

Marine Ports: Pollution Impacts Affecting Communities



AWMA West Coast Region Conference:

Marine Port Air Quality Impacts

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NRDC:

The Natural Resources Defense Council is a national, non-profit organization of scientists, lawyers and environmental specialists dedicated to protecting public health and the environment.

Founded in 1970, NRDC has more than 550,000 members nationwide, served from offices in New York, Washington, Los Angeles and San Francisco.

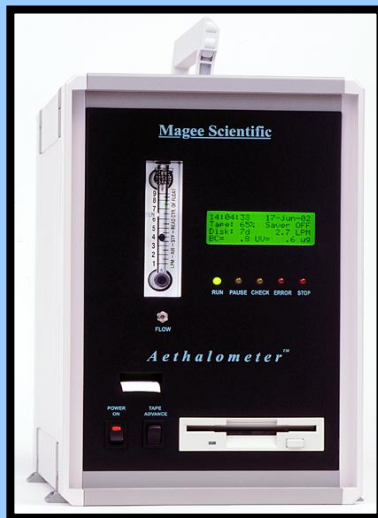


Why are Environmental & Community Groups Concerned?

- Ports across the country are expanding to accommodate growing intermodal container traffic. The increased trade takes a toll on air & water quality.
- As emissions from other sources decline due to regulation, emissions from the shipping industry are growing & are virtually unregulated.
- Even if international standards are met, pollution from large ships in the U.S. will still increase by roughly 13% in the next 30 years.

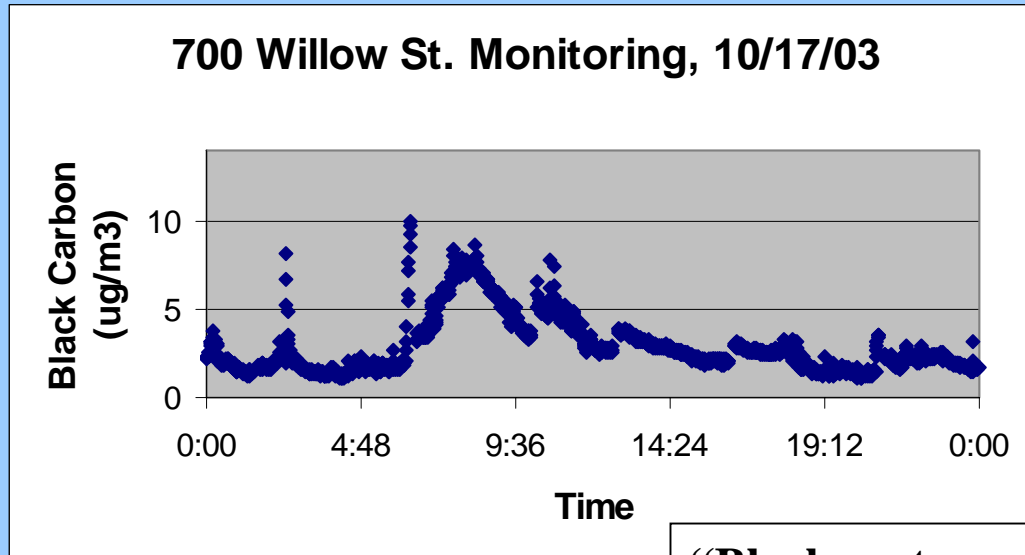
Air Pollution in West Oakland

- the Port of Oakland releases 4 times more NO_x & 45% more PM than the largest industrial source of those pollutants in the county (Owens-Brockway Glass Container factory).
- Recent local study showed severe impacts from truck traffic in W. Oakland:



- Hundreds of trucks cutting through neighborhood
- Residents bear a disproportionate burden of impacts; impacts; per capita pollution ~ 7x the County avg.
- Air monitoring showed that residents are exposed to to levels of Diesel PM (based on black carbon) up to to 5 times residents in other parts of Oakland, translating into elevated cancer risks of an extra 1 in 1,000.

Black Carbon Levels in a West Oakland Residence



“Black soot covers my window sills, my blinds, and my heating vents.

It is a constant cleaning dance to even control it. No wonder, that my four grandchildren, my son and myself have asthma.

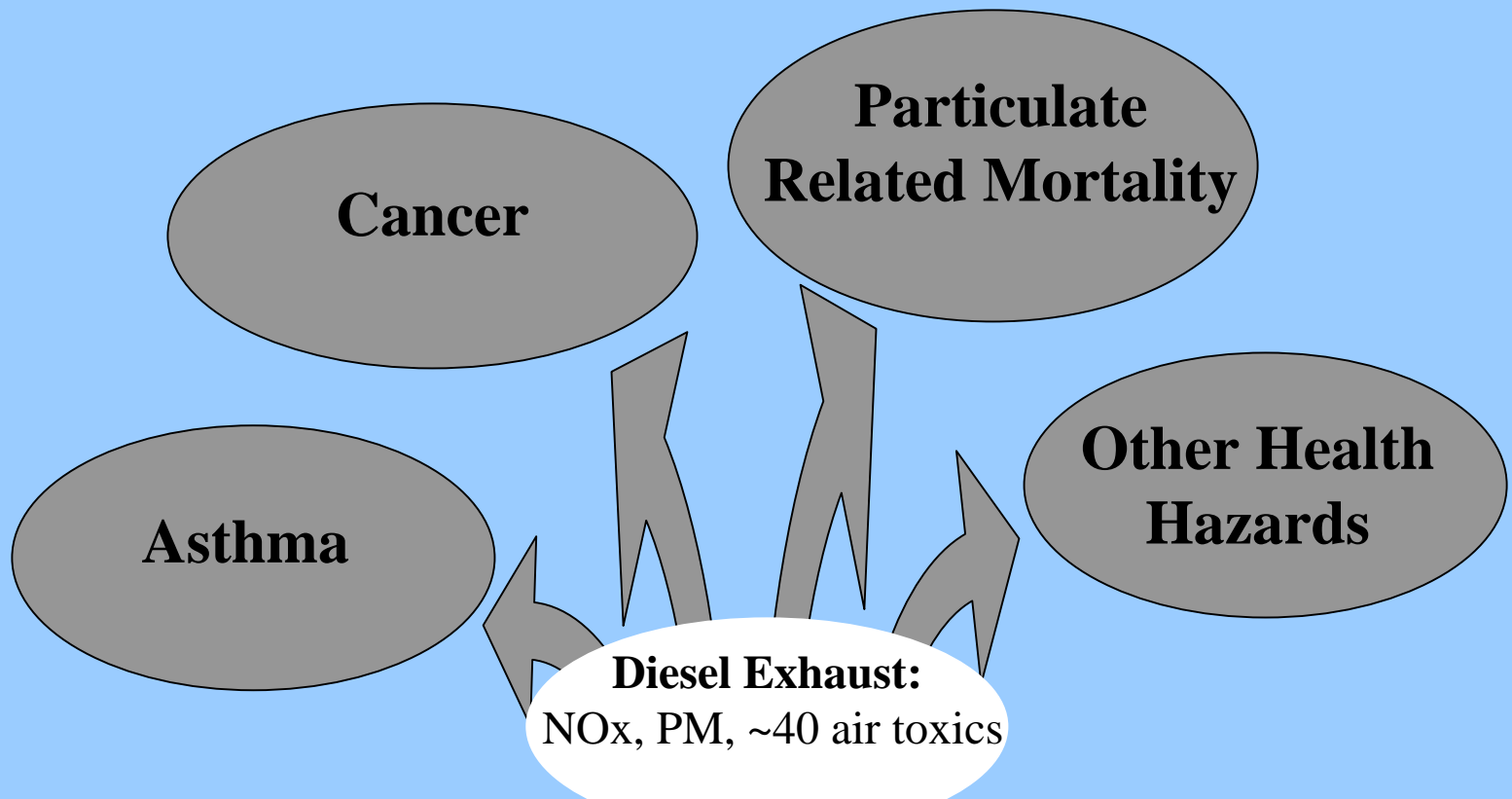
There is also a Head Start and three child care centers in my building where many of the children also suffer from asthma.”

Health Impacts of Air Pollution from Ports



- Marine ports bring together many of the dirtiest sources of air pollution – old diesel engines, affecting the health of port workers & residents in nearby communities + the pollution contributes significantly to regional air pollution.
- Diesel exhaust:
 - Criteria pollutants (NO_x, PM, etc.)
 - ~ 40 toxics, incl. arsenic, dioxins, formaldehyde, lead and mercury
- General Acute Diesel Exposure Effects: Nausea, eye irritation, increased blood pressure, headache, light-headedness, loss of appetite, poor coordination & difficulty concentrating.

Health Effects of Diesel Particulate Matter



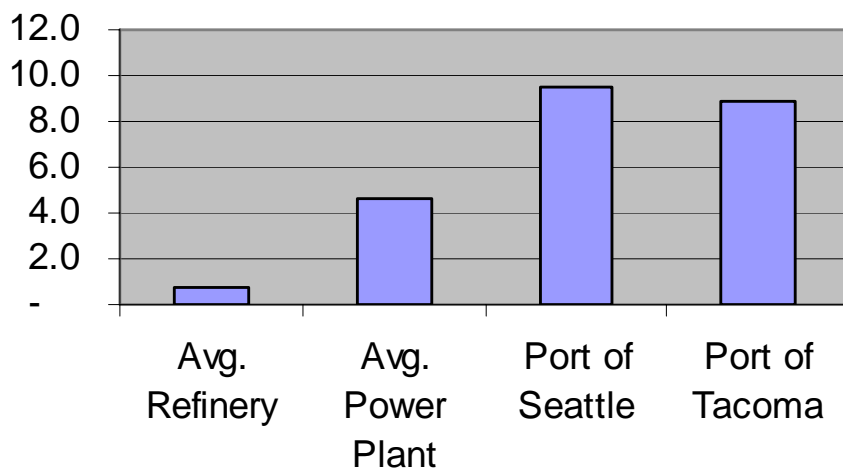
Health Effects of NO_x



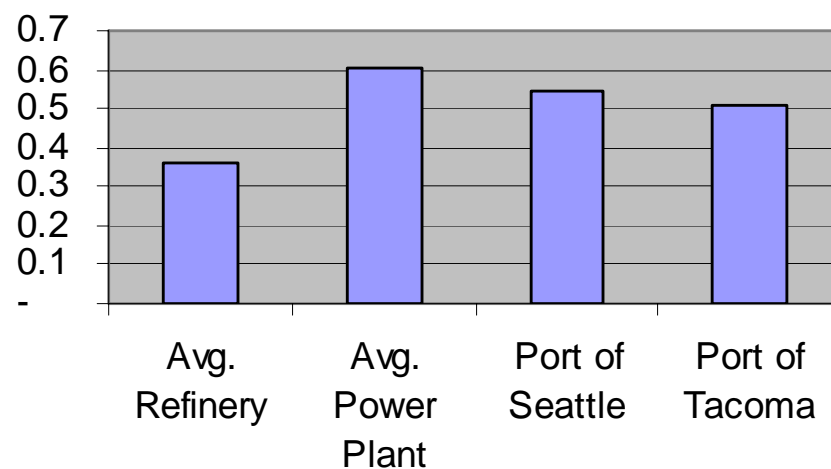
- NO_x causes a wide variety of health & environmental impacts:
- These compounds can react to form other toxic chemicals.
- NO_x causes respiratory problems; A recent Southern California study showed that exposure can lead to significant decreases in lung function growth among children.
- It may also cause birth defects.

Container Ports vs. Other Industry

NO_x Emissions (tons/day)



PM₁₀ Emissions (tons/day)



Source: NRDC Estimates based on reported TEU throughput in 2000, Surrogate Port EIS & Emission Inventory Data (2000), and EPA National Emissions Trends Data (2000).

Container Ports vs. Cars



The 10 Largest US Container Ports pollute the same amount as:

Over 3.2 million cars worth of NO_x

Over 8.1 million cars worth of PM₁₀

Over 18.5 million cars worth of SO_x

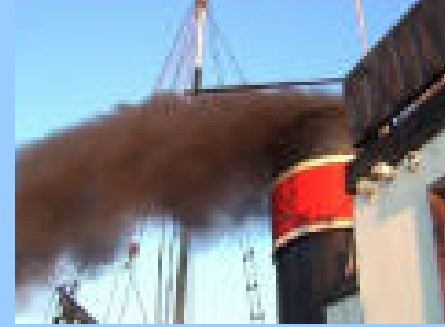
Over 182 thousand cars worth of VOC

Over 80 thousand cars worth of CO

Calculations are based on the number of cars registered in 2000, according to the Federal Highway Administration; Pollution from Passenger Vehicles according to EPA National Emission Trends Inventory, 2000 ; estimates of container port related emissions from the Ports of Los Angeles, Long Beach, Houston and Oakland Environmental Impact Reports and Related Emission Inventories, and Port Authority of NY & NJ Emission Inventories; and cargo throughput data from Seaports of the Americas, AAPA Directory 2002.

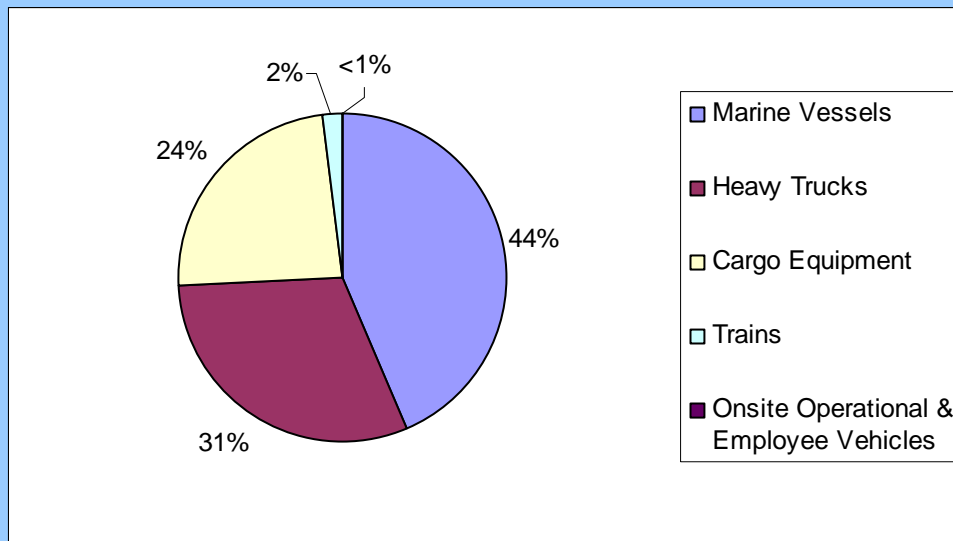


Marine Vessels Account for Most of the Emissions at Ports

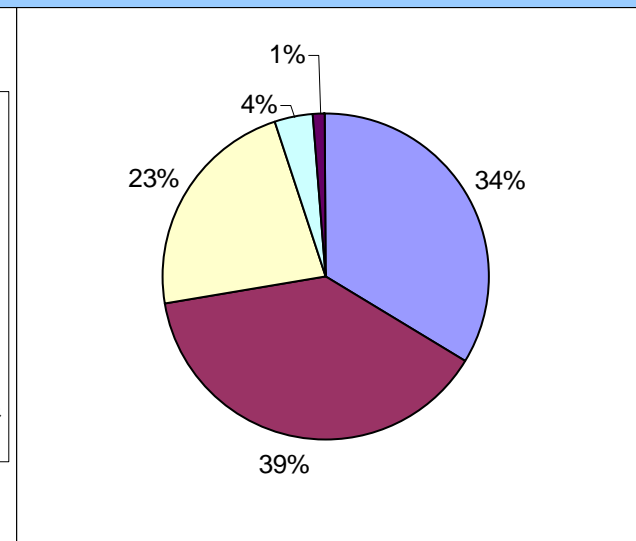


- Marine Vessels, Trucks & Cargo Handling Equipment together account for over 90% of emissions at ports.

PM Emissions



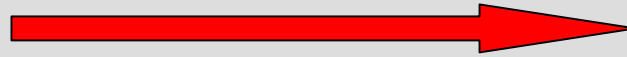
NOx Emissions



Note: Cleaning up trucks & equipment may be more of a priority to nearby communities, since those sources are closer.

Measures to Reduce Emissions

Short Term



Longer Term



Idling Contr.

Cleaner Fuels

LNG/Hybrids



Speed Reduction

Dockside Power

Cleaner Fuels
& Repowers

Exhaust Controls

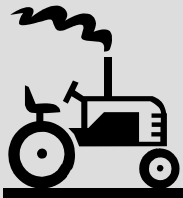


Idling Limits

Retrofits

Modal Shift to Rail

Fleet Turnover



Exhaust Contr.

Cleaner New
Purchases

Cleaner Fuels

Electrified/Automated

Recommended Mitigation Measures

What CAN be done at ports

Marine Vessels

■ Harbor Craft Retrofits & Re-powers

- Ex: Repowers common, testing various exhaust controls on ferries
- C/E: ~ \$500 per ton NO_x

■ Dockside Power

- Ex: Juneau, Alaska, Sweden

■ Cleaner Marine Fuels

- Ex: Long Beach/Orient Overseas Container Lines

■ Cleaner Ships

- Ex: > 100 ships w/ SCR in N. Europe

■ Ship Speed Limits

Mitigation Also Needed on the Land-Side: Container Handling Equipment

Alternative Fuels for New Purchases

- Ex.: LA, Propane Yard Tractors; Barcelona, Virginia, Hybrid Straddle Carriers
- C/E: \$3,500 - \$6,600 per ton NO_x

■ Cleaner Fuels

- Ex: LA, Long Beach, Houston – Emulsions; Oakland, Helsinki, Malmö-Copenhagen – LSD

■ Retrofits & Re-powers

- Ex: LA, Long Beach – DOCs w/ Emulsions; Oakland – DOCs w/ LSD & Repowers; Goteborg, Sweden – DPFs
- C/E: \$1,000 - \$5,000 per ton NO_x

■ Automation

- Rotterdam, Singapore



Land-Side Mitigation: Off-Site Trucks

- Incentivize Cleaner New Truck Purchases
 - Ex: Gateway Cities, Oakland
 - C/E: ~ \$ 8,000 per ton NO_x
- Retrofits for Existing Vehicles
 - Ex: Oakland
 - C/E: \$3,000 - \$40,000 per ton NO_x
- Make Cleaner Fuels Available to Off-site Trucks
 - Ex: Oakland, emulsions
- Minimize unnecessary idling
 - Ex: California, Lowenthal Bill
 - C/E: ~\$2,000 per ton NO_x
- Designate truck routes w/ least impact on community & provide truck truck parking area w/power & service.
- Transfer more container transport to rail: Invest in on-dock rail & freight improvements.
 - Note: Rail is 3x more efficient than trucking, but also needs to be cleaned up.

Land-Side Mitigation: Locomotives

- Cleaner New Purchases and Re-powers: Natural gas and diesel-electric hybrids
 - C/E: ~\$12,000 per ton NO_x



- Idling Controls
 - C/E: \$3,000 per ton NO_x
- Cleaner Fuels for Locomotives

Policy Recommendations: Marine Vessels & Locomotives

- 1) EPA must include locomotives & marine vessels in its low sulfur diesel (15 ppm) requirement in the proposed Non-Road rule; and should move forward with this rule asap.
- 2) EPA should expedite implementation of Tier 2 emission standards for Category 1, 2 & 3 marine vessels and Tier 3 emission stds. for locomotives.
- 3) The U.S. should ratify MARPOL Annex VI, and expedite efforts to establish the entire East, West and Gulf coasts, as "Sulfur Emission Control Areas".
- 4) EPA/States should implement fee systems to incentivize cleaner ships.

Policy Recommendations Cont'd

- 5) EPA/States should require ships plug into shore-side power while docked.
- 6) States should require the use of lower sulfur diesel (15 – 2,000 ppm) while in coastal waters and during hoteling until ships can plug in.
- 7) States should negotiate MOUs that incentivize cleaner locomotives.
- 8) Regional authorities should monitor and enforce ship speed reduction programs.

...And many more for land-side vehicles & equipment

Conclusions

- Most port related emission sources are poorly regulated; there is much work to be done.
- Mitigation only goes so far → in some cases caps on cargo throughput, or at the very least, efficiency improvements rather than expansion, should be considered.
- Expansions must consider impacts on surrounding communities; consultation and/or negotiations with those communities is imperative.

