

# TECHNICAL SUPPLEMENT 5: MARINE FACILITIES

## Technical Disclaimer

This technical supplement is intended to help you accurately determine and correctly report marine facility emissions. It does not supersede or replace any state or federal law, regulation, or rule.

This guidance, which reflects our current understanding of how marine facilities work and how they generate emissions, how they are monitored or tested, and what data are available for emissions determination, may change over time as we continue our scientific studies and as new information becomes available. We welcome any data, information, or feedback that may improve our understanding of marine facility emissions and thereby further improve emissions inventory emission determinations.

The represented calculation methods are intended as an emissions calculation aid; alternate calculation methods may be equally acceptable if they are based upon, and adequately demonstrate, sound engineering assumptions or data. If you have a question regarding the acceptability of a given emissions determination method, please contact the Industrial Emissions Assessment Section at 512/239-1773.

## Introduction

This technical supplement provides guidance on identifying, quantifying, and correctly reporting marine facility emissions on the annual emissions inventory. Marine facility emissions must be reported as part of the annual routine emissions inventory. The onshore facilities' owner or operator does not own or operate the marine vessel itself, but does operate most of the activities resulting in vessel emissions while the vessel is docked. Therefore, the onshore facilities' owner or operator is responsible for reporting dock and dockside marine vessel emissions in the annual emission inventory. This is consistent with the longstanding approach of reporting truck loading and cleaning emissions in the truck terminal or cleaning facility owner's inventory.

There are several categories of facilities associated with marine operations, including:

- onshore process units or equipment performing a function associated with dockside marine vessels (e.g., solid material stockpiles, silos, tanks, and abatement devices)
- the dock and all of its associated equipment (e.g., conveying lines, piping, valves, pumps, hoses, and blowers); and
- dockside marine vessel loading and unloading, cleaning and degassing, and abrasive blasting and painting. A marine vessel

is considered dockside if it is in any way connected to the shore. This includes vessels connected to the dock, connected to a vessel that is connected to the dock, or connected directly to the land.

Because onshore process units and equipment are addressed elsewhere in *2005 Emissions Inventory Guidelines*, this technical supplement addresses only dock and dockside marine vessel emissions.

This document does not address marine operations structural representation in the inventory. For guidance on this topic, consult *2005 Emissions Inventory Guidelines*, Chapter 3.

## **Expected Emissions**

Emissions associated with the dock and the dockside marine vessels, except for emissions from marine vessel engines, should be determined and reported in the annual emission inventory. This includes any emissions from marine vessel to marine vessel transfers (i.e., lightering or barging).

A marine facility's emissions depend on the activity performed and the material(s) handled or used.

Dock emissions may include:

- fugitive particulate matter from conveying lines; and
- fugitive VOCs from equipment leak fugitives.

Dockside marine vessel emissions may include:

- VOCs from loading or unloading liquid bulk materials;
- VOCs from loading or unloading liquified gaseous materials;
- particulate matter from loading or unloading solid bulk materials (including lightering or barging at the dock);
- VOCs from degassing and cleaning liquid vessel compartments; and
- particulate matter and VOCs from abrasive blasting and surface coating.

## **Emissions Determination**

For primary guidance on determining marine emissions, consult the air permit draft guidance document *Dockside Vessel Emissions*. In particular, Section 2 of this document addresses each dockside activity discussed in the following section, providing background information, specific calculation guidance, and references to other specific air permits guidance

documents that may also be helpful. The following sections address the key points related to the emission inventory.

### ***Loading/Unloading Bulk Liquid Materials***

Loading and unloading emissions bulk liquid materials may result in emissions at the dock and at the vessel. Dock emissions result from equipment leak fugitives, while vessel emissions result from vapor displacement during liquid loading.

Determine dock emissions from equipment leak fugitives following the guidance in Technical Supplement 3: Equipment Leak Fugitive Emissions. Code the emissions with a determination methodology of "A." Equipment leak fugitives should be determined for the entire period when VOCs are present in the dock piping.

Determine vessel emissions from liquid material loading and unloading using the techniques in the TCEQ air permits draft guidance document *Loading Operations*. Code the associated emissions with a determination methodology of "A."

If loading emissions are collected and abated, some emissions will escape collection and, additionally, some collected emissions will escape destruction. The air permits *Loading Operations* document provides guidance on determining uncollected emissions, which should be coded with a determination methodology of "A." The collected emissions that escape destruction at the abatement device should be determined using an appropriate destruction efficiency. Code these emissions with a determination methodology of "B."

During unloading operations, vapor in the receiving storage tank's vapor space is displaced, resulting in emissions. These emissions should be reported at the storage tank using storage tank emission calculations and following the general guidance.

### ***Loading/Unloading Bulk Liquefied Gaseous Materials***

Loading and unloading liquefied gasses will result in VOC emissions from dock equipment leak fugitives, and may also result in vessel emissions from gas freeing and vessel conditioning.

When liquefied gaseous materials are transferred to or from a pressurized marine vessel compartment, emissions usually come only from dock piping components. For guidance on determining these emissions, consult Technical Supplement 3: Equipment Leak Fugitive Emissions. Code the associated emissions with a determination methodology of "A." Equipment leak fugitive emissions should be determined for the entire period when VOCs are present in the dock piping.

Emissions from a pressurized marine vessel compartment may result from two processes used to ensure safety and product quality: gas freeing and gas conditioning. Gas freeing is the evacuation of residual liquid ("heel") and vapor after unloading and prior to loading a new material. Gas conditioning displaces the residual nitrogen pad from the marine vessel compartment and saturates the vapor space with product vapor prior to loading. Calculate gas freeing or gas conditioning emissions using the ideal gas law and the actual pressure, concentration and vessel volume data. Since the ideal gas law is a first-order scientific principle, code the associated emissions with a determination methodology of "S" for "scientifically calculated."

### ***Loading/Unloading Solid Bulk Materials***

Emissions from solid bulk material loading and unloading result from dock fugitives and from solids entrainment during displacement of the vessel compartment air space during loading.

Material transfer methods determine where and how particulate matter is emitted. Emissions from such transfer methods as pneumatic systems, clam shell buckets, drag chains, belt conveyors, manual operations, or a combination of these methods should be determined following the detailed guidance in the air permits document *Dockside Vessel Emissions*.

If a material type is explicitly addressed in air permits guidance, then code the associated emissions with a determination methodology of "A." If the material type is not explicitly addressed, use the method for the most closely related material and code the emissions with a determination methodology of "E" for "estimated."

### ***Degassing/Cleaning Liquid Vessel Compartments***

Cleaning operations remove residual material from vessel compartments prior to change of service, maintenance, or repair. Depending on the vessel compartment's condition, as many as three steps in the process may result in emissions: degassing, deheeling, and cleaning. The air permits document *Dockside Vessel Emissions* explains the emission calculation method for degassing, deheeling, and cleaning. It also references the TCEQ document for determining uncontrolled vessel degassing and cleaning emissions, *Tank Truck and Rail Car Cleaning (RG-106)*. Since these techniques use the ideal gas law, code the associated emissions with a determination methodology of "S" for "scientifically calculated."

If saturation test results are used to calculate degassing, deheeling, and cleaning emissions, then the ambient temperature during the test should correspond to or be greater than the average ambient temperature for that year's ozone season. Similarly, the chemical vapor pressure(s) used to calculate emissions should be the vapor pressure(s) of the chemical(s) at

the average ozone season temperature. Additionally, the test results can only be applied to chemicals that have an equivalent or lower vapor pressure than the tested chemical's vapor pressure.

If emissions are determined using saturation test results, code the associated emissions with a determination methodology of "B" for "material balance." Submit summary test results with each year's EIQ, and include information such as the ambient temperature during testing and vapor pressure(s) of the tested chemical(s).

### ***Abrasive Blasting and Surface Coating***

Building or repairing marine vessels and offshore platforms may involve abrasive blasting and painting operations. Abrasive blasting results in particulate matter emissions of the abrasive material and the old paint. Painting results in emissions of the VOCs that volatilize from the paint as it cures and particulate matter resulting from paint overspray. Determine these emissions using the TCEQ documents *Abrasive Blast Cleaning* (RG-169) and *Surface Coating Operations* (Draft dated April, 2001).

Since particulate emissions from abrasive blasting are calculated based on the abrasive material usage and the emission factors in the abrasive blast cleaning guidance, code the emissions with a determination methodology of "A."

Since VOC and particulate emissions from coatings are determined based on the coating composition and the application equipment's transfer efficiency, code the emissions with a determination methodology of "B" for "material balance."

### **Annual and Ozone Season Emission Rates**

Determine actual annual emissions following the guidance in this supplement. If the same material is handled throughout the year, then use annual material throughput and the guidance in this supplement to determine emissions. If materials vary, determine emissions from each individual operation using the guidance in this supplement and the following information:

- the amount and type of material processed;
- speciation of any VOC or particulate emissions;
- temperature, vapor pressure, molecular weight, and any other data necessary to determine emissions.

Report the resulting emission rates at the appropriate FIN/EPN paths as the annual emissions rates. Do not use "average" or "typical" operations data to determine actual annual emissions.

To obtain ozone season emission rates for each FIN/EPN path, first determine emissions (in pounds) that the FIN generated and emitted through the EPN during the months of June, July, and August. Next, divide the resulting emissions rate(s) by the number of days that the FIN operated and emitted through the EPN during the months of June, July, and August. Report the resulting rates as the ozone season pound per day (PPD) emissions rates for that FIN/EPN path. Note that the number of days that a FIN can operate during the ozone season cannot exceed 92. For more information, consult the “Ozone Season Emissions” sub-heading under the “Reported Emissions” heading in Chapter 4 of this book.

## VOC and Particulate Speciation

Speciation should follow the guidance in *2005 Emissions Inventory Guidelines*. In general:

- Emissions from bulk liquids and liquified gaseous materials loading and unloading will be VOC with a composition corresponding to that of the material loaded or unloaded.
- Vessel gas freeing and conditioning emissions will be VOC with a composition corresponding to that of the previously loaded material and/or the material being loaded.
- Solid bulk material loading emissions will be particles of the material loaded.
- Degassing and cleaning emissions will be VOCs with a composition corresponding to that of the material previously held in the vessel compartment.
- Abrasive blasting results in particulate matter emissions of the abrasive material and the old paint. Painting results in emissions of the VOCs that volatilize from the paint as it cures and particulate matter resulting from paint overspray.

## Supporting Documentation

So that QA staff may verify reported emissions, include representative sample calculations with your emissions inventory submission. Provide the data used in these sample calculations, including:

- the amount and type of material processed during each operation, including the type and amount of material transferred between vessels at the docks;
- the date and time of the activity;
- temperature, vapor pressure, molecular weight, and other factors upon which emission determinations depend;
- material composition data, if the associated emissions (total or speciated) depend upon them; and
- all other information necessary to determine emissions.

## Frequently Asked Questions

**1. May I omit my marine emissions from the annual inventory?  
Aren't these emissions accounted for in the area source inventory?**

No. The area source inventory only includes emissions from ships in transit. Once a ship is docked, it is considered a stationary source. All engine emissions from a docked vessel should be reported in the point source inventory.

**2. Since I don't own the marine vessel, why am I required to report its emissions in my inventory?**

Because the marine vessel is at your site supporting your business, the associated emissions should be reported in your inventory. This is similar to the situation for truck loading or unloading inside a plant.

**3. What if I share a marine loading facility with another company?**

The answer to this question depends upon the business decision for a site. Please call the IEAS for guidance in your particular situation.

**4. Should I report emissions generated when materials are transferred from one marine vessel to another while docked? (This is sometimes also called lightering or barging.)**

Yes. All emissions from vessels at the dock should be reported by the dock owner or operator.

## References

- Air Permits Technical Guidance for Loading Operations.*
- Air Permits Technical Guidance for Grain Elevators, RG-053.*
- Air Permits Technical Guidance for Rock Crushing Facilities, RG-058.*
- Air Permits fact sheet: Bulk Material Handling Emission Estimates.*
- Air Permits Technical Guidance for Dockside Vessel Emissions* (Draft dated September, 2001), including the memorandum *Marine Unloading/Loading Particulate Emission Factors.*
- Air Permits Technical Guidance for Tank Truck and Rail Car Cleaning, RG-106.*
- Air Permits Technical Guidance for Abrasive Blast Cleaning, RG-169.*
- Air Permits Technical Guidance for Surface Coating Operations* (Draft dated April, 2001).