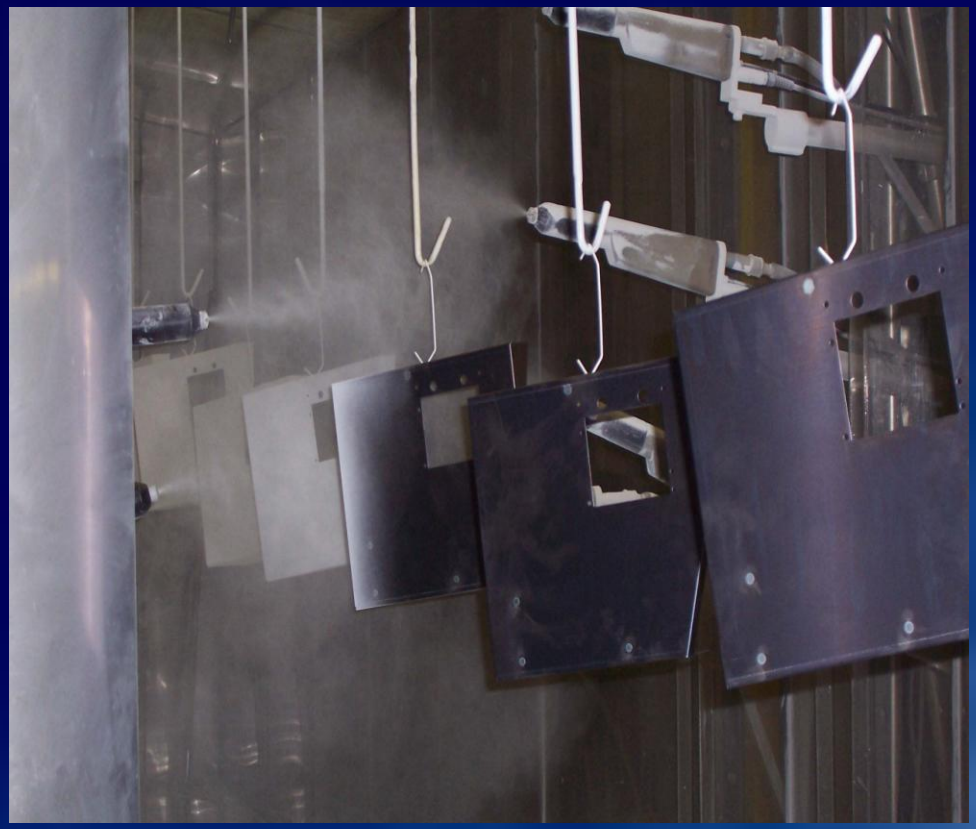
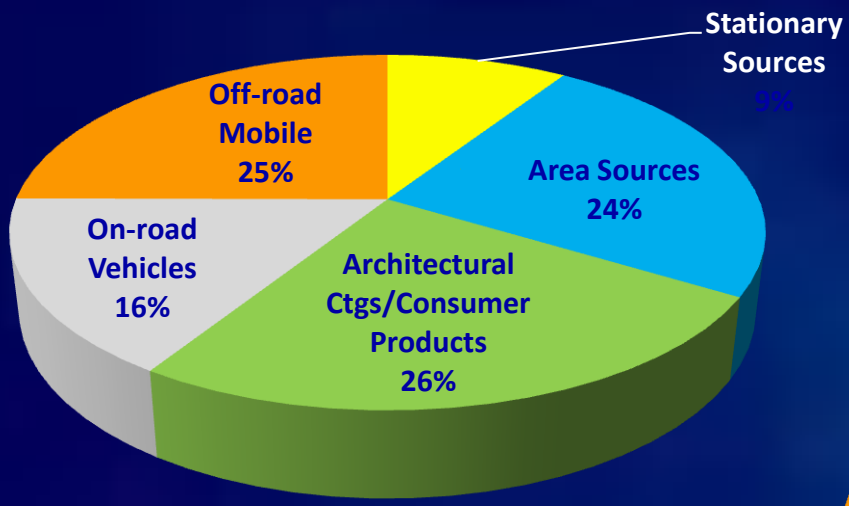


Reducing VOC and Toxic Emissions

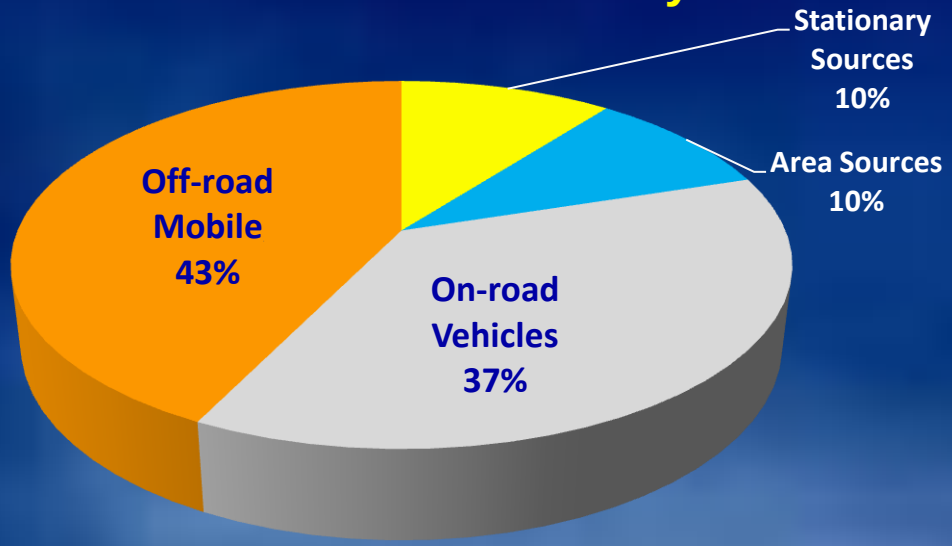
South Coast AQMD

Sources of Ozone*

VOC Emissions: 433 tons/day



NOx Emissions: 313 tons/day



** Year 2023 baseline emissions – Summer Planning Inventory*

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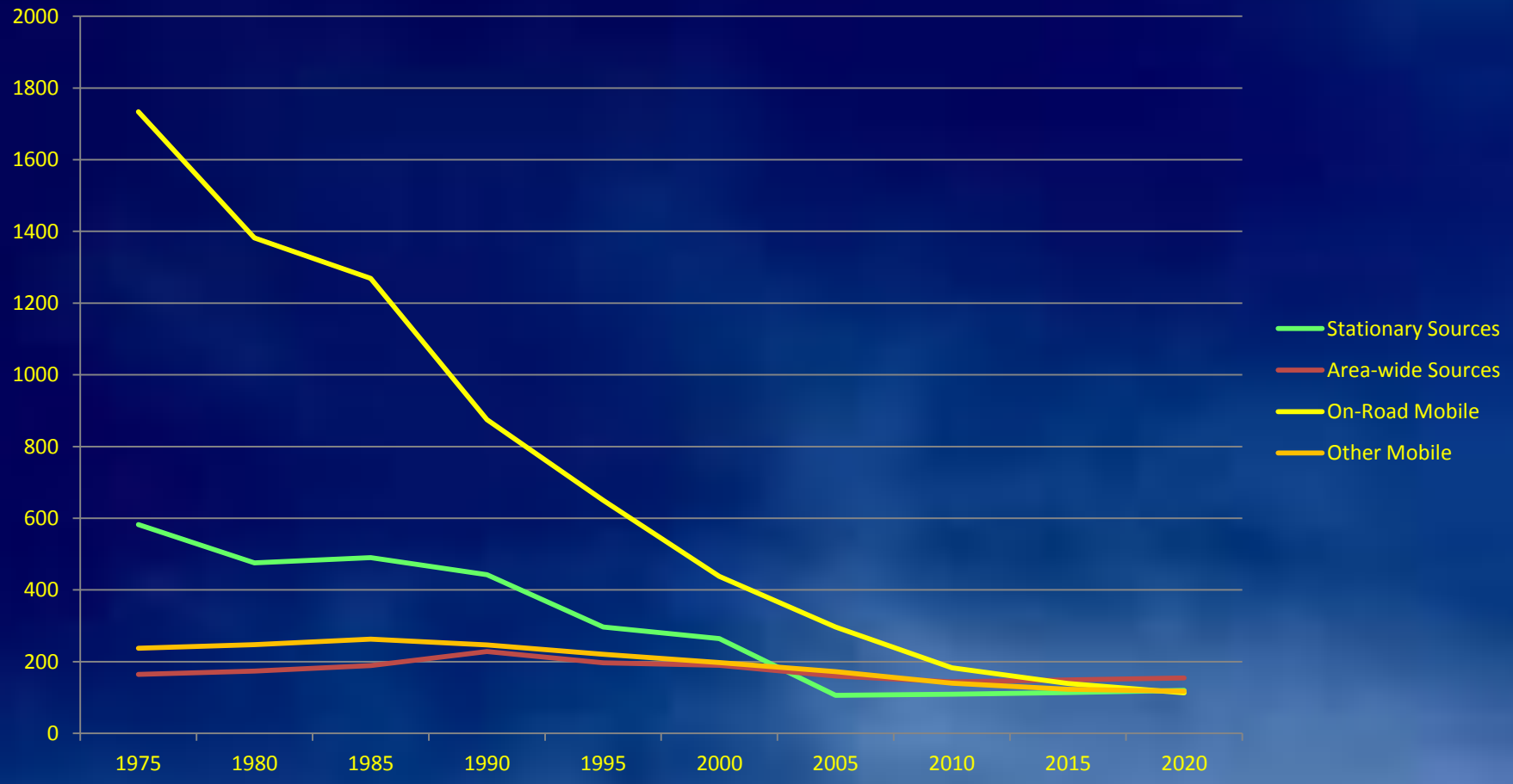
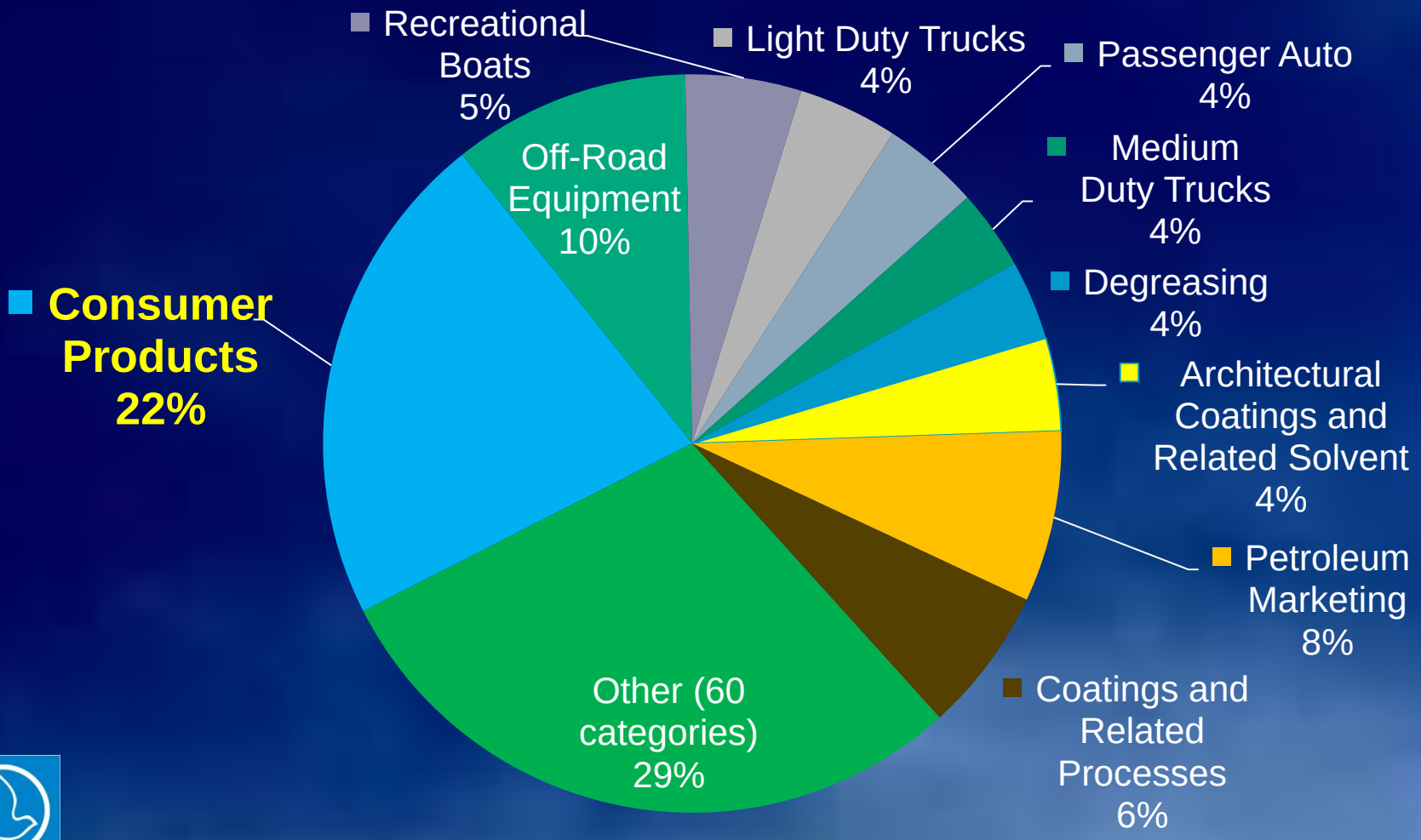
ROG Emission Trends
(tons/day, annual average)



Major Source Contribution To VOC (2023)



2023 VOC = 530 tons/day Source: 2012 AQMP

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VOC Source Specific Rules Industrial Coatings and Solvents

- Boats (Rules 1106 & 1106.1)
- Metal (Rule 1107)
- Batch Cleaning (Rule 1122)
- Solvent Cleaning
- Aerospace (Rule 1124)
- Metal coil and containers (Rule 1125)
- Printing (Rules 1130 & 1130.1)
- Wood (Rule 1136)
- Metalworking fluids (Rule 1144)
- Plastic/Rubber/Glass (Rule 1145)
- Auto refinishing (Rule 1151)
- Polyester Resin (Rule 1162)
- Adhesives (Rule 1168)
- Hand-wipe Cleaning (Rule 1171)

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VOC Source Specific Rules
Fugitive Emissions

- Fuel Dispensing (Rule 461)
- Liquid Loading (Rule 462)
- Liquid Storage (Rule 463)
- Refinery Process Turnarounds (Rule 1123)
- Oil Wells (Rules 1148, 1148.1, 1148.2)
- Storage Tank Degassing (Rule 1149)
- Landfills (Rule 1150, 1150.1, 1150.2)
- Leaks from Refineries (Rule 1173)
- Sumps and Wastewater Separators (Rule 1176)
- LPG Transfer and Dispensing (Rule 1177)
- Storage at Refineries (Rule 1178)

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VOC Source Specific Rules Consumer Related

- Dry Cleaning (Rule 1102)
- Architectural Coatings (Rule 1113)
- Paint Thinners and Multi-purpose Solvents (Rule 1143)
- Aerosol Coatings (CARB)
- Household and Institutional Products (CARB)

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Coating Regulatory Requirements

- Applicability and Purpose
- Definitions
- Coating VOC content
  - **Prohibits use of high VOC coatings**
- Transfer Efficiency
  - **HVLP**
- Solvent Use
  - **<25 g/l**
- Control Equipment (optional)

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General VOC Content Limits

Product Type	VOC Content(g/L)
Adhesive	50 - 150
Architectural Coating	50 -100
Industrial Coating	100 - 420
Inks	225 - 300
Cleaning	25 - 100

- Limits designed to encourage the use of low and non-solvent technologies

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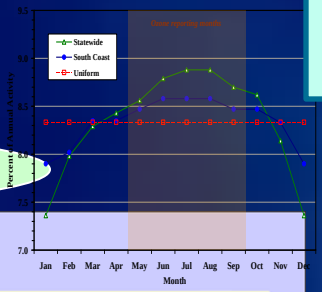
Architectural Coatings

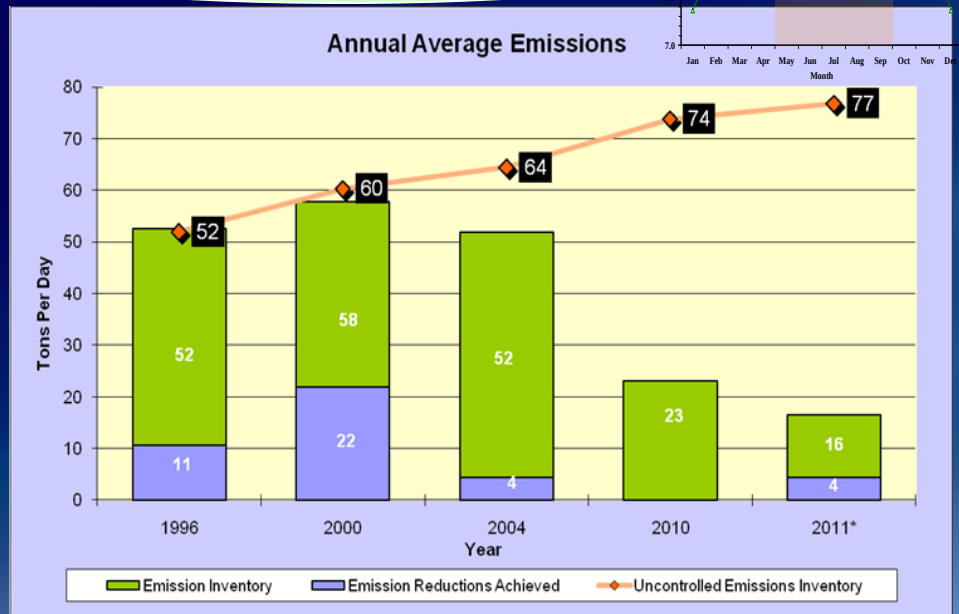
Rule Limits: VOC 50 – 100 g/l
Numerous Commercial Coatings: VOC < 10g/l
Colorants Limit: VOC 50 g/l – First in U.S.

Solvent-based Alkyd, Epoxy, Urethanes

100% Solids
Acrylics
Alkyd Emulsions
Waterborne Epoxy & Urethanes
Exempt Solvent-based

Summer (Planning) Inventory about 30% higher





Basis for VOC Limits

- Feedback from manufacturers
- CARB Coating Survey
- Commercial volume reporting
- Data search for compliant materials
- Technical Advisory Committee and Working Groups
- Technical Assessments
  - Laboratory Evaluation
  - Field Evaluation
  - Accelerated Weathering

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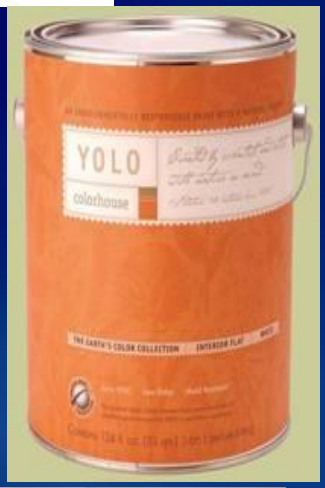
Staff Findings

- Greater number of compliant or super-compliant products virtually in all coating categories
- Courts have upheld technical feasibility
- Private Standards Groups conducting paint testing
- Significant reduction in VOCs with toxic and health concerns
  - Xylene, toluene, ethylbenzene

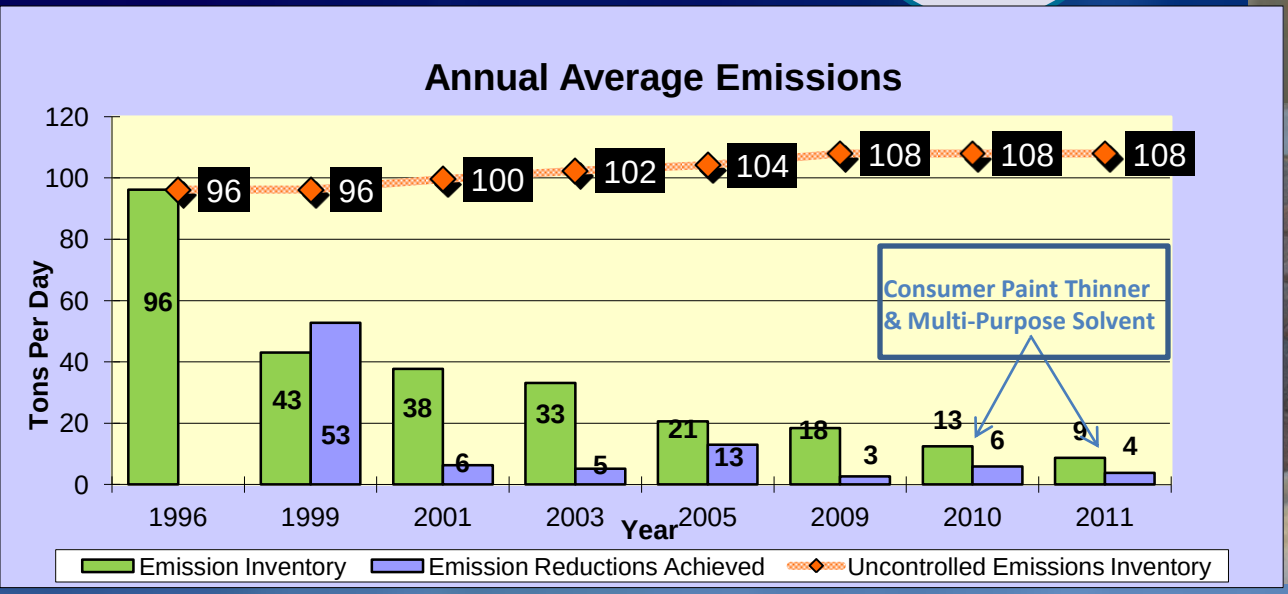


Solvent Usage
Industrial & Consumer

VOC < 25 g/l

PERC, TCE, MEK, Xylene, Toluene, Glycol Ethers, Mineral Spirits (Naphtha)

- **Aqueous**
- **Exempt Solvents**
- **Bio-based**



Vapor Degreasers

- Open Top
- Drag Out Losses
- PERC, TCE emissions

1995

- Airless/Airtight
- Reduced solvent use and waste
- Virtually no emissions

2001

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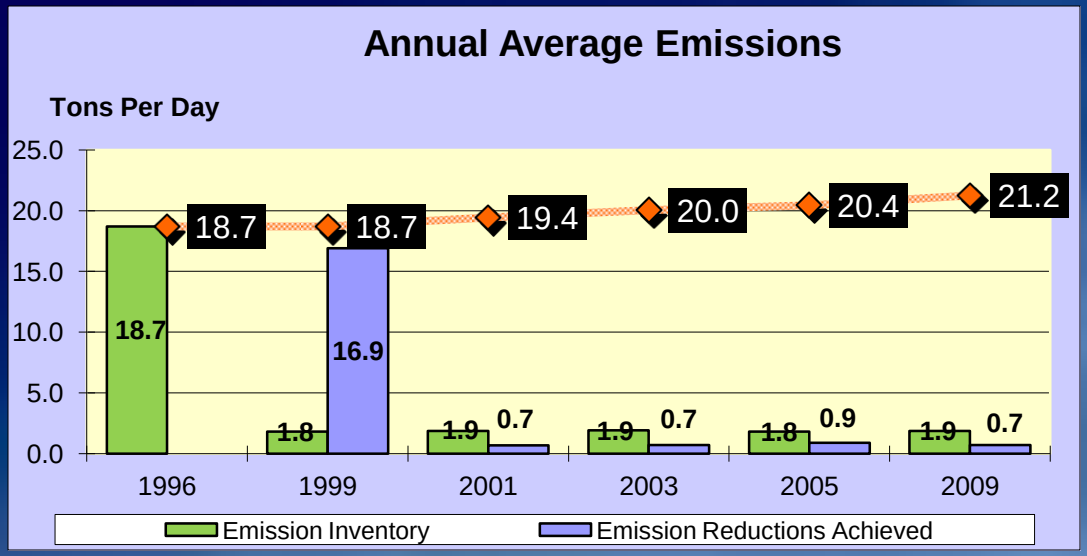
Automotive Parts Washers

Rule 1171 - Repair and Maintenance Cleaning

- Previously used mineral spirits in parts washers (remote reservoir)
- Replaced by aqueous parts washers and spray cabinets
  - VOC 50 g/l in 1999
  - VOC 25 g/l in 2005

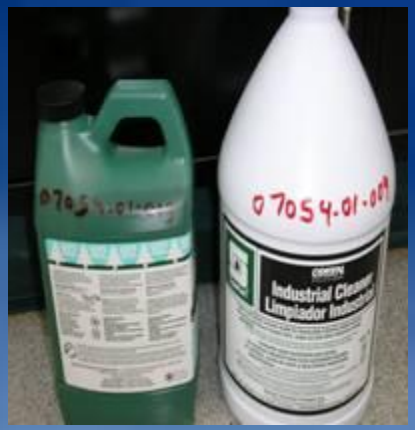


Remote reservoir

Spray cabinet

Clean Air Solvents & Clean Air Choices Cleaner Certification Program

- Multi-media certification programs
  - **More than 80 participating companies and over 180 certified products**
- Ultra-low VOC
- Prohibits toxics
  - **PERC**
  - **TCE**
  - **Methylene Chloride**
  - **Xylene**
  - **Toluene**
  - **Methanol**
  - **Glycol ethers**
  - **Ethylene glycol**
  - **Diethanolamine**
  - **Alkylphenol and nonlyphenol ethoxylates**



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Objective

- Certify ultra-low VOC cleaning products
  - **Recognize availability**
  - **Encourage marketing and use**

- Reduce VOC emissions and reduce human health and environmental impacts

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Cost and Performance

- Tested products with City of Santa Monica, major school district, office buildings
- Chemical prices are the same
- Adequate performance with only minor increase in labor
- Nearly invisible transition for most uses
- Significant reduction in VOCs and toxics

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Fuel Dispensing

- 16 billion gal/yr gasoline sales in California
  - Estimated 8.4 lbs/1,000 gal of VOC emissions from uncontrolled fuel dispensing
  - Concurrent reductions in BTEX
  - 56 tons/day emission reductions from Phase I controls
  - 11 tons/day from Phase II controls

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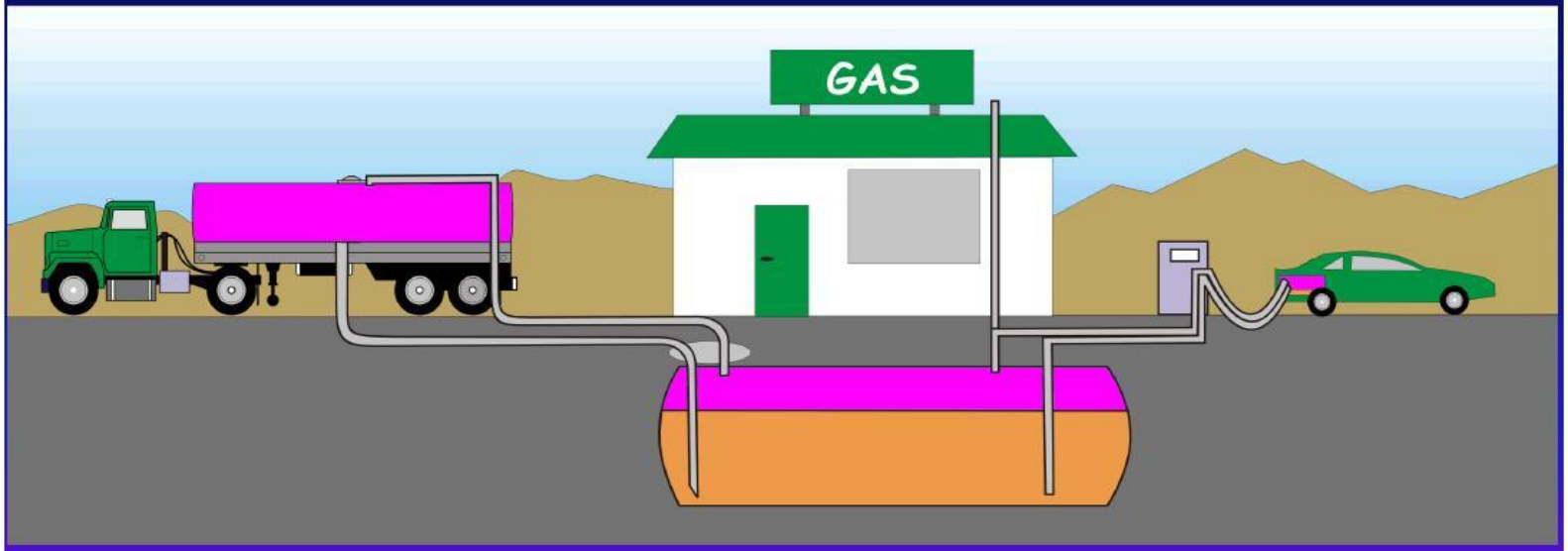
Vapor Recovery at Service Stations



Phase I

Phase II

Source: CARB

Vapor Recovery Controls

- Phase I – Fuel deliveries
  - Trucks unload fuel using submerged drop tube
  - Vapors displaced returned to fuel truck
- Phase II – Fueling vehicles
  - Nozzle boot captures vapors displaced during fueling
  - Vapors returned to fuel storage tank
  - Phase I controls return vapors to truck during delivery

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Enhanced Inspection and Repair at Refineries and Chemical Plants

- Applies to valves, flanges, pumps, etc.
- Requirements for atmospheric pressure relief devices (PRDs)
  - Monitor to detect any release
  - Notify and report significant releases
- Periodically report PRD release statistics
- Approx. 14 tons/day emission reductions

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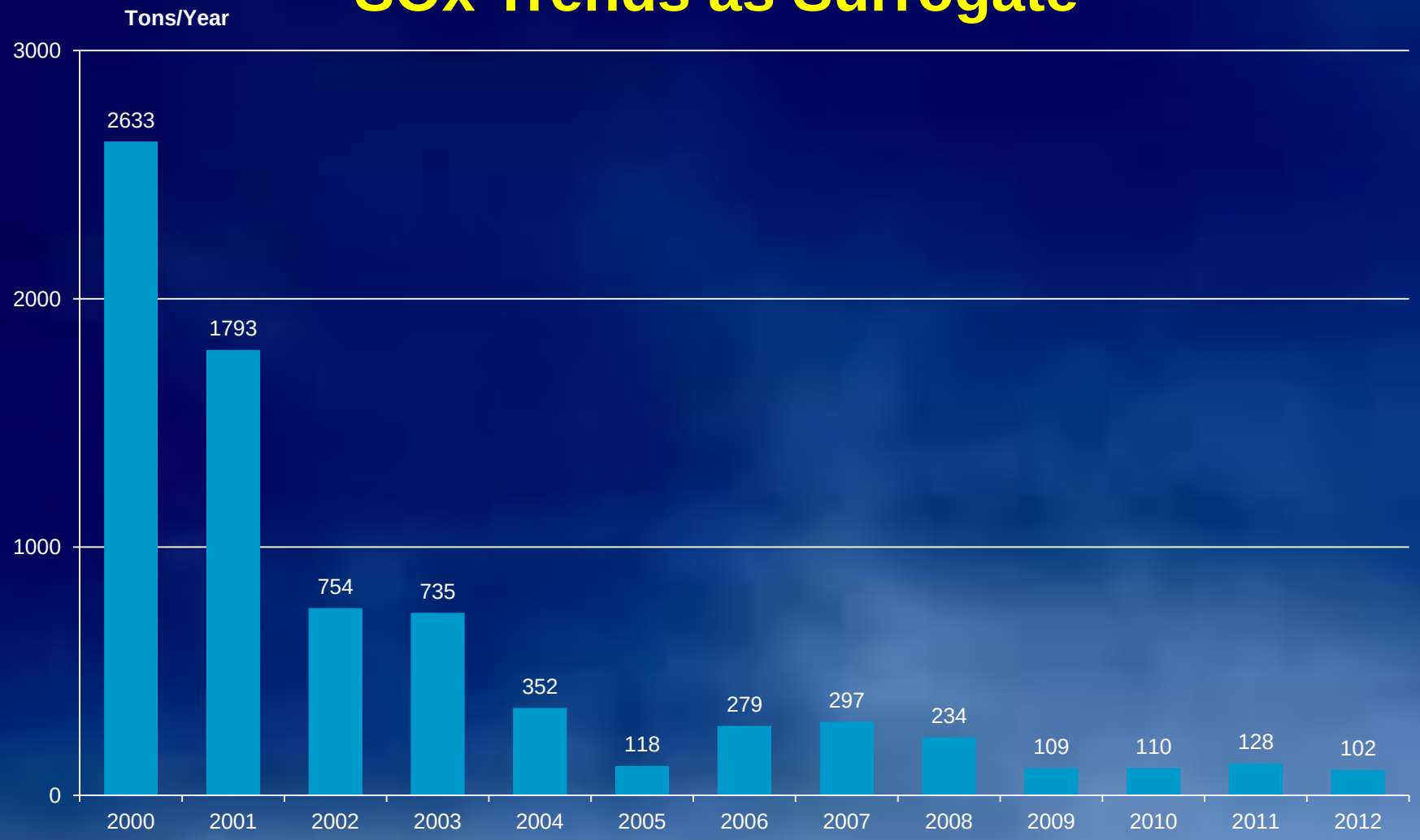
Refinery Flaring Reduction

SOx Trends as Surrogate



Enforcement

- Critical aspect of rule process
  - Major impetus for compliance with rules
  - Provides feedback for further rule development and improvements
- Compliance components
  - Prohibition of sales
    - Including labeling of product containers and technical data sheets
  - Visual inspection of equipment
  - Review of permit conditions
  - Examine daily recordkeeping

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Challenges

- Reactivity vs. Mass-based reductions
  - Much more regulatory complexity with Reactivity
- Test methods
  - Low VOC limits in rules challenging methodologies
    - Particularly high water content coatings
- Reactivity vs. Toxicity
  - Added flexibility may increase use of toxic compounds
- Low Vapor Pressure
  - Physiochemical properties may provide options
    - Establishing appropriate parameters under study

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Conclusions

- Industry can thrive under “smart” regulations
- Inclusive rule development process key to industry acceptance
- Research and development (R&D) funds going towards development of low and non-solvent technologies
- VOC reductions lead directly to toxics reductions

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Questions or Comments?

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