Ethanol Issues in the Context of the Air Quality Management Plan

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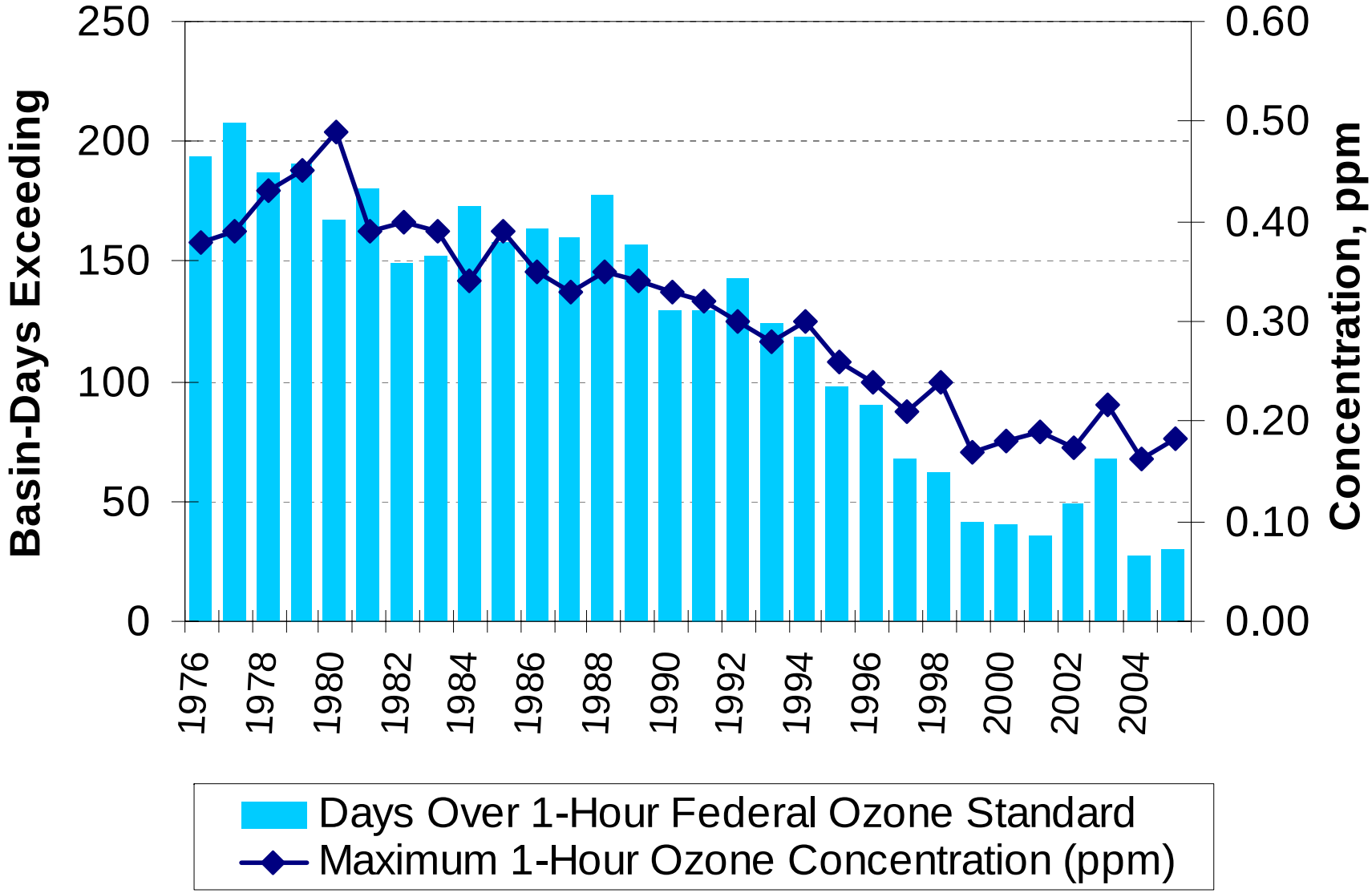
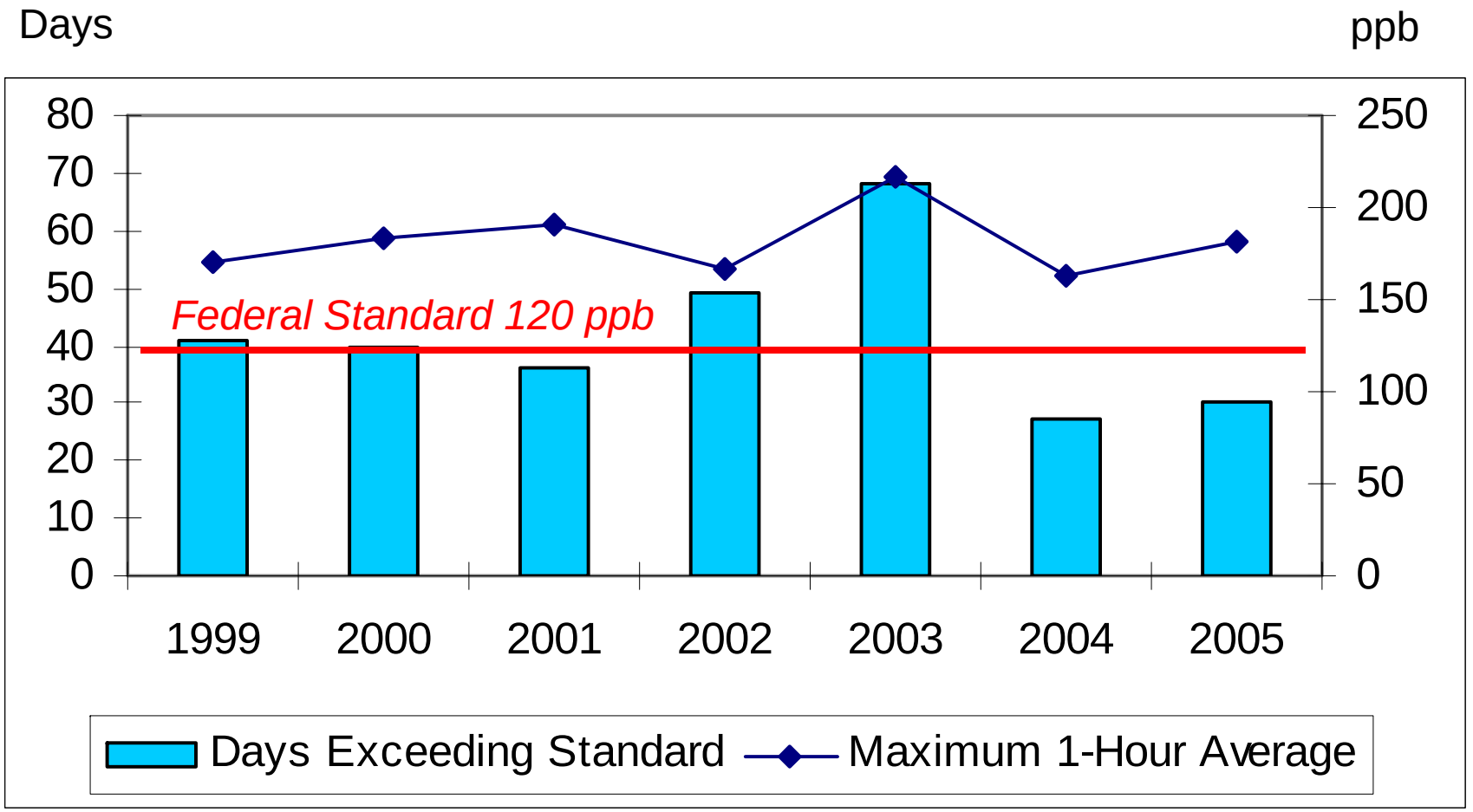
South Coast Air Basin Smog Trend



Trend of Basin 1-Hour Ozone



Observations

- Ozone trend responds quickly to major changes in emissions
- Major reduction in ozone formation post Phase II reformulations (mid 90’s)
- Trend flattened late 90s
- Ozone concentrations, days violating the standard and areas impacted increased in 2002 and reached a maximum in 2003
- Phase III reformulation (ethanol as an oxygenate) targeted to commence in 2002 but delayed to 2003

Focus on 2003 Air Quality

- Highest ozone concentrations since mid 90's
- Exceptionally warm-stagnant year
- Co-mingling of ethanol and MTBE increase evaporative emissions
- Permeation adding to evaporative emissions increase
- Modeling sensitivity analyses (assuming co-mingling and permeations) suggest a 10-20 ppb potential increase in maximum ozone concentrations due to evaporative emissions enhancement

AQMP Issues

- Must demonstrate future attainment of federal standards:
    - > PM2.5 – 2015
    - > 8-Hour Average Ozone – 2020
- Preliminary estimated 2020 carrying capacity of approximately 500 TPD of NOx and VOC combined
- At least 23 TPD additional VOC emitted through permeation due to ethanol (estimated for 2004 -- or about 3% of the VOC inventory)

Ethanol Impact on Ozone Formation

- Different blends of ethanol have been suggested for future Basin distribution E6, E10, E85
- Chemistry Question:
  - > Implications are that increased ozone production from enhanced evaporative VOC emissions are partially offset due to reduced CO emissions for E6 – E10
- Meteorological Interference:
  - > Episode days are typically much hotter than average and evaporative emissions may increase faster and in greater totals

Impact on AQMP Control Strategies

- Federal oxygenate mandate is no longer in effect
  - > neighboring gas stations may have different blends – some with ethanol and some without
  - > potential return of co-mingling, and enhanced permeation
- Need to evaluate the impact of potential ethanol market penetration scenarios
- Nominal increases in VOC in future years may lead to ozone exceedances