UPDATE ON THE REFINERS PROGRESS TO COMPLY WITH THE REFORMULATED GASOLINE REGULATIONS

JUNE 9, 1994

California Environmental Protection Agency

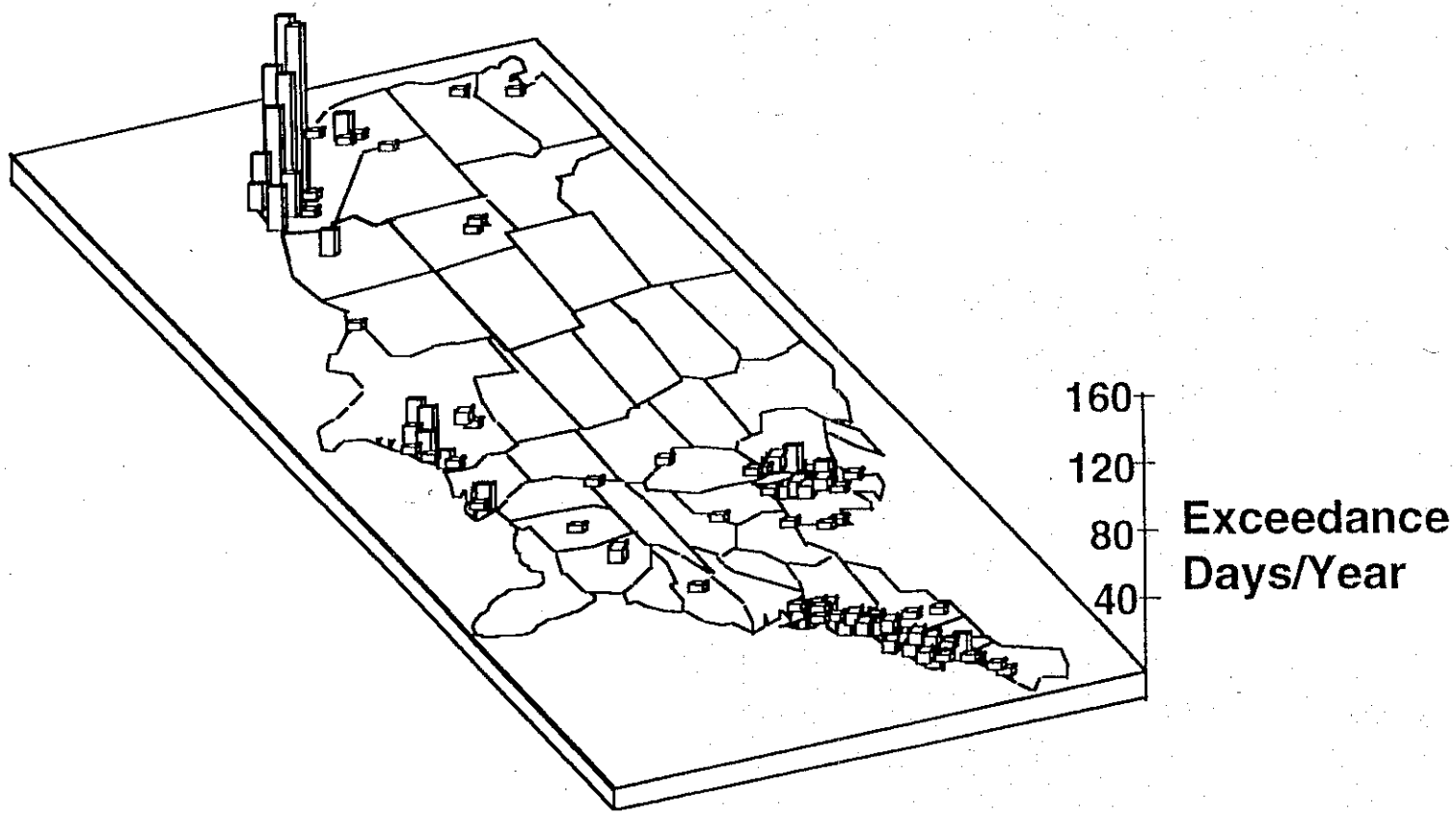
Air Resources Board

Presentation Overview

- Background
- California's Motor Vehicle Fuels Programs
- California's Reformulated Gasoline Program
- Federal Program
- RFG Implementation Activites
  - CEQA
  - Compliance Plans
  - Supply and Demand
  - Public Outreach

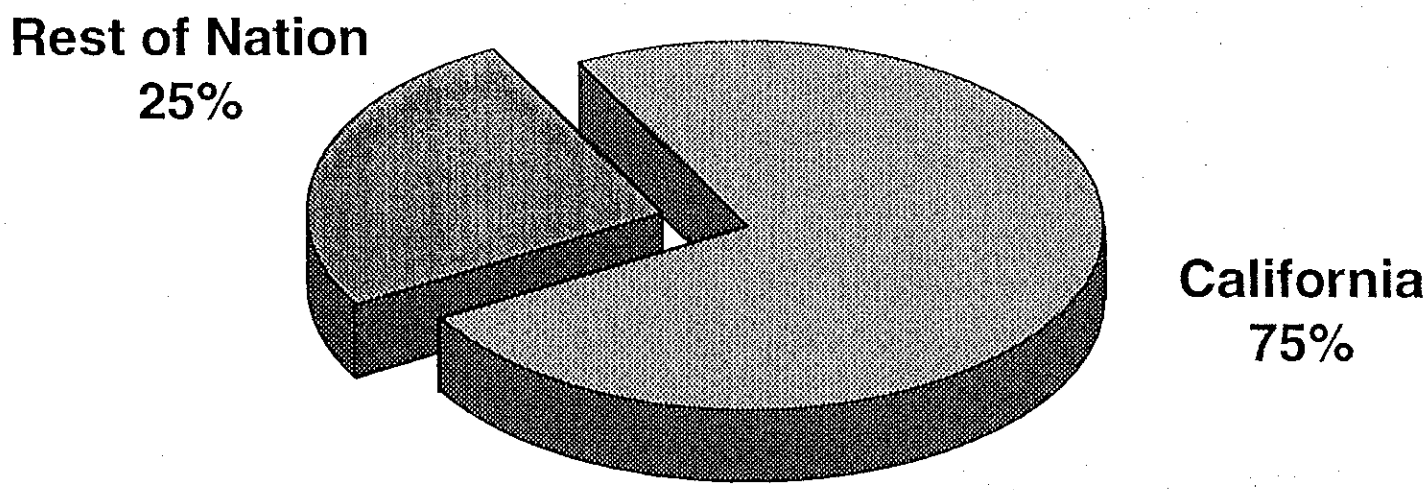
Background

United States Air Quality Ozone
Frequency of NAAQS Violations
1989-1991



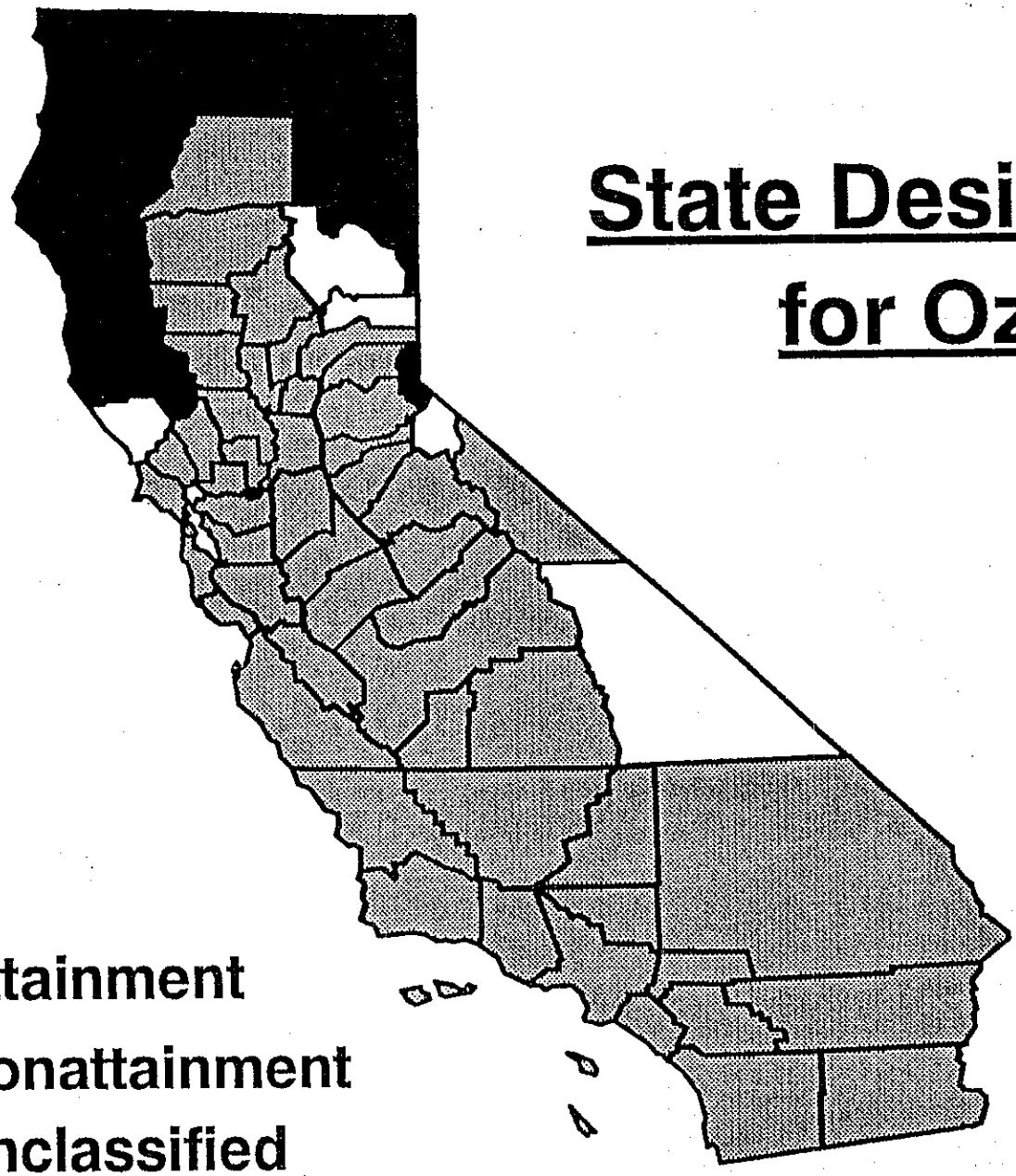
75% of Ozone Problem Is in California

1989-1991 (MSAs only)



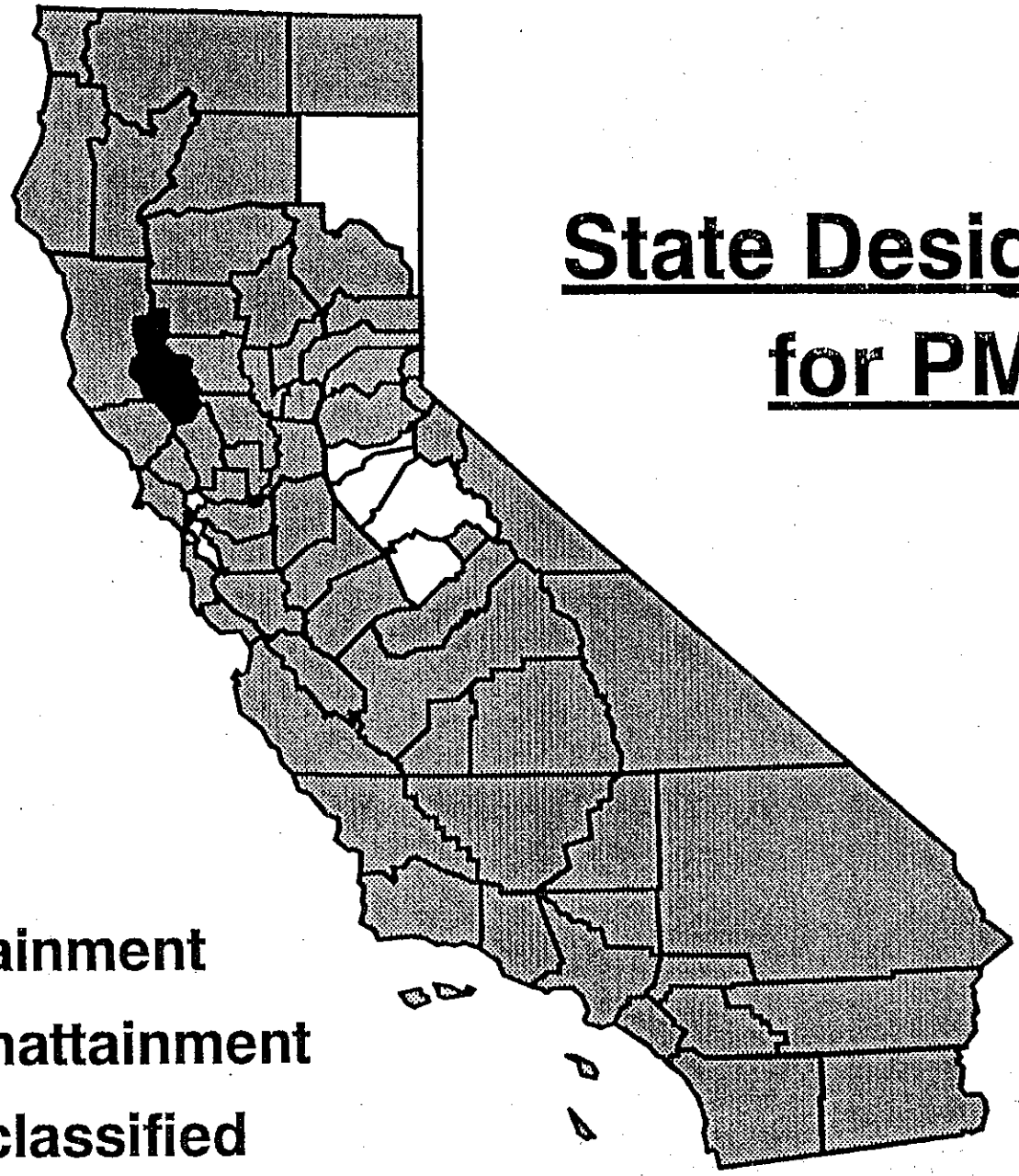
Source: ARB, 1994

State Designations for Ozone



- Attainment
- Nonattainment
- Unclassified

State Designations for PM10



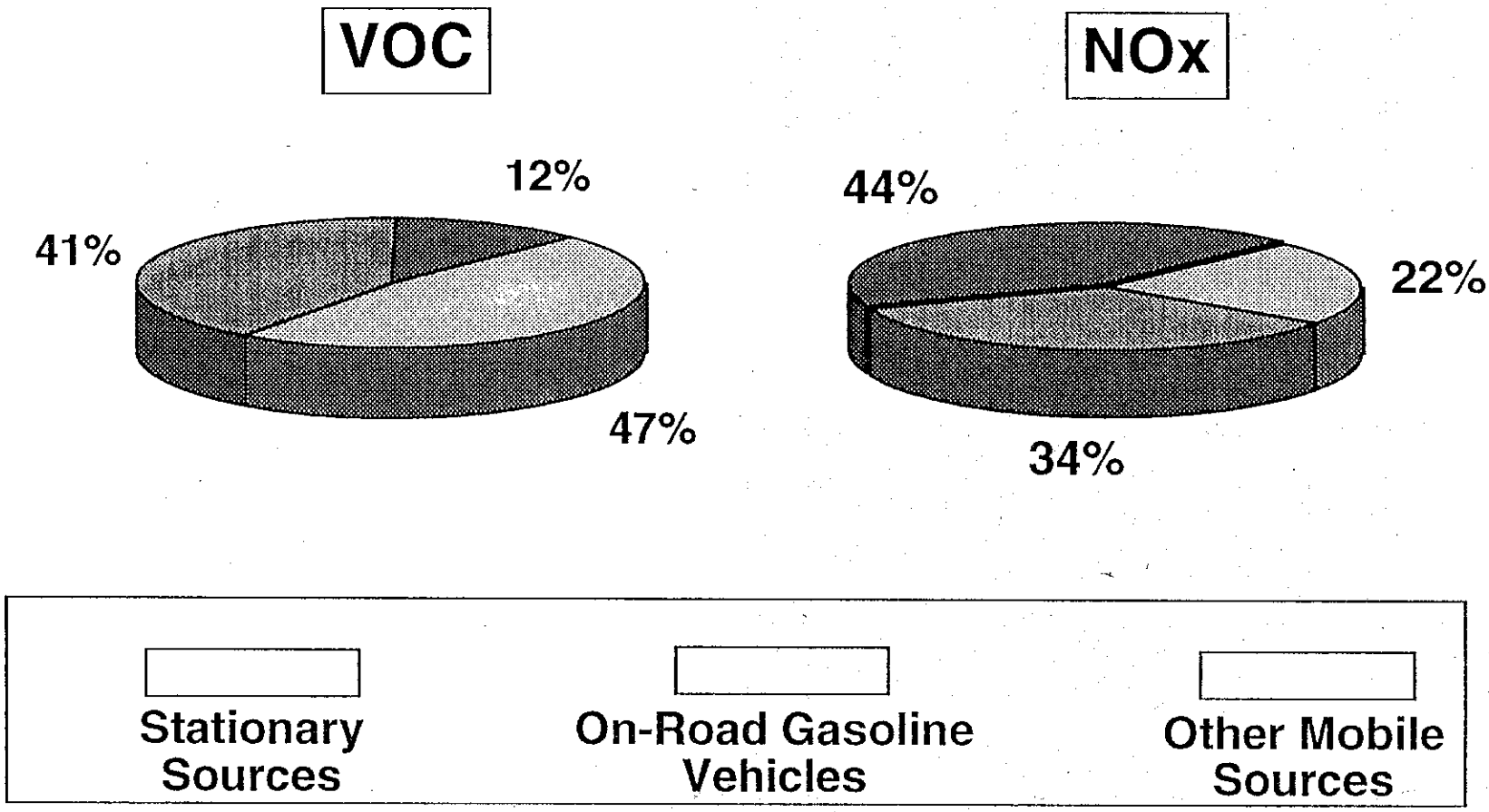
Attainment

Nonattainment

Unclassified

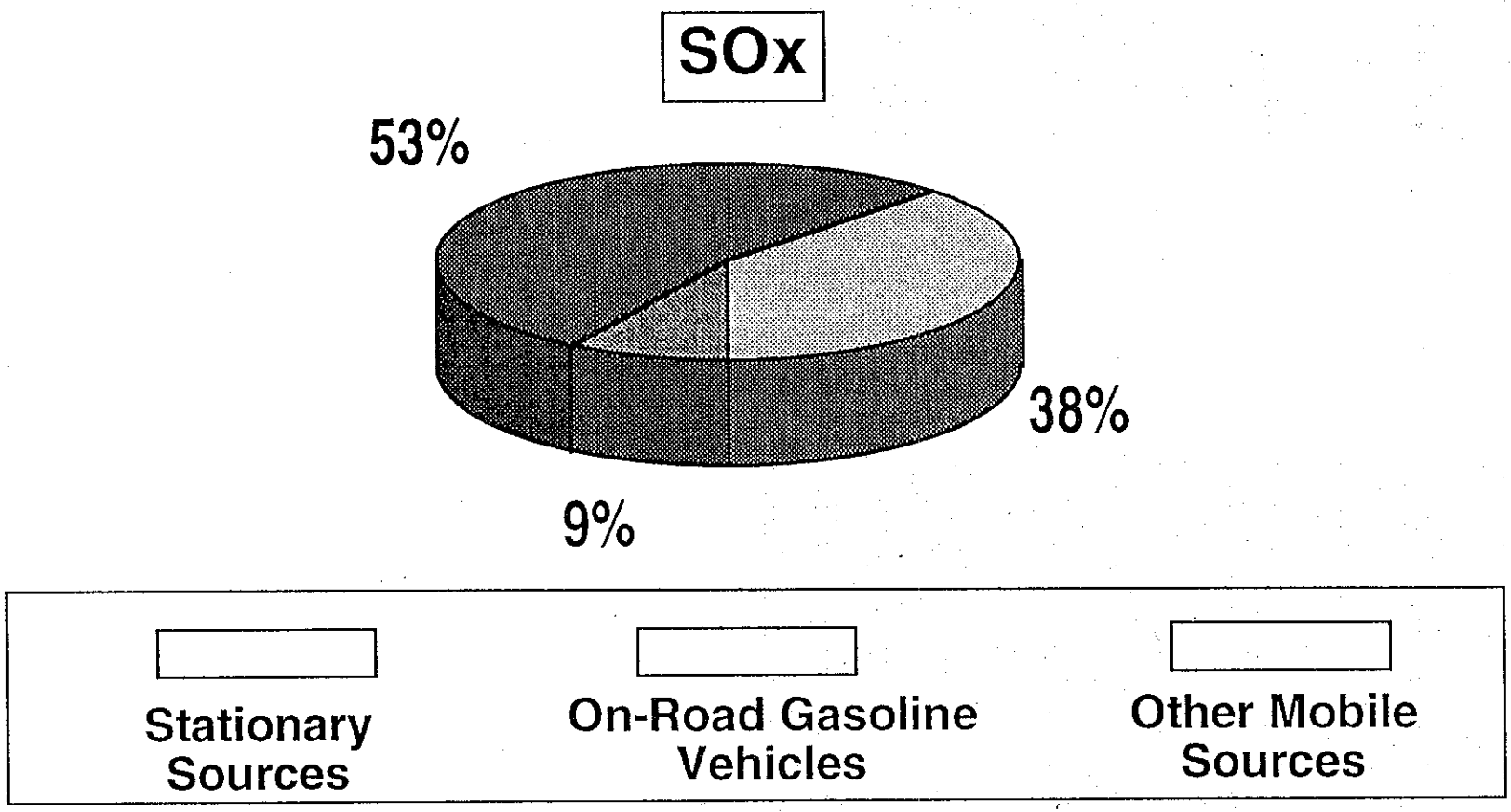
Vehicles are Major Contributors to VOC and NOx Emissions

(1991 Inventory)



Vehicles are Major Contributors to SOx Emissions

(1991 Inventory)



California Clean Air Act Requirements For Mobile Sources

- Achieve maximum emission reductions of VOC and NOx by earliest practicable date
- Achieve maximum feasible reductions in PM, CO, and toxic air contaminants
- Adopt most effective combination of control measures on all classes of motor vehicles and their fuels

Air Toxic Statutory Requirements

- AB 1807 - Adopt measures to reduce public exposure to toxic air contaminants
- AB 4392 - Achieve maximum possible reductions in public exposure to toxic air contaminants from motor vehicles

California's Motor Vehicle Fuels Programs

ARB Strategy Considers Vehicles and Fuels as a System

- Fuel Standards
- Vehicle Emission Standards
- Prevent excess emissions

Why Fuels?

- Immediate emission reductions
  - No wait for fleet turnover
- Cleaner burning fuels help vehicle manufacturers meet the low emission vehicle standards

California's Vehicle Fuels Programs

Year Adopted	Gasoline	Diesel	Alternative Fuels
1971	Reid Vapor Pressure	-------	-------
	Bromine Number	-------	-------
1975	Sulfur	-------	-------
	Manganese/Phosphorus	-------	-------
1976	Lead	-------	-------
1981	-------	Sulfur (SCAB)	-------
1982	Lead	-------	-------
1988	-------	Sulfur/Arom. HC*	-------
1990	Phase 1 RFG		
	- Reid Vapor Pressure	-------	-------
	- Lead Phase-Out	-------	-------
	- Deposit Control Additives	-------	-------
1991	Phase 2 RFG	-------	-------
	Wintertime Oxygenates	-------	-------
1992	-------	-------	Commercial and Certification Spec.

Source: ARB/SSD

* Statewide

Summary

- California has significant air quality problems
- Motor vehicles are major contributors
- ARB has legislative mandates to adopt regulations on motor vehicle fuels
- ARB has long history of regulating fuels
- Fuel regulations are essential to meeting Federal requirements

Review of RFG Program

California's Reformulated Gasoline Program (Two Phases)

Phase 1 Regulations

- Required minimal refinery modifications
- Effective January 1, 1992

Phase 2 Regulations

- Comprehensive specifications to maximize reductions of criteria and toxic pollutants from motor vehicle emissions
- Require significant refinery modifications
- Effective March 1, 1996

Summary of Phase 1 RFG Requirements

Phase 1 RFG

- RVP limit of 7.8 psi
- Require deposit control additives to prevent and reduce deposits
- Eliminate leaded gasoline from on-road motor vehicles

1994 Statewide Emission Reductions

Phase 1 RFG

Major Benefit is 210 tons/day (12%) of Volatile Organic Compounds

Phase 1 RFG Regulations Costs

Phase 1 RFG

	Cents/Gallon a/
RVP	0.4 - 0.6
Additives	<0.1 - 0.4
Lead	0.4

a/ Minimal capital costs involved

Wintertime Oxygenated Gasoline Program

Mandated by 1990 Federal CAAA

- 1.8 - 2.2% by weight oxygen content
- Reduce CO emissions by 10%
- Cost $0.03/gallon
- Incorporated into Phase 2 RFG regulations on March 1, 1996

California Phase 2 RFG Requirements*

- Gasoline sold in California must meet limits for eight fuel properties
  - RVP
  - T50 (50% distillation temperature; where 50% of fuel boils off)
  - T90 (90% distillation temperature; where 90% of fuel boils off)
  - sulfur
  - benzene
  - olefin
  - aromatic hydrocarbons
  - oxygen

* In effect 3/1/96

California Phase 2 RFG Requirements* (cont'd)

- Options for compliance under existing regulation
  - Meet "flat" limit
  - Meet "average" limit
  - Meet formulation certified as equivalent through vehicle testing option
- The predictive model, refiners may choose to use the model for compliance purposes

* In effect 3/1/96

Specifications for Phase 2 Reformulated Gasoline

	Average CA Fuel	Flat Limit Standard
RVP, psi	7.8 [a]	7.0
Sulfur, ppmw	151	40
Aromatic HC, vol%	32	25
Benzene, vol%	1.7	1.0
Olefins, vol%	9.6	6.0
Oxygen, wt%	1.8 -2.2	1.8-2.2
T90, deg F	329	300
T50, deg F	212	210

[a] CEC PIRA , Jan-June, 1991

Implementation Dates

	Phase 2 RFG
Large & Independent Refiners	March 1, 1996
Distribution System	April 1, 1996
Small Refiners	March 1, 1998 a/

a / Applicable to olefin, T90, T50, and sulfur limits, only.
Other limits must be met March 1, 1996.

Benefits and Cost of California's RFG Program

Phase 2 Reformulated Gasoline Benefits

- Average ozone precursors reduced over first four years (1996 - 2000):

  310 tons/day (12%)

- Toxic air contaminants will be reduced by 30% from gasoline vehicles

Summary of Cost to Produce Phase 2 RFG

- Capital required & resulting modernization
  - 3 to 6 billion dollars
- Annualized cost of production (capital, operating, and maintenance)
  - approximately 2 billion dollars/year
- Vehicle operating cost (based on production cost)
  - <2% of cost of owning & operating a new vehicle
  - 0.5 cents/mile

Cost-Effectiveness of Phase 2 RFG
1996

ROG+NOx+CO/7+SO2* (in $/lb.)	ROG+NOx** (in $/lb.)
3.9	4.0

* 20 percent of added cost towards TAC reductions

** one-half of added cost towards TAC reductions

Cost Effectiveness of Phase 2 RFG Comparison to Other Control Measures

Control Measures	$/lb. (ROG + NOx)
Phase 2 RFG	4
Typical Vehicle Controls	up to 5
Typical Stationary Source	5
Marginal Stationary Source	11

Federal Program

Federal RFG Regulations

- Apply only in L.A. Area, Ventura County, and San Diego
- Two Phases:
  - Phase 1 in 1995
  - Phase 2 in 2000
- Combination of fuel specifications and emission performance standards

Federal Phase 1 RFG Regulations

(Takes Effect in 1995)

Fuel Specifications

• RVP limit (psi)	7.2	(ARB*: 7.0)
• Oxygen content (wt%)	2.0-2.7	(ARB*: 1.8-2.2)
• Benzene limit (vol%)	1.0	(ARB*: 1.0)
• Reduction in mass of toxic emissions**	$\geq$ 15%	

* ARB Phase 2 takes effect in 1996

** Based on 1990 model year car as it would emit in 1995

Federal Phase 2 RFG Regulations
(Takes Effect in 2000)

Performance Standards*

• VOC reduction	27.5%
• NOx reduction	5.5%
• Toxic mass reduction	20.0%

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* Based on 1990 model year vehicle as it would emit in 2000 if there were no Phase 1 Federal program

RFG Implementation Activities

RFG Implementation Monitoring Efforts

- CEQA/Permitting
- Compliance Plans
- Supply and Demand

CEQA/Permitting

CEQA/Permitting

- Facilitate CEQA/Permitting with Governor's Office of Planning & Research (began June 1992)
- Ongoing Meetings (began June 1992)
  - Met with APCD's, AQMD's and refiners
  - Attended public meetings to assist in addressing technical issues
  - Coordinated with CEQA lead agency activities
  - Disseminated information to simplify environmental impact report (EIR) development

CEQA/Permitting Status Of California Refiners

- Ten of 13 major refineries have met all CEQA requirements
- Nine refiners have full or partial air permits
- Three refineries are developing their EIRs
- Expect the major refiners will be permitted in time to comply with the Phase 2 RFG by March 1, 1996
- Public kept informed through periodic letters

CEQA/Permitting (cont'd)

Refinery	EIR	Air Permits
North		
– Chevron	Yes	Yes
– Exxon	Yes	Yes
– Shell	Yes	Yes
– Pacific	Yes	No*
– Tosco	No	No
– Unocal	No	No

* Pacific's air permits are in the public review process

CEQA/Permitting (cont'd)

Refinery	EIR	Air Permits
South		
– Arco	Yes	Yes*
– Chevron	Yes	Yes*
– Mobil	Yes	Yes*
– Ultramar	Yes	Yes*
– Unocal	Yes	Yes*
– Texaco		
» SCAB	Yes	Yes*
» SJVAB	No	No

* Permits to meet federal RFG issued, remaining district permits to meet CARB RFG expected by 1st quarter of 1995

Annual Compliance Plans

Compliance Plans

- Promote timely compliance with the Phase 2 RFG regulations
- Monitor the progress of compliance efforts
- Assess the supply/demand balance of complying fuel
- Due March 1993, 1994, 1995
  - After 3/94, additional quarterly submittals through 9/95
  - After 9/95, monthly submittals through 3/96

Compliance Plan Summary

- 1994 compliance plans received from all refiners
- California refiners, except one, on schedule
- Plans include
  - CEQA status
  - Permit status
  - Financing status
  - Key equipment on critical path
  - Construction schedule
  - Estimated production volume

Supply/Demand

Supply and Demand

- For 1996:
  - Estimated production* 880 - 1,000 MBPD
  - Projected demand** 860 - 920 MBPD

* Based on Refiners' compliance plans, dated March 1994 & additional estimates of ARB staff

** Based on Caltrans Forecast report, dated November 1992

Supply and Demand (cont'd)

- Work with CEC to monitor supply and demand
- Issued guidance document to fuel producers requesting additional voluntary information on production volumes

Transition to Phase 2 RFG

- Performance compatibility
- Public Outreach
- Test Methods

Performance Compatibility

Phase 2 RFG Vehicle Material Compatibility

- Ensure acceptable compatibility
  - Continuing cooperative effort with refiners and auto manufacturers to evaluate compatibility
- Plan to conduct fleet testing beginning this year

Compatibility (cont'd)

- Some existing fuels have similar characteristics of Phase 2 RFG
  - ARCO EC1 and ECP have many characteristics as Phase 2 RFG
    - » EC1 approximately 1 billion gallons sold
    - » ECP approximately 1 billion gallons sold
  - Some ultra low sulfur fuel is sold in California

Compatibility (cont'd)

- Wintertime Oxygenates Program
  - » same types and levels of oxygenates that are required in Phase 2 RFG
- Wintertime Oxygenates Program in place since October 1992

Public Outreach

Public Outreach

- Public kept apprised through
  - Periodic letters on refiners' progress toward compliance
  - Periodic letters on estimated production volumes
- Disseminate information
  - Air quality/health benefits of RFG
  - Performance and testing results
  - Supply and cost

Compliance Test Methods

Test Methods

- Ongoing efforts to update test methods specified for the enforcement of Phase 2 RFG regulations
- Coordinating efforts with WSPA, and ASTM

Summary

- Vehicles are significant contributors to air quality problems
- Reformulated fuels are an integral part of efforts to reduce emissions
- Reformulated fuels result in significant & immediate emission reductions
- Cost effective
- Ongoing efforts to ensure smooth transition
- Currently on schedule
- Periodic updates to Board (approx. every six months)