

Emission & Health Impacts from Vessels at Anchor

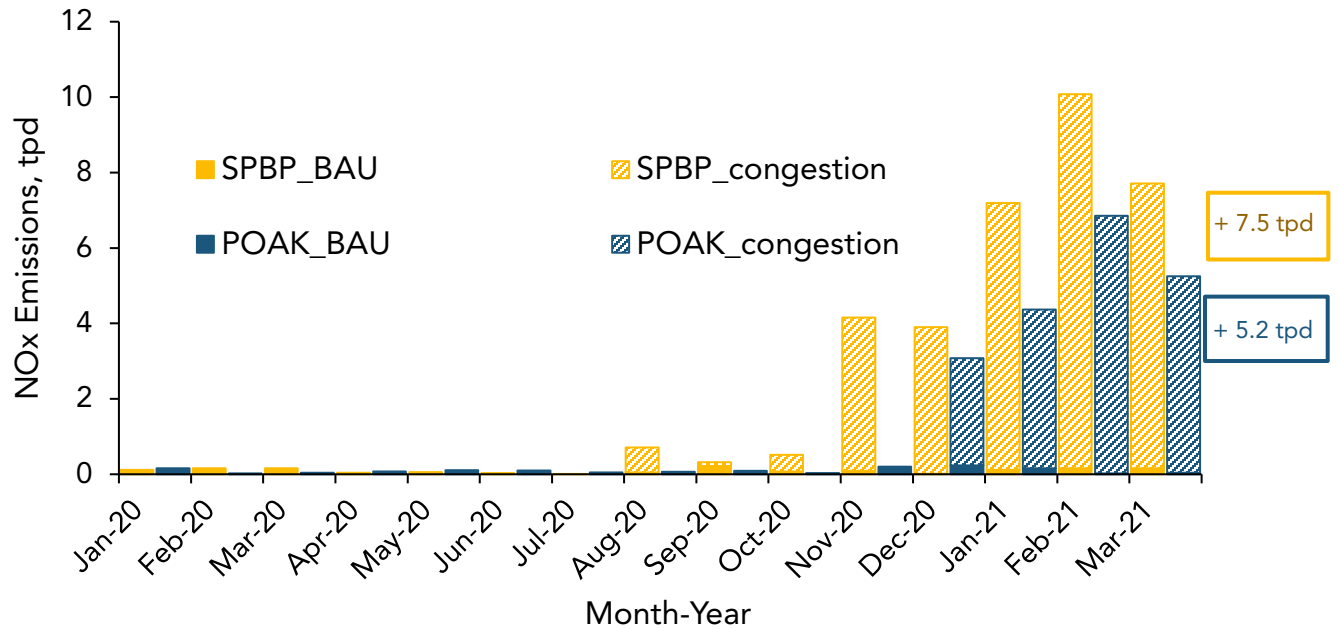
Quantifying emissions and health impacts of recent changes in container vessels at anchor near Ports of Los Angeles and Long Beach (SPBP) and the Port of Oakland (POAK).

- Recent increases in marine congestion at major California ports have seen up to 40 vessels queued near the San Pedro Bay Ports (SPBPs), and up to 20 vessels queued near the Port of Oakland. This increase in congestion is very unusual and is assumed to be caused by the significant increase in imports as well as shortages of both equipment and labor to handle them. Prior to this, on average these ports have only one vessel at anchor waiting to unload.
- This document focuses on the emissions and potential health impacts of this congestion due to the abnormally high number of container vessels at anchor waiting to unload at the Ports of Los Angeles, Long Beach, and Oakland.
- When at anchor, marine vessels rely on their auxiliary engines to provide power needed for critical shipboard functions like refrigeration, cooling, and circulating fresh and saltwater, similar to at-berth operations. The auxiliary engine emissions from anchored vessels have substantial implications for portside communities from increased particulate matter (PM) emissions, as well as contributions to smog-forming oxides of nitrogen (NO_x).
- In March 2021, the SPBPs saw an average increase of 50 percent in cargo movement (twenty-foot equivalent units - TEU) compared to the same time in 2019 prior to the COVID-19 pandemic.
- Overall, the three major ports in California have seen an increase of about 44 percent in cargo movement as compared to the same time in 2019.

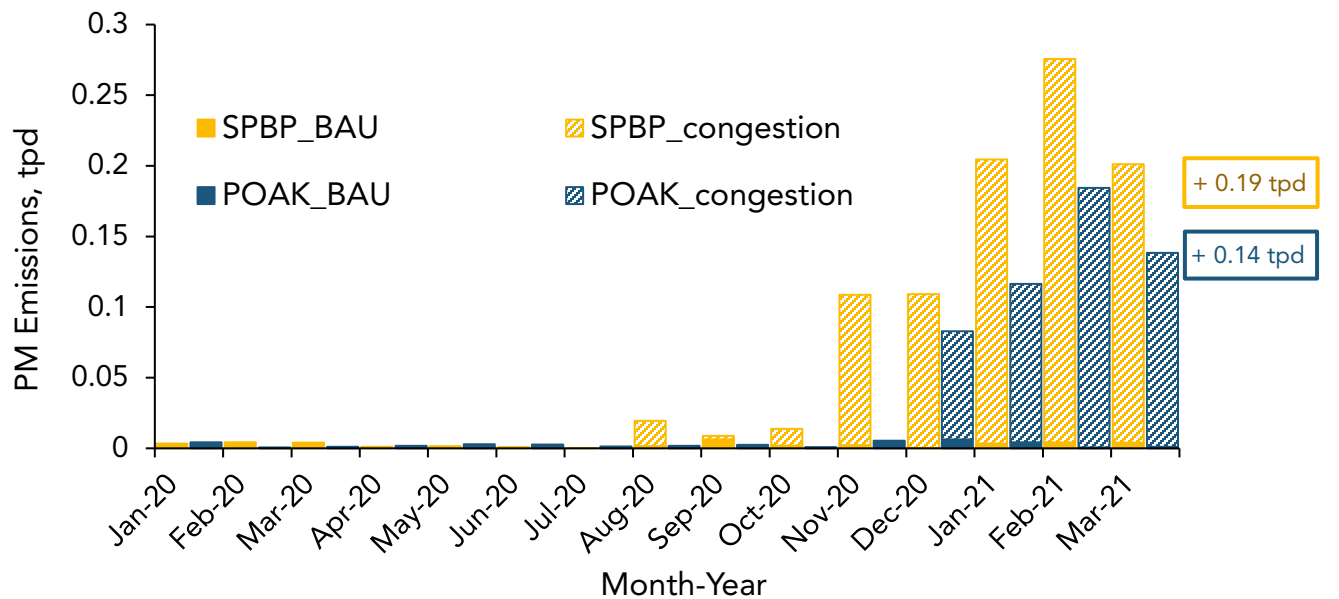
Ports	Port's TEU Data			
	March 2019	March 2020	March 2021	Percent increase since 2019
Port of Los Angeles	650,977	449,568	957,599	47%
Port of Long Beach	552,821	517,664	840,387	52%
Port of Oakland	213,972	190,188	241,470	13%
Total	1,417,771	1,157,420	2,039,456	44%

- The following two figures illustrate how NO_x and PM emissions associated with anchored container vessels increased sharply at California's major ports beginning in November 2020, peaked in February 2021, and have been declining since although they are still much higher than historical averages.

Container Vessel Anchorage Emissions: NOx



Container Vessel Anchorage Emissions: PM



- To put this into context, CARB’s current emissions inventory estimates that Ocean Going Vessels (OGV) within 3 nautical miles (nm) of the coast of the South Coast Air Basin emit approximately 0.4 tons per day (tpd) of PM, and 13.8 tpd of NOx.

- In the San Francisco Bay Area, OGVs contribute approximately 12.8 tpd of NO_x and 0.25 tpd of PM within 3 nm of the coast. These include emissions associated with at-berth, at-anchorage, and transit/maneuvering operations.
- To provide context and qualitative information on potential health impacts in the South Coast Air Basin (SCAB) from the increased anchorage emissions at the Ports of Long Beach and Los Angeles, CARB staff relied on the estimates of health benefits developed for the At Berth Regulation.
- The estimated annual emission increases¹ from higher anchorage activities are quite similar to the emission reductions from implementing At Berth regulation in SCAB in 2025 when auto carrier requirements begin. Therefore, in comparison, the annual health disbenefits from increased anchorage emissions will likely be comparable to the estimated numbers of cases of mortality and illness listed in the table below for the At Berth Regulation in year 2025.

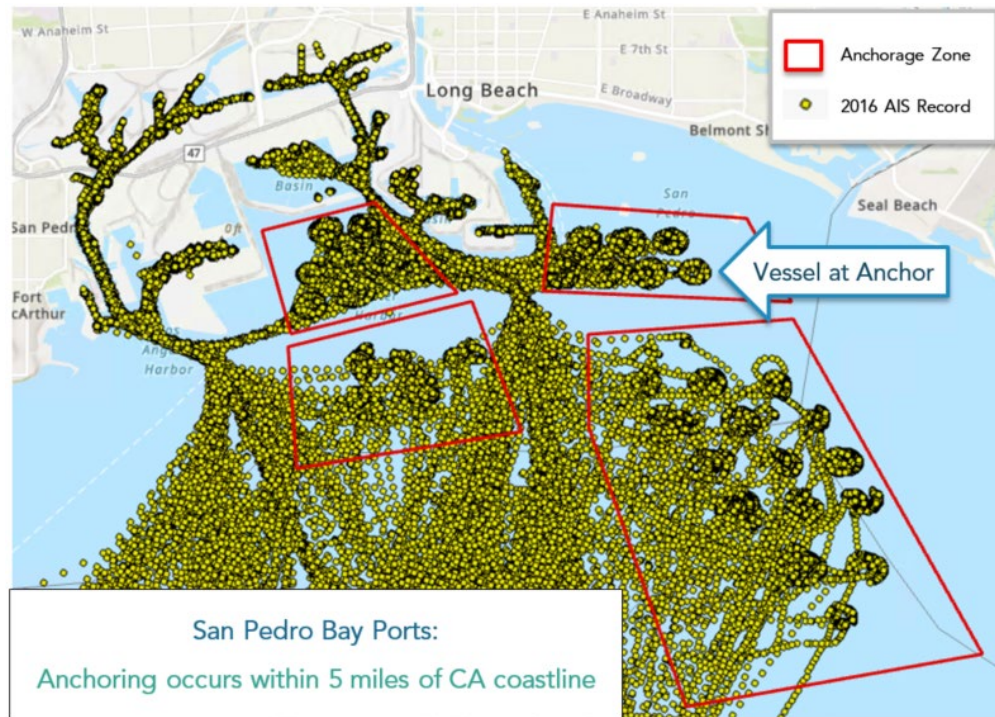
Health Outcomes for implementing At Berth Regulations at South Coast Air Basin in year 2025

Outcomes	Incidence Reduction
Cardiopulmonary mortality	20
Hospitalizations for cardiovascular illness	3
Hospitalizations for respiratory illness	3
Emergency room visits for asthma	10

- CARB staff is evaluating anchorage emissions as a component of the required 2022 Interim Evaluation for the At Berth Regulation. In the At Berth Regulation Resolution, the Board directed the staff to review the potential feasibility of control technologies for vessels at anchor and to publish the findings in a report by December 1, 2022.

¹ Between April 2020 and March 2021

- The following two figures provide vessel locational information from 2016 AIS² data that was the basis for the emissions estimates provided in this analysis.



² The automatic identification system (AIS) is an automatic tracking system that uses transceivers on ships provides information such as unique identification, position, course, and speed.