

Current Methodologies and Best Practices in Preparing Port Emission Inventories



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EXECUTIVE SUMMARY

This report describes current methodologies and best practices used for preparation of a port emission inventory. An emission inventory is necessary for port authorities, those doing business at ports (such as terminal operators, tenants, and shipping companies), state and local entities, or other interested parties to understand and quantify the air quality impacts of current port operations, and to assess the impacts of port expansion projects or growth in port activity. An inventory provides the baseline from which to create and implement emission mitigation strategies and track performance over time. This report focuses on mobile emission sources at ports, including oceangoing vessels (OGVs), harbor craft, and cargo handling equipment (CHE), as well as other land-side mobile emission sources at ports, such as locomotives and on-highway vehicles. For this report we reviewed current information on port emission inventory preparation and summarized the most current practices.

This report was prepared for the U.S. Environmental Protection Agency's (EPA's) Sector Strategies Program, which works with several industry sectors, including ports, to address the most significant impediments to better environmental performance in each sector. EPA, in partnership with the American Association of Port Authorities (AAPA), is encouraging ports to proactively address air quality issues. This report is intended to help port authorities and others who want to prepare a port mobile source emission inventory and thereby quantify current emissions. The inventory can then be used to develop strategies to minimize current and projected emissions and to quantify progress. An emission inventory can inform regulatory requirements such as those in State Implementation Plans (SIPs), the National Environmental Policy Act (NEPA), and the California Environmental Quality Act (CEQA), and also inform voluntary initiatives such as a collaborative regional air toxics assessment or development of a port environmental management system (EMS).

In the past, port emission inventories were less refined than inventories for other sectors, because port activities were not well defined, and emission factors were based on limited data. Because ports can be large sources of nitrogen oxides (NO_x), particulate matter (PM), sulfur oxides (SO_x), and toxic emissions, more detailed and accurate emission inventories are needed. Port inventory methodologies have been improving over the last several years, as reflected in the newer port inventories. However, there is still little guidance on preparing port inventories; thus, they can vary by who prepares them and the purpose of the inventory. In addition, emission factors and other operational data on marine vessels continually evolve; plus, the parameters often differ between studies.

Because the rationale and resources to prepare inventories vary between ports, this report provides a range of preparation approaches to provide the appropriate level of detail to meet ports' needs. The three approaches presented in this report are:

- A *detailed approach* in which each ship trip into and out of a port is quantified. Harbor craft and land-side emissions are estimated in detail.
- A *mid-tier approach* in which ship trips are averaged by ship type and dead weight tonnage, and then average trip characteristics are calculated. Harbor craft and land-side emissions also can be averaged by type of ship or equipment.
- A *streamlined approach* in which marine, harbor craft, and land-side emissions are estimated from other detailed inventories.

The report first provides a methodology for detailed emission calculations for OGVs, as this is the best practice. In a detailed inventory, each ship call is analyzed and emission impacts calculated. The report explains how to determine port boundaries, what data sources to use, how to determine ship activity, and

