PWCs

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Installed marine fuel tanks also deliver fuel to marine SI engines, but unlike portable fuel tanks, they are integrated into the vessel's design and cannot be moved from vessel to vessel.

Installed marine fuel tanks are installed on trailerable and nontrailerable vessels.

- Trailerable vessels (or boats) can be transported by trailer.
- Nontrailerable vessels are large boats that stay in the water throughout boating season and therefore see a much smaller daily swing in fuel temperatures, which corresponds with a smaller degree of diurnal emissions. They measure 26.0 feet or more in length, or more than 8 and a half feet in width per 40 CFR Part 1060.801.

Installed marine fuel tanks are found on sterndrive or inboard vessels and PWCs. PWCs are designed to be operated by a person or persons positioned on, rather than within, the confines of the hull.

Slide 11: Diurnal Standards for Installed Marine Fuel Tanks



Diurnal Standards for Installed Marine Fuel Tanks

Installed marine tanks must meet standards in 40 CFR 1060.105 and 1060.525:


- Diurnal emissions are measured in grams/gallon/day (g/gal/day)
- Installed fuel tank standard is 0.40 g/gal/day
- Alternative standard of 0.16 g/gal/day is available for nontrailerable vessels
- Tethered tank caps must include visual or audible indication of proper seal
- Water and liquid fuel must not reach carbon canister of fuel system
- Design must prevent fuel spit-back of spillage during tank refueling
- Test procedures are specified in 40 CFR 1060.525

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Installed marine tanks for both trailerable and nontrailerable vessels must meet the following diurnal emission standards and requirements specified in 40 CFR 1060.105 and 1060.525:

- Diurnal emissions are measured in grams per gallon per day.
- Diurnal emissions from marine SI fuel tanks may not exceed 0.40 grams per gallon per day.
- An alternative standard of 0.16 grams per gallon per day is available for fuel tanks installed on nontrailerable vessels.
- Tethered fuel tank caps must include visual or audible indication of proper seal.
- Water and liquid fuel must not reach carbon canisters of the fuel tank system.
- The design of the fuel tank system must prevent fuel spit-back of spillage during in-use tank refueling.
- Test procedures to determine whether fuel tanks meet diurnal standards are specified in 40 CFR 1060.525.

Slide 12: Demonstrating Compliance



Demonstrating Compliance

Vessel manufacturers are required to demonstrate that their diurnal systems meet EPA standards and regulations:

- Boat builders have two options to meet diurnal standards:
 - Install EPA-certified diurnal system
 - or
 - Develop own diurnal system and obtain EPA certification
- Manufacturers of diurnal systems must obtain EPA certification

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Vessel manufacturers are required to demonstrate that their diurnal systems meet EPA standards and regulations.

Boat builders have two options to meet diurnal standards:

- Install an EPA-certified diurnal system; or
- Develop their own diurnal system and obtain EPA certification

Manufacturers of diurnal systems must obtain an EPA certificate to demonstrate compliance. A link to a tutorial on the certification of diurnal fuel systems is available in the Helpful Resources slide at the end of this tutorial.

Slide 13: Requirements for Non-certifying Boat Builders



Requirements for Non-certifying Boat Builders

Boat builders who do not wish to obtain their own certificate must:

- Install EPA-certified diurnal systems, fuel lines, fuel tanks and engines
- Affix a label on the vessel that includes the:
 - Corporate name
 - Trademark
 - Statement: “MEETS U.S. EPA EVAP STANDARDS USING CERTIFIED COMPONENTS”
 - Label may be combined with Coast Guard label per 40 CFR 1060.135(c)
- Keep required records and documents per 40 CFR 1060.210
- Avoid violations per 40 CFR 1060.601 and 40 CFR 1068.101

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Boat builders who do not wish to obtain their own EPA evaporative emissions certificate must instead:

- Install EPA-certified diurnal systems, fuel lines, fuel tanks and engines
- Affix a label on the vessel that includes the corporate name, trademark, and the statement: "MEETS U.S. EPA EVAP STANDARDS USING CERTIFIED COMPONENTS". This label may be combined with the Coast Guard label per 40 CFR 1060.135(c)
- Keep required records and documents per 40 CFR 1060.210; and
- Avoid violations per 40 CFR parts 1060.601 and 1068.101 .

Slide 14: Summary

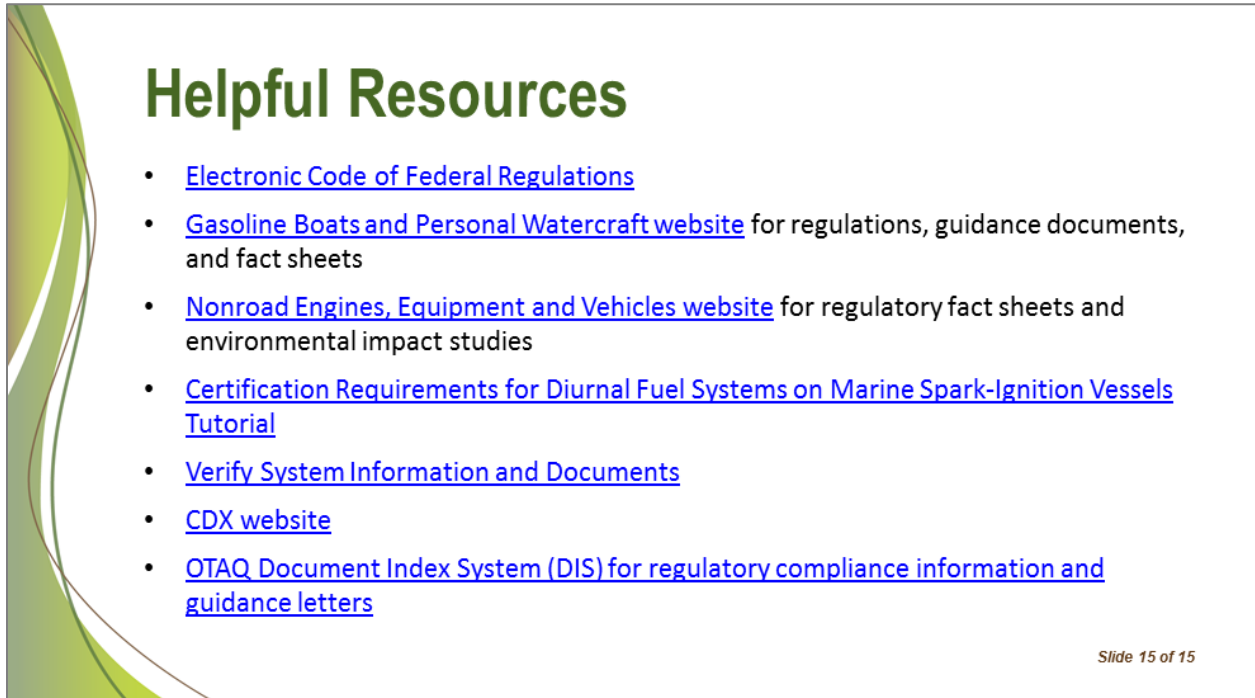
Summary

- Diurnal emissions are daily evaporative emissions vented from vessel fuel tanks
- Diurnal emission regulations and standards for vessel manufacturers are found in 40 CFR parts 1045 and 1060
- Both portable and installed marine fuel tank systems are subject to diurnal emissions regulations
- Non-certifying boat builders must install EPA-certified components (diurnal systems, engines, tanks, and fuel lines)

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In summary, the diurnal emissions are daily evaporative emissions vented from vessel fuel tanks, and the diurnal emissions regulations and standards for vessel manufacturers are found in 40 CFR Parts 1045 and 1060. Both portable and installed marine fuel tanks are subject to diurnal regulations. Non-certifying boat builders must install EPA-certified components in their vessels, which include certified diurnal systems, engines, tanks, and fuel lines.

Slide 15: Helpful Resources

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Helpful Resources

- [Electronic Code of Federal Regulations](#)
- [Gasoline Boats and Personal Watercraft website](#) for regulations, guidance documents, and fact sheets
- [Nonroad Engines, Equipment and Vehicles website](#) for regulatory fact sheets and environmental impact studies
- [Certification Requirements for Diurnal Fuel Systems on Marine Spark-Ignition Vessels Tutorial](#)
- [Verify System Information and Documents](#)
- [CDX website](#)
- [OTAQ Document Index System \(DIS\) for regulatory compliance information and guidance letters](#)

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Shown on your screen is a list of resources discussed in this tutorial, along with additional related information. Click on any of the links to open the selected page in a new browser window.

- [Electronic Code of Federal Regulations](#)
- [Gasoline Boats and Personal Watercraft website](#)
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This concludes the tutorial on EPA's requirements for controlling diurnal emissions from marine vessels powered by spark-ignition engines.