SCAQMD Rule 1171
Solvent Cleaning Operations

Safer Alternatives to Toxic Cleanup Solvents Workshop

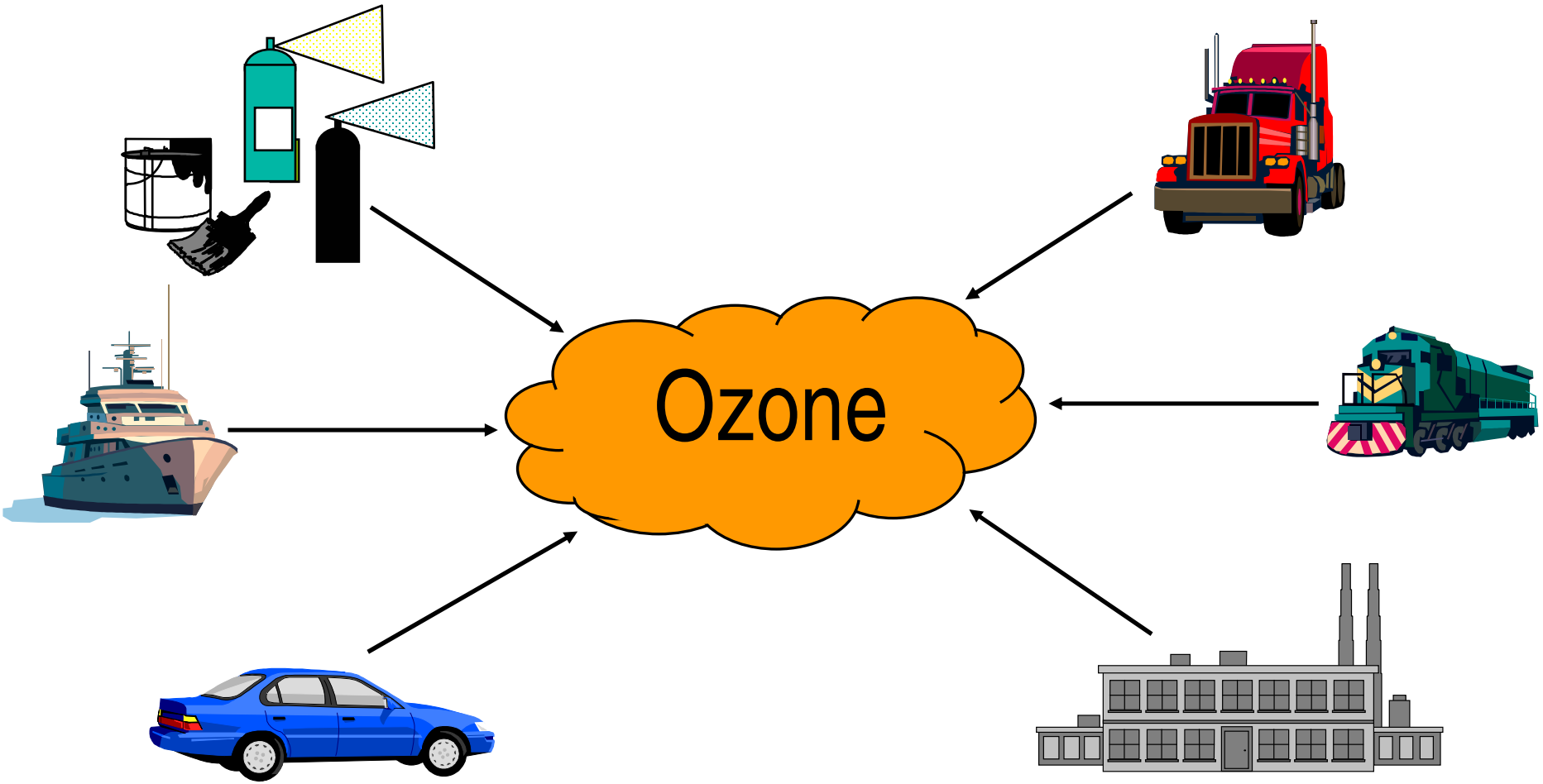
March 7, 2007

Introduction

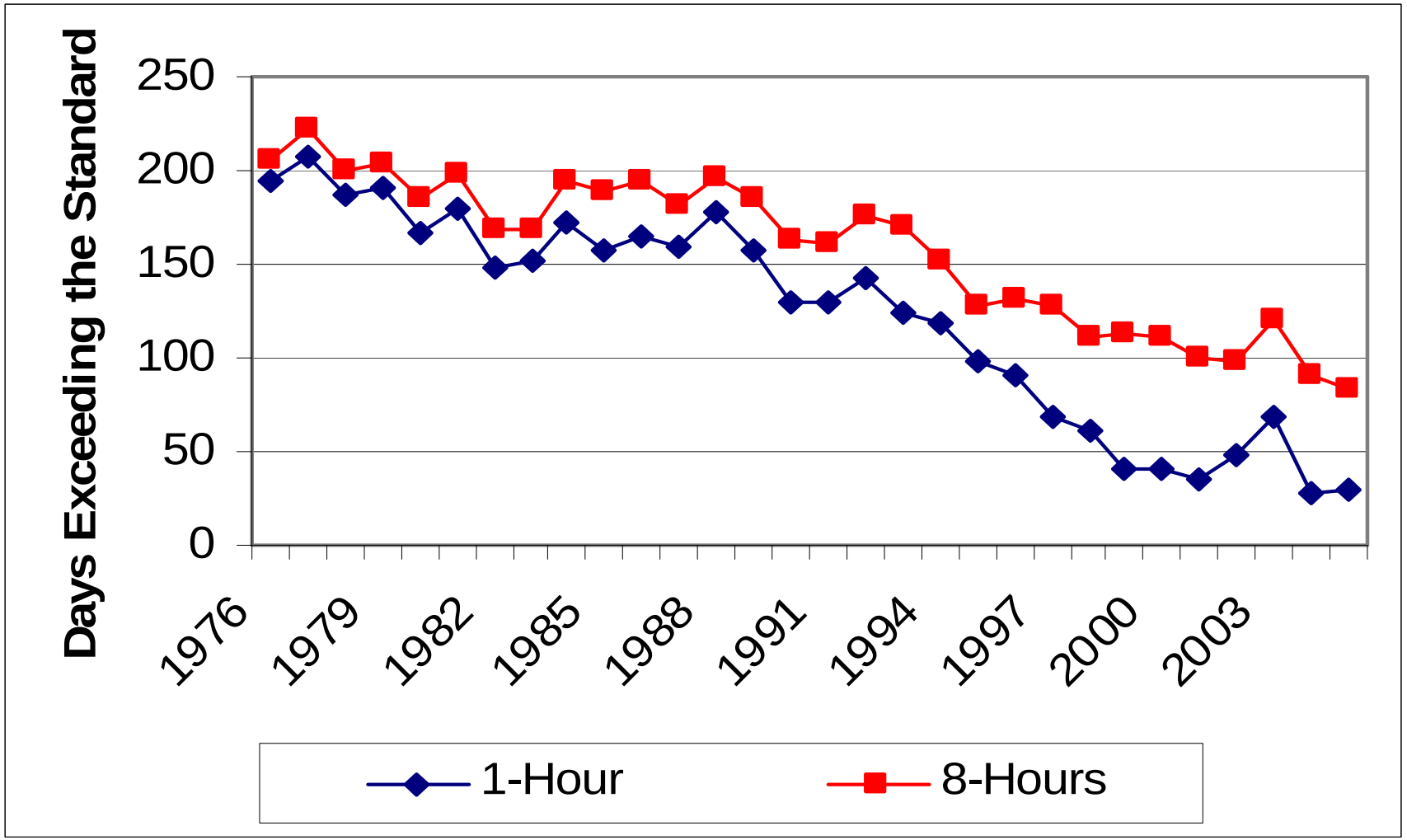
- Rule 1171 ⇒ Key component of SCAQMD's ozone reduction strategy
- Adopted in August 1991 to reduce VOC emissions from solvent cleaning operations
- Ozone building blocks
  - VOC
  - NOx

Major Contributors to Ozone

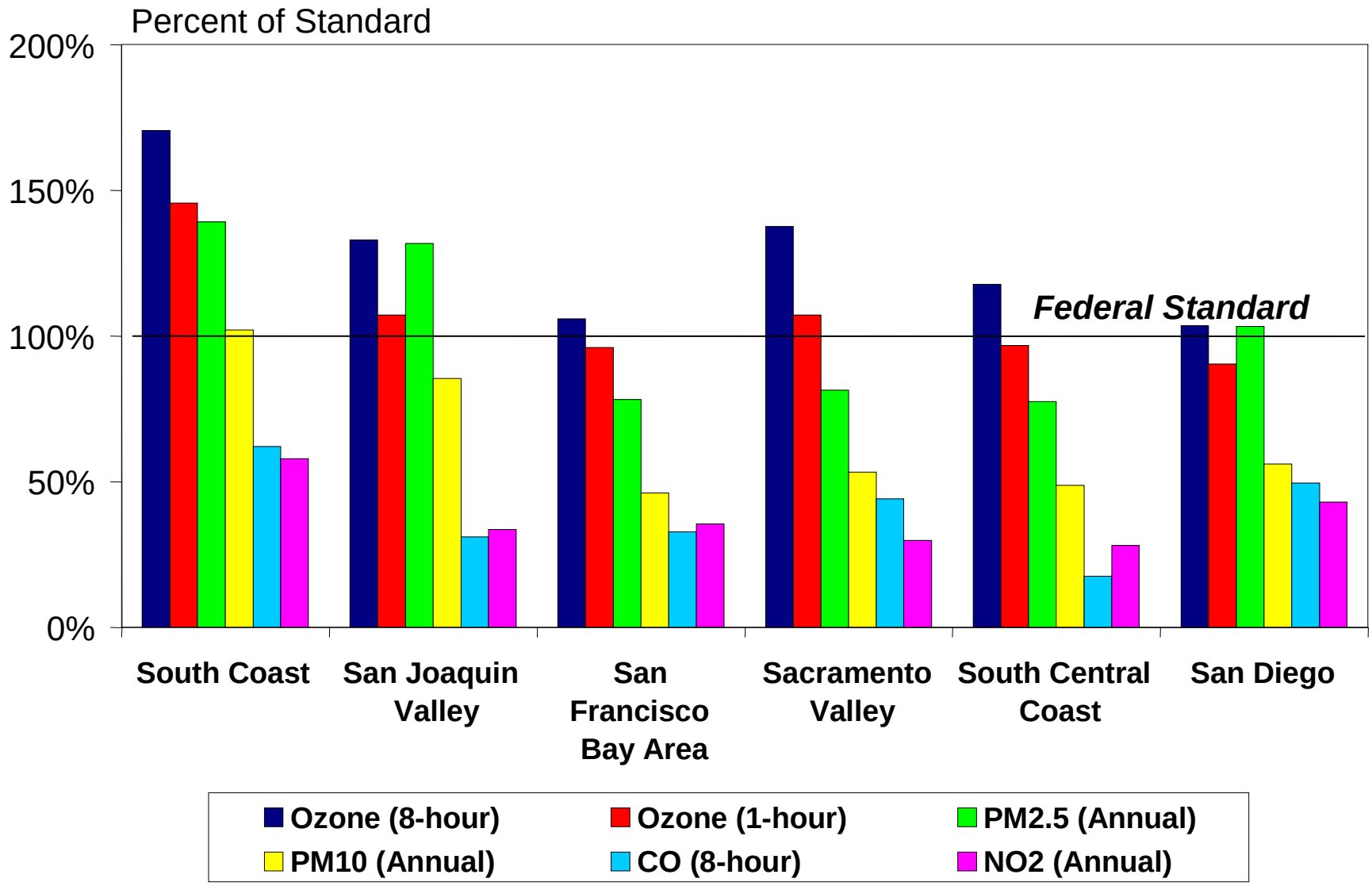
Sources of NO_x and Hydrocarbons (VOCs)



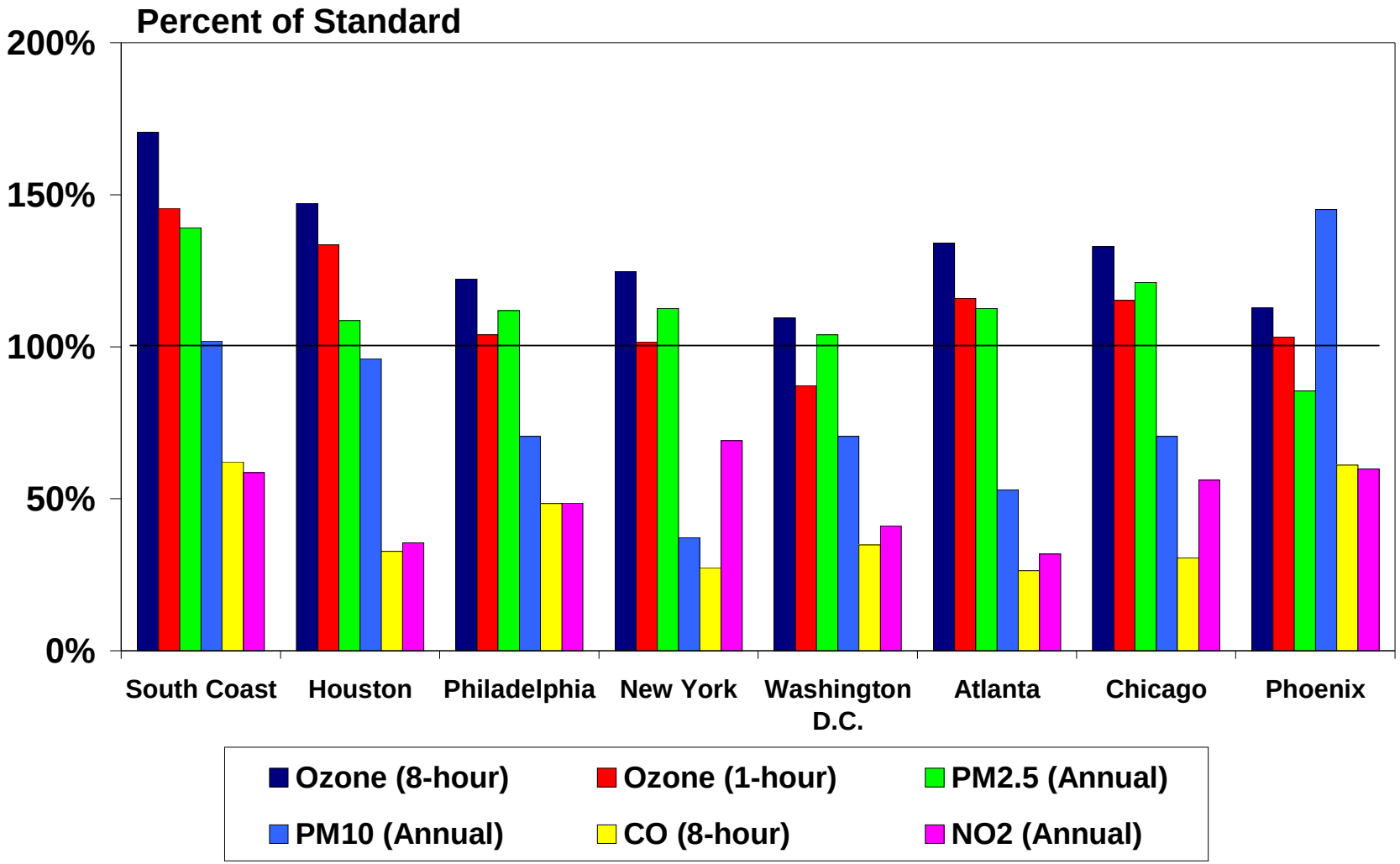
Air Quality Trend
Days Exceeding Ozone Standards



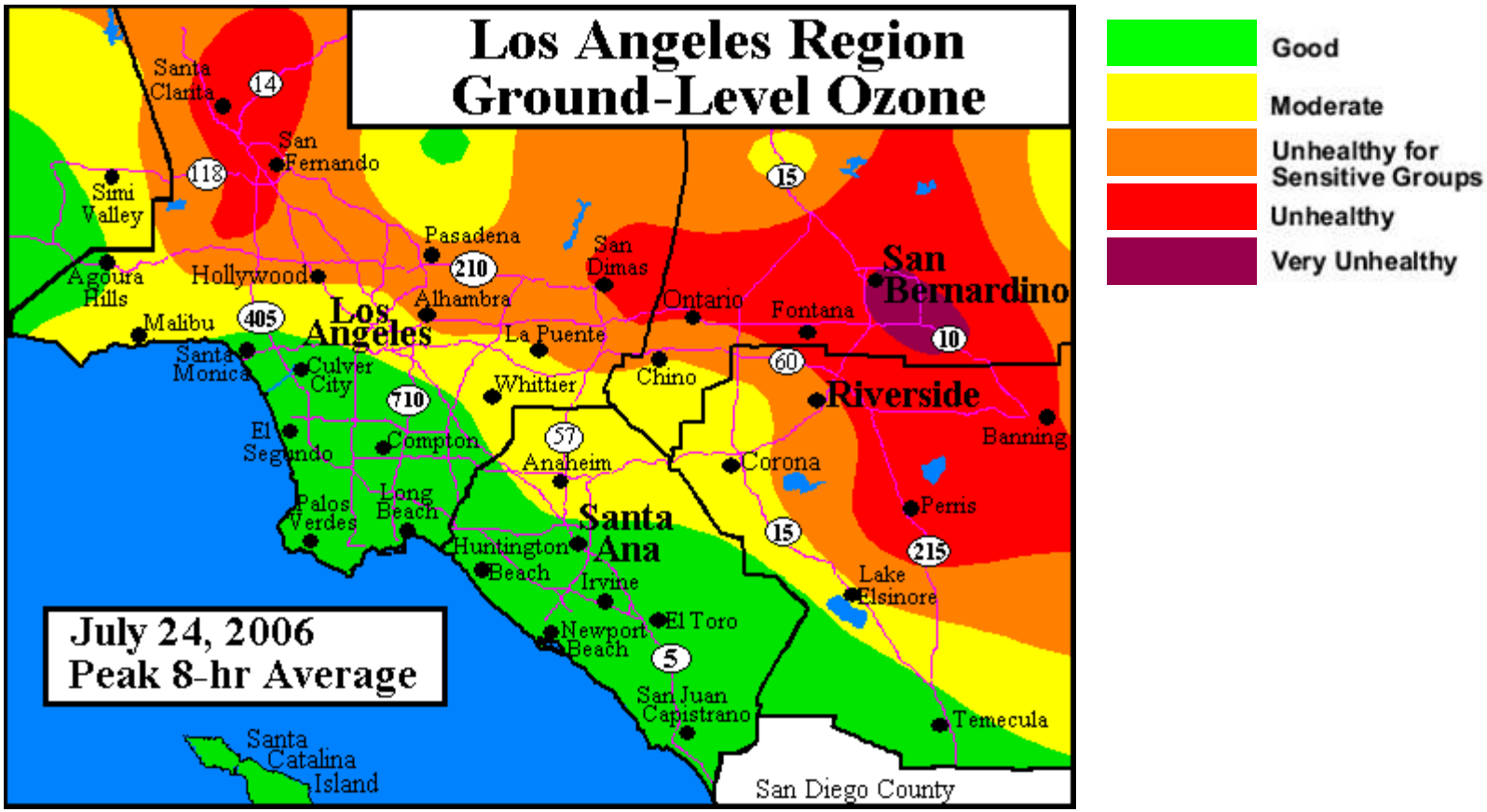
2005 South Coast Air Basin Quality Compared to Other California Air Basins



2005 South Coast Air Basin Quality Compared to Other U.S. Cities



Severe Air Quality Problem



Rule Background

- Adopted in August 1991 to reduce VOC emissions from solvent cleaning operations

- 8 amendments since rule adoption;
  rule now also controls
  - Toxic air contaminants
  - Ozone depleting compounds
  - Global warming compounds

Rule Background (cont.)

- 1999 amendment established 2-tiered VOC limits
  - Use of aqueous cleaning technologies, VOC-exempt solvents, or development of new low-VOC cleaning materials
  - Tier I limits implemented in 2001 (6 tpd reductions)
  - Tier II limits effective July 2005 (9 tpd reductions)
    - Subject to completion of technology assessment

Rule Background (cont.)

- SCAQMD completed technology assessment in support of Tier II limits for cleaning of:
  - Electrical/electronic components
  - Coating/adhesive application equipment
  - Litho ink application equipment
  - Screen printing ink application equipment
  - UV/EB ink application equipment

  Reports available online: www.aqmd.gov/rules/support.html
- Tier II VOC limits implemented in 2003 and 2005 except for lithographic, UV/EB inks, and screen printing operations
  - Extended testing
  - Interim limits of 500 g/l established

Rule Background (cont.)

- 2006 amendment delayed implementation of low-VOC limits for litho/UV/EB inks/screen printing operations
  - New compliance date for 100 g/l limit is January 1, 2008
  - Raised interim VOC limit for automatic wash systems and cleaning of UV/EB inks to 650 g/l; handwipe cleaning remains at 500 g/l
  - Allows time to evaluate and transition to low-VOC solvents
  - Implemented 100 g/l VOC limit for lithographic printing on newsprint

Technology Assessment
Lithographic Printing

- Study conducted by 3 SCAQMD contractors
  - Institute for Research and Technical Assistance (IRTA)
    - Developed new low-VOC cleaning materials
  - Graphic Arts Technical Foundation (GATF)
    - Tested existing materials reformulated to meet 100 g/l limit
  - University of Tennessee (UT)
    - Conducted solvent/equipment compatibility testing
- Extended field testing of potential cleaning materials to determine long term effect of low-VOC cleaners on equipment
- Costs of alternative cleaners evaluated

Technology Assessment – cont.

- Study indicated that 100 g/l limit viable for many applications using alternative cleaners
  - Water-based cleaners
  - Soy-based cleaners
  - Acetone-based cleaners
  - Blends of cleaners with VOC solvents
- Newsprint facilities already meet 100 g/l VOC limit
- Oily residue from soy-based cleaners requires additional cleaning times (additional rinse)

SCAQMD Field Visits

- Industry reported difficulties during the first few months following implementation of 500 g/l interim limit (oily residue, print quality problems)

- 25 printing facilities visited to evaluate performance of 500 g/l cleaners; 4 of these facilities involved in extended testing using 100 g/l solvents
  - Printing problems during first few months
  - Learned to work around new cleaners to achieve desired results; may require process change
  - Better compliant products now available
  - Low-VOC cleaners not as convenient to use as high VOCs
  - Remaining concerns on oily residue/additional cleaning times
  - Low-VOC solvents difficult to use in auto wash systems

Printing Industry Association's Test Program

- Project designed to select and test low-VOC solvents/formulations identified during the technology assessment including other commercially available solvent cleaning products
- Printers, solvent formulators, equipment manufacturers involved in the program
- Industry to meet regularly with SCAQMD staff on progress of testing program
- Project completion date: July 2007
- SCAQMD staff will evaluate results of test program

Conclusions

- 100 g/l VOC limit viable for most lithographic printing cleaning applications
- Effectiveness of low-VOC solvents in automatic wash systems remains a concern and may need to be re-evaluated
- Oily residue and additional cleaning times with the use of soy-based cleaners not a hindrance to implementing the 100 g/l VOC limit
- Expect more and better compliant products from solvent formulators