

# Meeting of the California Environmental Policy Council

April 30, 2004

# Agenda

- Multimedia Evaluation of Lubrizol's PuriNOx Water/Diesel Emulsion
- Multimedia Evaluation of Amendments to the Diesel Fuel Regulations

# **Multi-media Evaluation of Lubrizol's PuriNOx Water/Diesel Emulsion**

# Outline

- Multimedia Evaluation Requirements
- Background
- PuriNOx Verification
- PuriNOx Multimedia Process
- Evaluations
- Peer Review
- Recommendations

# Multimedia Evaluation Requirements

# Health and Safety Code Requires:

- Multimedia evaluation shall include assessments of:
  - Air pollutants including ozone forming compounds, particulate matter, toxic air contaminants (TAC), and greenhouse gases
  - Contamination of soil, surface and ground water
  - Disposal or use of byproducts and waste material from the production of the fuel
- Peer review

# Environmental Policy Council Shall:

- Determine whether or not a significant adverse impact on public health or the environment may result from the Board's action:
  - If the council finds no significant impact:
    - Proposed regulation or application stands as approved by the Board
  - If the Council determines a significant adverse impact:
    - The Council shall recommend alternative measures to reduce or mitigate those impacts

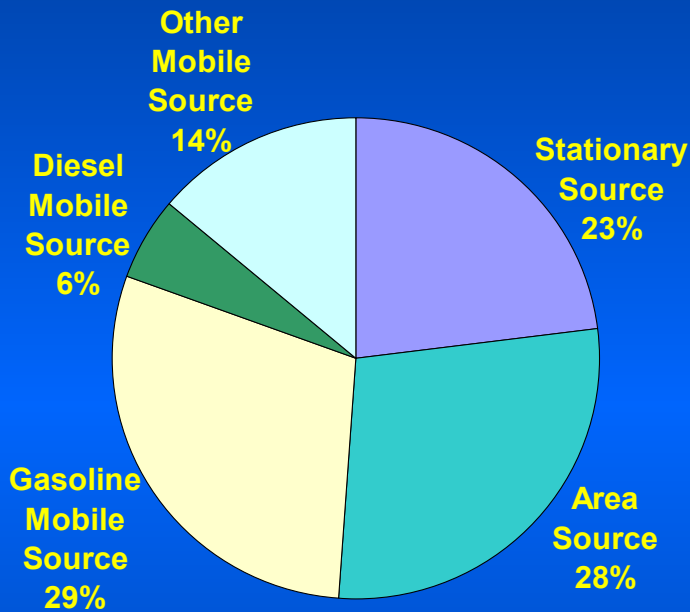
# Background



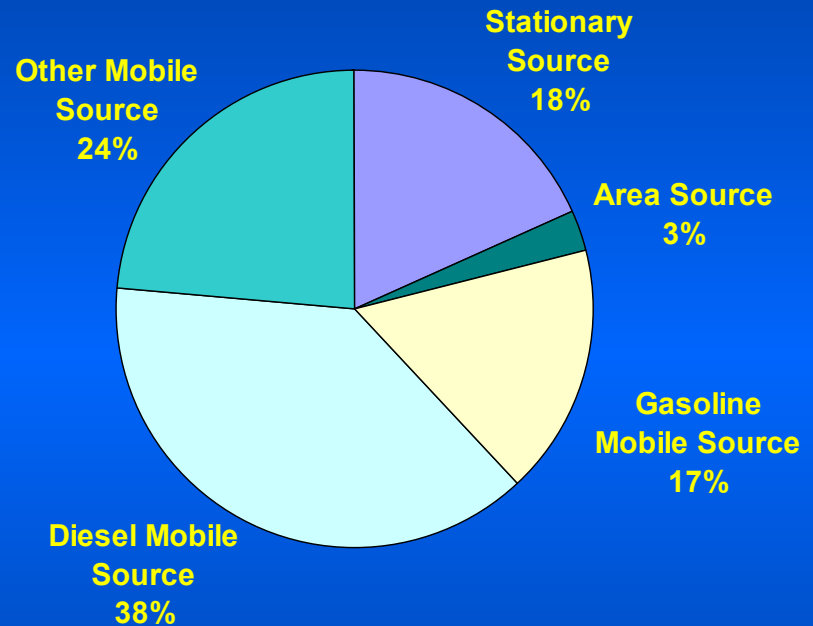
# Background

- Diesel PM Identified by ARB as a Toxic Air Contaminant (TAC)
- Accounts for 70% of toxic risk from all TACs
- ARB approved diesel risk reduction program
- Alternative Diesel Fuels (e.g. PuriNOx) can play an important role in reducing diesel PM

# Statewide Emissions

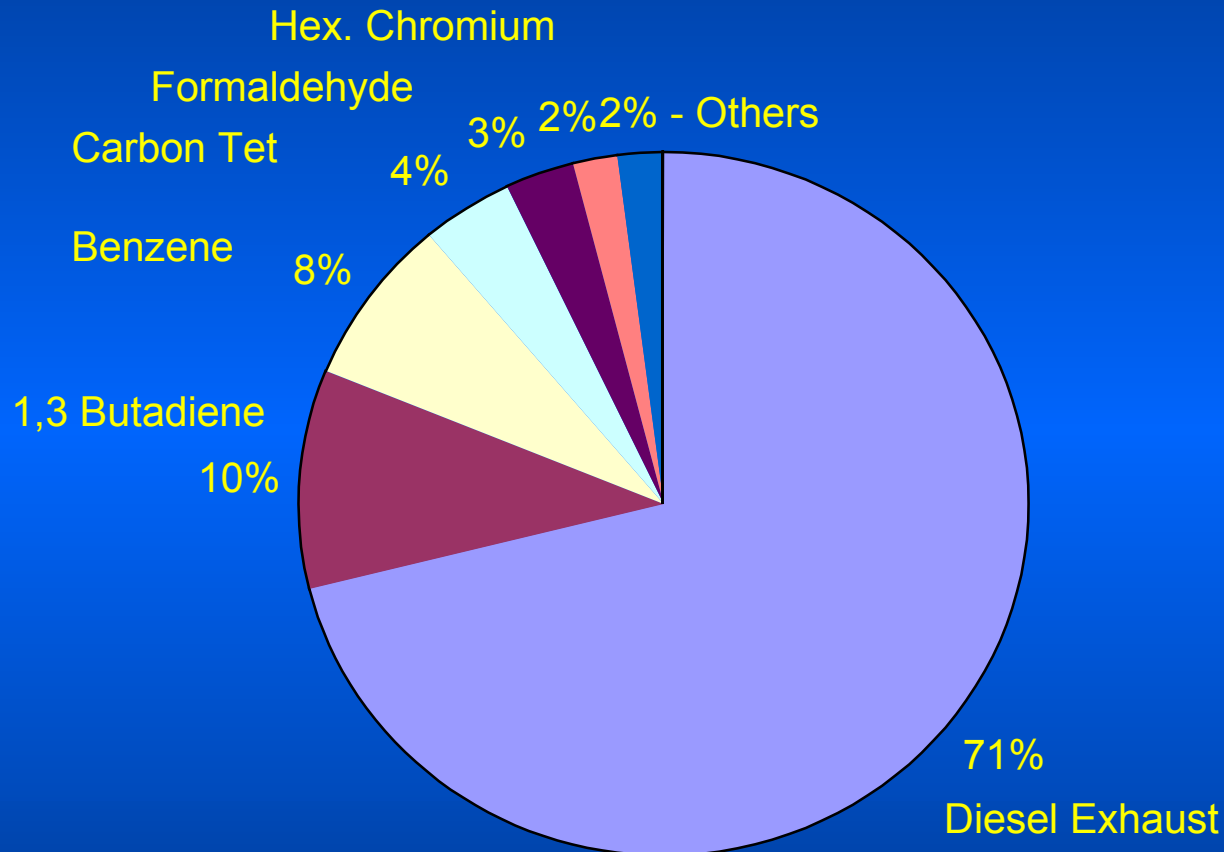


2010 Statewide  
ROG Emissions



2010 Statewide  
NOx Emissions

# Air Toxics Cancer Risk



Source: ARB Diesel Risk Reduction Plan-2000 - Table 7.

# Diesel Retrofit In-Use Program

- Requires retrofit of in-use vehicles to reduce PM
  - Requirements established on fleet basis
- Includes a verification program to establish performance and availability of controls, including alternative diesel fuels
- Multimedia evaluation required for fuels, under the Health and Safety Code

# Verification Program

- Establishes three levels of PM reduction performance for verifying controls for specific engine types:
  - Level 1  $\geq 25\%$  PM reduction
  - Level 2  $\geq 50\%$  PM reduction
  - Level 3  $\geq 85\%$  PM reduction
- Establishes minimum level for NOx reduction:  $\geq 15\%$  NOx reduction

# Verification Program (cont.)

- Number of verified hardware technologies:
  - Level 1: two
  - Level 2: none
  - Level 3: six
- No verified fuel technologies at this time

# PuriNOx Verification

Lubrizol applied for verification  
of PuriNOx Diesel Water  
Emulsified Fuel under Diesel  
Retrofit In-Use Program



**PuriNOx Qualifies at  
Verification Level Two  
(50% Minimum PM Reduction)**

# PuriNOx Water Emulsified Diesel Fuel

- Alternative diesel fuel that can be used in diesel engines without engine modifications
- Diesel/water emulsion
  - Water/additive (20%) and diesel fuel (CARB)
- Additive package: needed to form diesel-water emulsion

# PuriNOx Fuel Combustion

- Water micro-explosion phenomena
- Promotes even spray pattern for more complete combustion
- Reduced combustion temperature reduces NOx
- Delays combustion which results in reduced PM emissions

# PuriNOx Use

- Blended at the terminal
- Dedicated fuel storage tanks
- Target centrally fueled fleets
- No retail sales
- In 2002 two million gallons used in CA
- Capacity to produce up to 35 million gallons in CA

# Benefits of PuriNOx

- If approved would be the only fuel verified
- Significant reductions in NOx and PM
- Wide range of applications
  - Used where hardware retrofits are not feasible
  - On-road and off-road applications
- Economic benefits
  - Low up front cost compared to hardware retrofits
  - Requires no modification to engine

# U.S. EPA Approval

- Registered PuriNOx summer blend  
October 2002
  - Tier 1 testing
    - Regulated and non regulated emissions
    - Comparable to commercial diesel
  - Tier 2 testing
    - Subchronic inhalation animal toxicity testing
    - Comparable to commercial diesel
- U.S. EPA Environmental Technology Verification - December 2002

# PuriNOx Multimedia Process

# Established a Multimedia Working Group

- Cal/EPA
- ARB
- State Water Resource Control Board (SWRCB)
- Office of Environmental Health Hazard Assessment (OEHHA)
- Department of Toxic Substances Control (DTSC)



# Multimedia Working Group Responsibilities

- ARB: coordinate multimedia evaluation, assess air quality impacts
- SWRCB: assess surface and groundwater impacts
- OEHHA: assess potential human health impacts
- DTSC: assess potential hazardous waste concerns

# Evaluations

# Air Quality Evaluation

## Air Resources Board:

- Assessment based on a relative comparison to CARB diesel fuel
- Criteria pollutants: NO<sub>x</sub>, THC, CO, PM
- Air toxic emissions: diesel PM, additives, other toxics
- Greenhouse warming gases: carbon dioxide, black carbon

# Air Emissions Evaluation (cont)

## Findings:

- PuriNOx significantly reduces PM and NOx emissions in diesel exhaust
- PuriNOx significantly reduces health risk from PM a TAC in diesel exhaust
- PuriNOx lifecycle emissions expected to be similar to conventional diesel

# Water Evaluation

- State Water Resources Control Board (SWRCB) staff identified information needs on potential impacts to surface water and groundwater
- In response to information needs of Cal/EPA agencies Lubrizol submitted a multimedia evaluation report
- Lawrence Livermore National Laboratory (LLNL) reviewed data supporting Lubrizol report on potential water impacts
- Based on Lubrizol report and LLNL review SWRCB staff developed recommendations on PuriNOx fuel

# Water Evaluation (cont)

SWRCB staff findings:

The risks to the water environment are minimal and acceptable given the limited and controlled use of PuriNOx

- The following work to address uncertainties associated with the additive package should proceed expeditiously:
  - Development of analytical methods for PuriNOx components of greatest concern
  - Improved soil column studies
  - Biodegradation studies
  - Aquatic toxicity testing
  - Assessment of actual environmental distributions after a known release of PuriNOx additive or PuriNOx fuel