

# Harboring Pollution

## Air Quality Impacts of Marine Ports



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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.



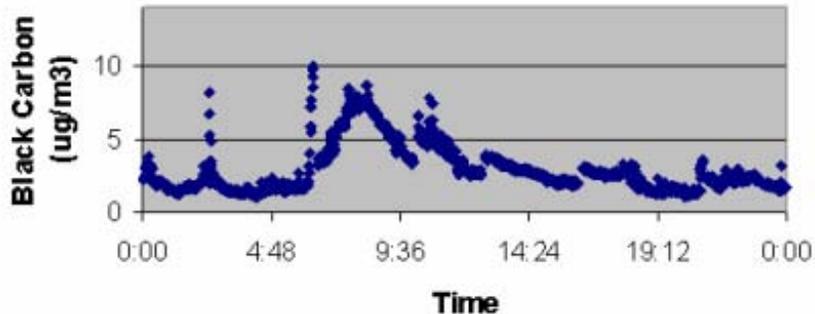
# Why are Environmental & Community Groups Concerned?



- Ports are expanding → takes toll on Air & Water Quality.
- Shipping Industry Emissions growing & virtually unregulated.

# Pollution Levels in one Port-side Community: West Oakland

700 Willow St. Monitoring, 10/17/03

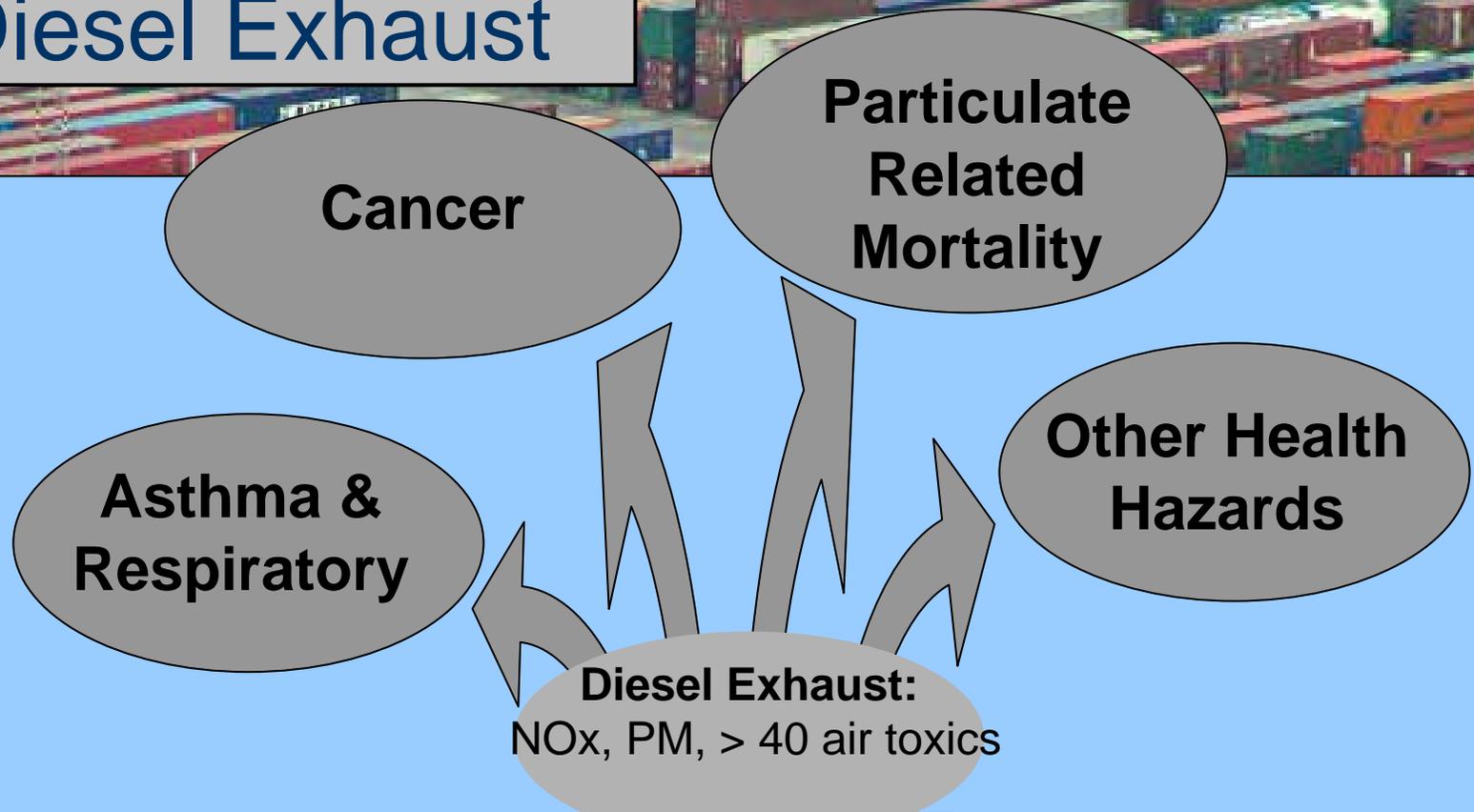


**“Black soot covers my window sills, my blinds, and my heating vents.**

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

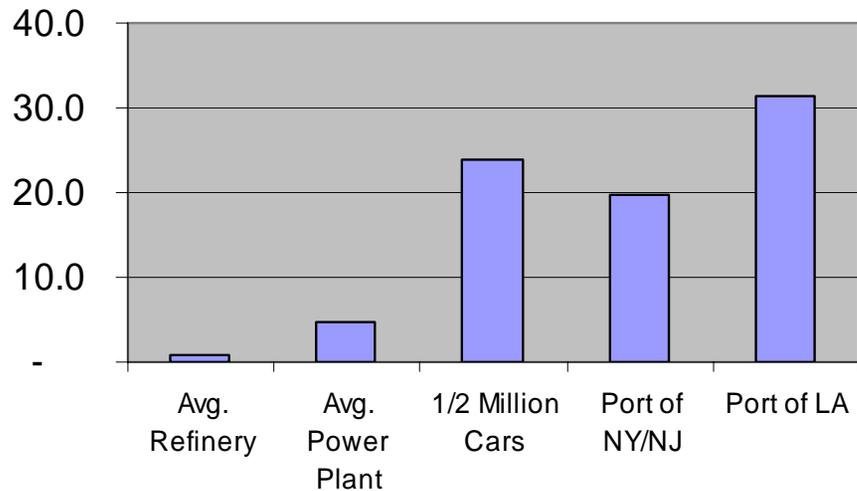
There is also a Head Start and three child care centers in my building where many of the children also suffer from asthma.”

# Health Effects of Diesel Exhaust

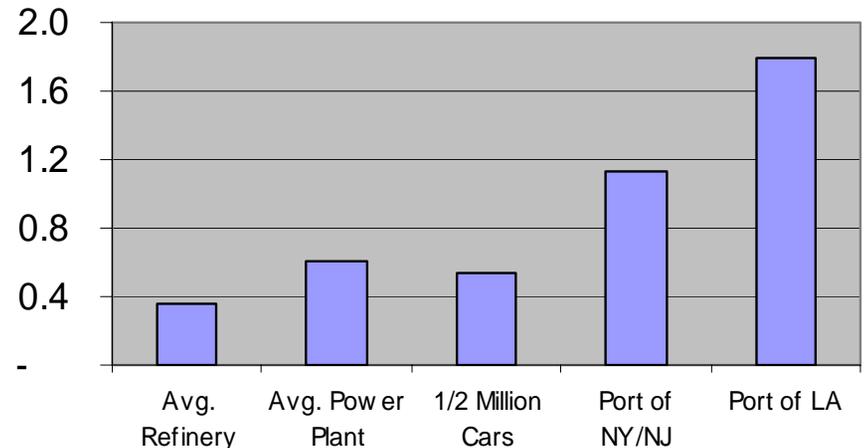


# Container Ports vs. Other Industry

## NOx Emissions (tons/day)



## PM10 Emissions (tons/day)

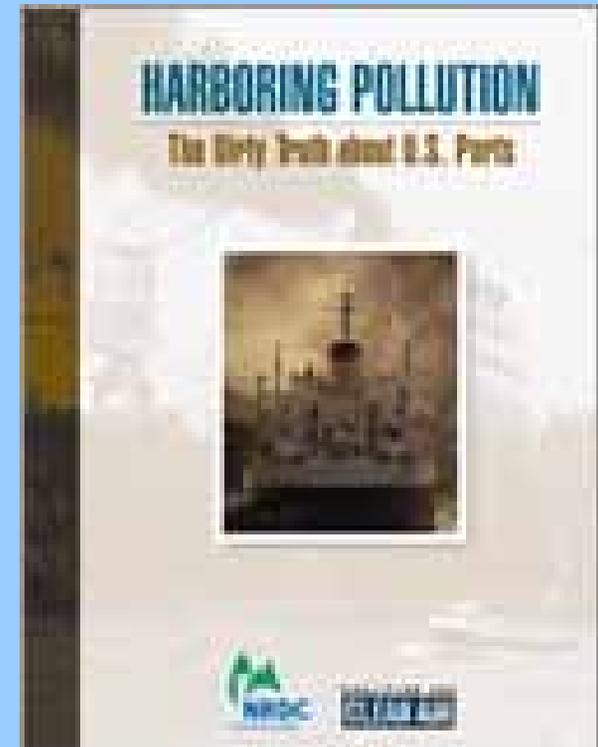


Source: NRDC Estimates based on reported TEU throughput in 2000, Surrogate Port EIS & Emission Inventory Data (2000), and EPA National Emissions Trends Data (2000).

# Harboring Pollution

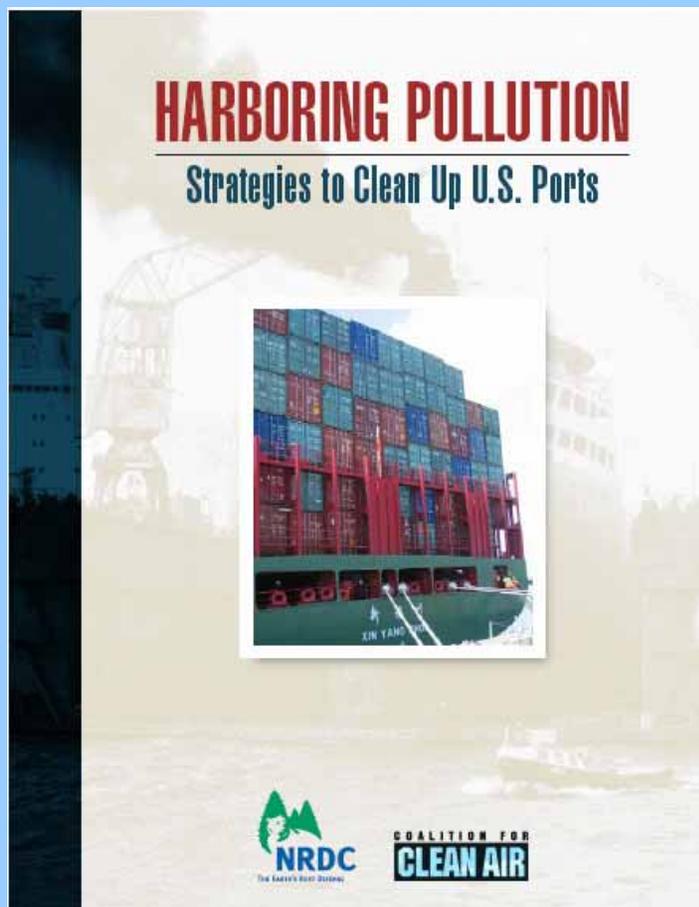
## The Dirty Truth about U.S. Ports

Environmental Criteria	Oakland	NY/ NJ	Los Angeles	Houston
Air Quality	B-	C	C+	D
Water Quality	B	D+	C-	C+
Land Use	C	B-	D+	F
Community Relations	C+	C+	D	F
Overall Grade	B-	C+	C-	F

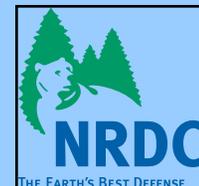


# Harboring Pollution

## Strategies to Clean Up U.S. Ports



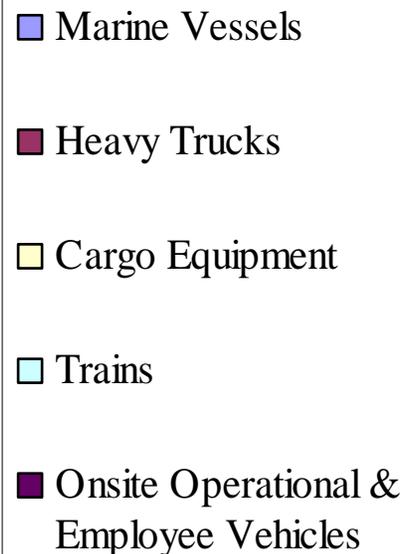
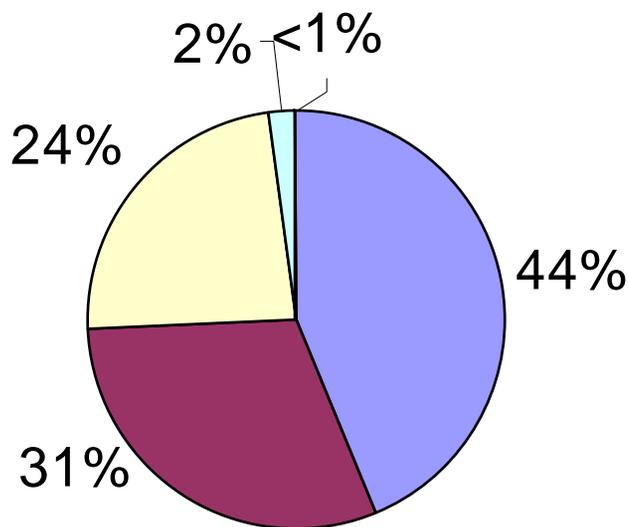
- Reviews measures to clean up diesel emissions from largest port sources
- Reviews existing policy and regulations covering marine ports
- Recommends measures that ports should implement and policies that agencies should adopt



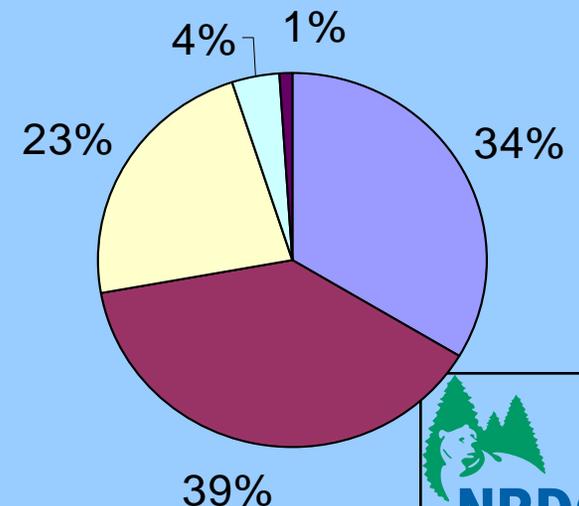
# Largest Emission Sources within Ports

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

## PM Emissions



## NOx Emissions



# Recommended Mitigation Measures:

What CAN be done at ports

## Marine Vessels

### ■ Shore-side Power

- Ex: LA; Juneau, Alaska; Sweden

### ■ Cleaner Marine Fuels

- Ex: Long Beach/Orient Overseas Container Lines

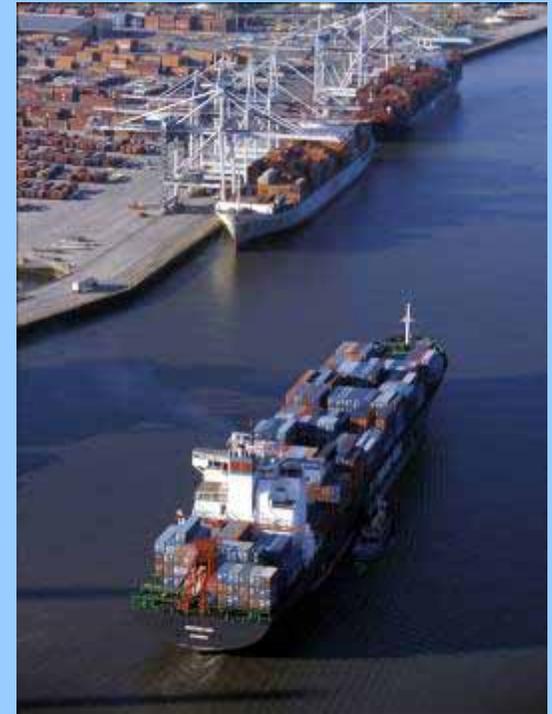
### ■ Cleaner Ships

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

### ■ Harbor Craft Retrofits & Re-powers

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

### ■ 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 NOx

## ■ Cleaner Fuels

- Ex: LA, Long Beach, Houston – Emulsions; Oakland, Helsinki, Malmo-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 NOx

## ■ 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<sub>x</sub>
- Retrofits for Existing Vehicles
  - Ex: Oakland
  - C/E: \$3,000 - \$40,000 per ton NO<sub>x</sub>
- 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<sub>x</sub>
- 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 NOx



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

# Port Pollution Can be Reduced: W. Coast Examples

## CHINA SHIPPING CONTAINER TERMINAL IN LOS ANGELES

- **Shore-side Power**
  - 80% of ships will plug-in to electric power while at berth.
- **Alternative fuel yard equipment**
  - All yard tractors will run on natural gas or propane
  - All other yard equipment (e.g., top picks) will have diesel oxidation catalysts and use emulsified diesel fuel
- **Port will pay \$10 million to Gateway Cities Program to fund replacement of old trucks with newer cleaner ones.**

## PORT OF OAKLAND ALSO HAS AIR QUALITY PLAN



# Policy Recommendations

- Need National Regulations over ports, to address competitiveness issues among U.S. ports.
- U.S. regulators should coordinate with Canada & Mexico on marine port policies.
- Cleaning up the dirtiest engines and largest sources should be the priority; start with ships.
- Ports should add environmental fees to existing container fees to cover mitigation.
- Detailed policy recommendations listed in our ***Harboring Pollution*** Report.

# Conclusions

- Most port related emission sources are poorly regulated; there is much work to be done.
- If ports implement the diesel control measures that we recommend, NO<sub>x</sub> would be reduced by 1/3 and PM by over 1/2.
- 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.

