



# Air Quality Challenges at the Port of Houston Authority

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# Agenda

- Port of Houston
- Port Air Emission Sources
- PHA Air Quality Initiatives
- Regulatory Changes
- Path Forward





# Port of Houston

- 6<sup>th</sup> largest port in the world
- 1<sup>st</sup> in US in foreign tonnage
- 2<sup>nd</sup> in US in total tonnage
- Largest petrochemical complex in nation
- 287,000 jobs for Houston and Texas
- 100,000 barges/ 7,000 vessels per year





# Port of Houston Authority

- Political subdivision of the State
- Board of 7 commissioners
- 10 facilities
- Own 9,000 acres
- 150 tenant properties
- General cargo to containers
- 500 employees





# Houston-Galveston Area

- Houston-Galveston Area (HGA) is classified Non-attainment for 1-hour and 8-hour Ozone Standards
- Near Non-attainment for Particulate Matter
- State Implementation Plan development began with Regional Air Quality Planning Committee in 1998 for 1-hour
- HGA needed every emission reduction possible
- Port reviewed its inventory in the SIP
- Developed an air committee of Operations, Consultants, Attorneys, and the Environmental Affairs Department



# Air Emission Sources at Ports

- Port stationary sources
  - Grain Operations
- Port mobile sources
  - On-road
  - Off-road
- Non-port sources
  - Vessels
  - Tenants
  - Railroads



# SIP Emission Inventories

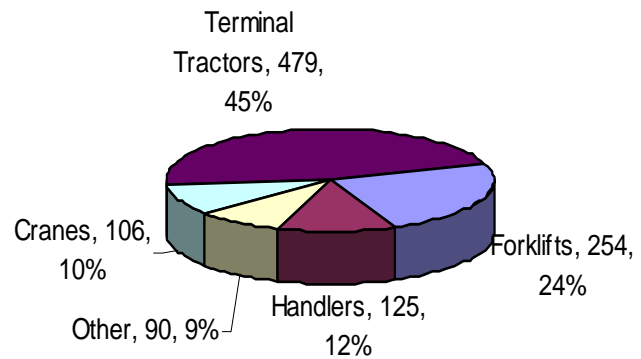
- Determine inventories were based on inaccurate assumptions - 1999
- Needed to understand largest sources
- Received partial grant funding to refine inventories
  - Off-road port equipment  
1.2 to 3 tpd
  - Marine vessels – 34 tpd reduction
- Unexpected benefit –  
Education tool



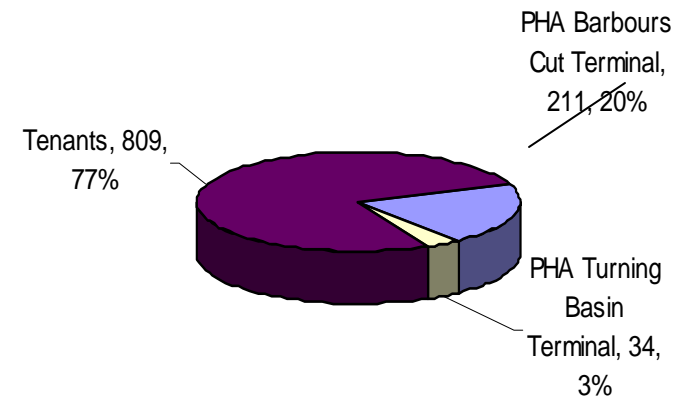


# PHA Air Emissions

### NOx Emissions



### NOx Emissions





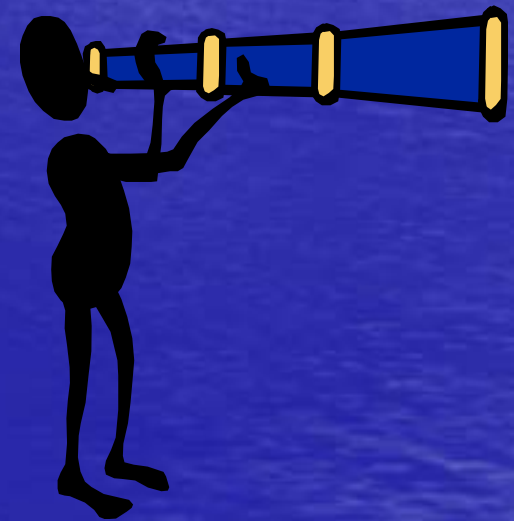
# PHA Cargo Handling Equipment Sources





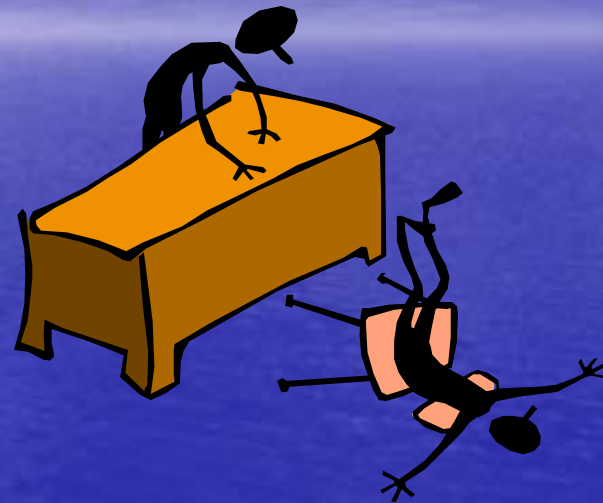
# PHA Air Quality Initiatives

- Conducted emission inventory on OGV and CHE
- Determine PHA controllable sources
- Researched and evaluated technologies
- Research funding opportunities
- Conducted demonstration projects
- Implemented control strategies



# Technology Demonstrations

- Lubrizol's PuriNOx
  - 25% NOx, 30% PM
  - Ease of conversion
  - Company commitment
- Lubrizol's PuriMuffler
  - PM reductions
  - Low costs
- Propane
  - Fueling- infrastructure and operability
  - Vehicle availability



# Technology Demonstrations (continued)

- SCR
  - 80%+ emission reductions
- EcoSystems– Fuel Vapor Enhancer
  - Ease of installation
  - Low costs
- Other diesel emulsions
  - Competition
  - Waiting on verification



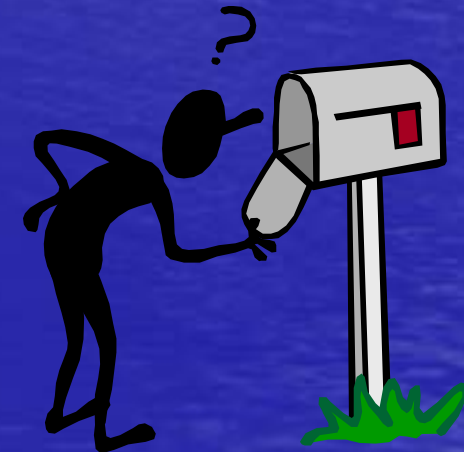


# Results

- PuriNOx running strong for 4 years
  - RTG cranes and yard tractors
  - Grant funded
  - Difficulty with marine engine and engines with horsepower issues, low maintenance
- Propane
  - PHA owns 15 on-road vehicles, 1 fueling station
  - Vehicles currently not available
  - Operability issues
  - High fuel costs

# Results (continued)

- SCR's
  - 86% reduction in NOx
  - Extremely high cost per ton
  - Can't guarantee urea is injecting
  - Negative maintenance experience/feedback
- EcoSystems
  - Waiting for emission testing
  - Visual test show improvements
  - Easy installation/no maintenance
- Other technologies
  - Waiting for emission testing / verifications



# Future Opportunities

- Fuel additives – ULSD, TxLED
- SCR advancements
- Fuel cells
- Vessel controls
- Railroad engine controls





# Environmental Management System – Air Quality Goals

- Reduce NOx Emissions at BCT by 25% by 2005.

Yard Tractors and Yard Cranes – PuriNOx

2005 Goal 214 tpy → 173 tpy

- Reduce VOC Emissions at Facilities via On-Road Fleet – ULEV/LEV
- Greenhouse Gas Emission Inventory on all PHA Equipment (on-road and off-road)



# EMS Software : eQRP

## Environmental and Quality Management Tracking Software

- Organizes, distributes and controls data
- Tracks Environmental Performance  
(i.e. NO<sub>x</sub>, VOC, PM programs)
- Multi-departmental utilization tool:  
Environmental, Operations and IT





# PHA Future Air Initiatives

- Tenant stakeholder group
- Quality Shipping program
- Greenhouse Gas Inventory
- On-road emission inventory
- Energy Efficiency/ Green building program
- PTRRA railroad engine inventory
- Alternative maritime power study

# Tenants/Users

- Held workshop for education on the SIP, TERP, and emission inventories
- Selected certain tenants for stakeholder involvement
- Developed Air Quality brochure for distribution
- Added air component to tenant inspections





# Contractors

- Developed Clean Air Plan for bid/proposal documents
  - Contractor receives additional points for participation
  - Simple one page form with approved items
- Developed NOx calculator for General Conformity provisions





# Bayport Air Mitigation Efforts

- Air Monitors
- Electric Concrete Batch Plant
- Mechanical Dredging
- Dredge Conveyor System
- PuriNOx
- Aggregate transport by barge
- Tier 3 Engines - future





# Upcoming Regulatory Changes

- Locally enforceable voluntary idling rule
- 8-hour SIP development
- New proposed national rules for off-road vehicles
- On-road vehicle emission standards continually more restrictive at national level for new engines
- EPA is evaluating general conformity to streamline process for both environmental protection and business operations

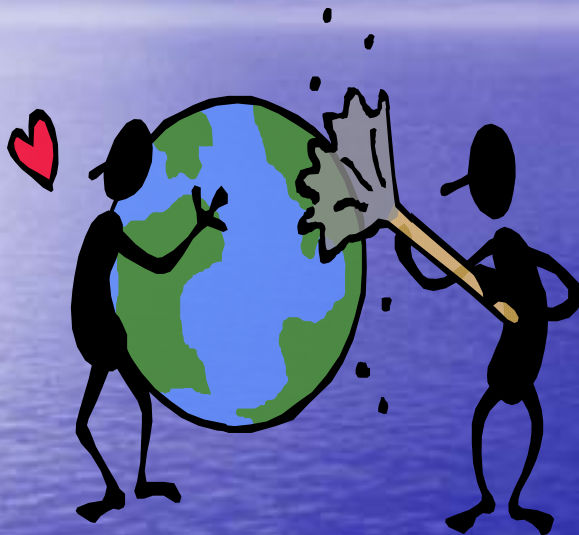


# Air Quality Path Forward

- Engage Senior Management (i.e. EMS)
- Encourage AAPA and TPA Air Quality work groups
- Actively participate in local, state, and federal Air Committees
- Develop port-specific stakeholder groups
- Continually evaluate technologies
- Research and promote funding opportunities
- Encourage verification process for technologies
- Share lessons learned with all Ports



# QUESTIONS ?????



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