VOC Controls White Paper Working Group Meeting #4

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Cleaning The Air That We Breathe…

VOC Control White Paper

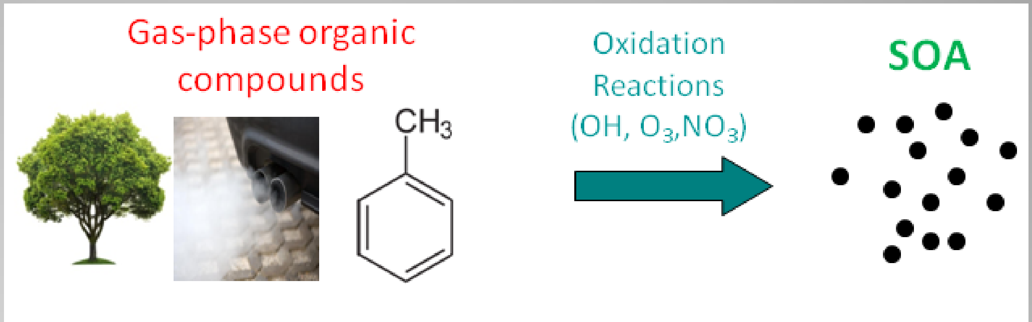
- Previous working group meetings: 6/25/2014, 8/19/2014, and 10/15/2014
- Outline released to public on 9/25/2014
- Draft paper released to public on 4/2/2015

- Scientific discussion
  - Definition and Classification of VOCs
  - The role of VOCs in ozone formation
  - The role of VOCs in PM formation
  - Ozone control modeling analysis

Ozone Formation From VOCs

- Formed in atmosphere by reaction of volatile organic compounds (VOCs) with oxides of nitrogen (NOx) in sunlight
- Depends on VOC and NOx levels but also the ratio of VOC/NOx concentrations
- Ozone isopleth diagrams to evaluate the dependence on changing VOC and NOx concentrations
    - Geographic variations

Particulate Matter Formation From VOCs

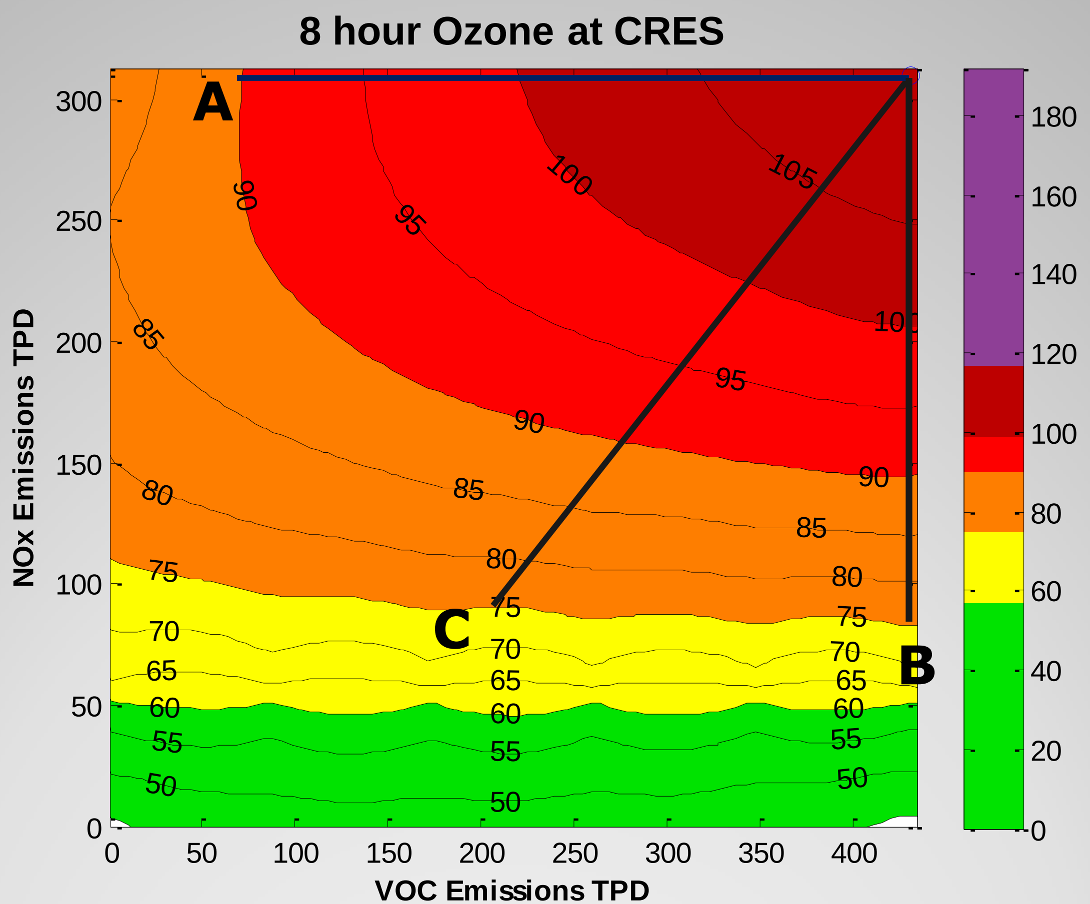


- Majority of ambient PM mass is secondary (formed from reactions in the atmosphere)
- VOCs react with atmospheric oxidants to form secondary organic aerosol (SOA)
- 30-50% of PM mass in SoCAB is organic
- Different chemical reactions are responsible for formation of ozone and PM from VOCs. (Organic compounds with large ozone formation potentials may not contribute to PM2.5 mass and vice versa.)

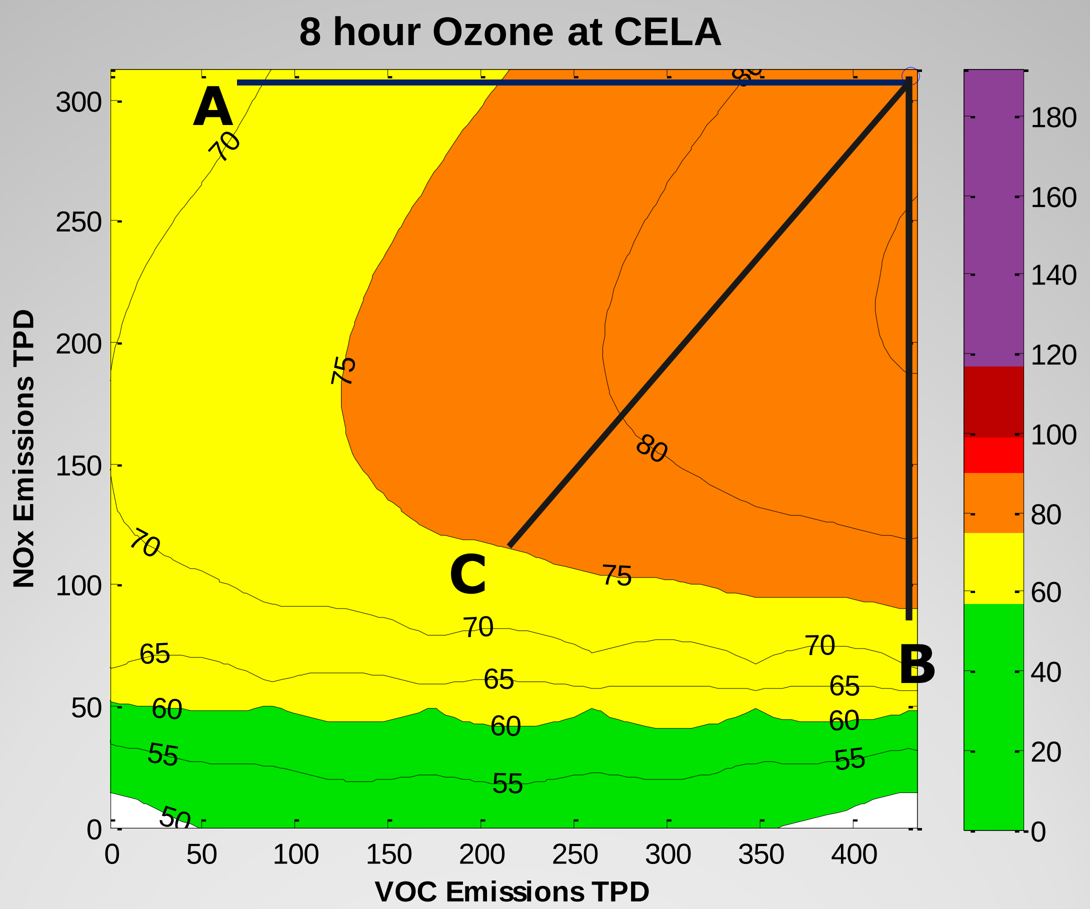
Control Strategy Evaluation

- Based on model results from 2012 AQMP
- 2012 inventory was projected from 2008 baseline inventory
- Potential Pathways
  - ❑ NOx-Only
  - ❑ VOC-Only
  - ❑ Combined NOx and VOC

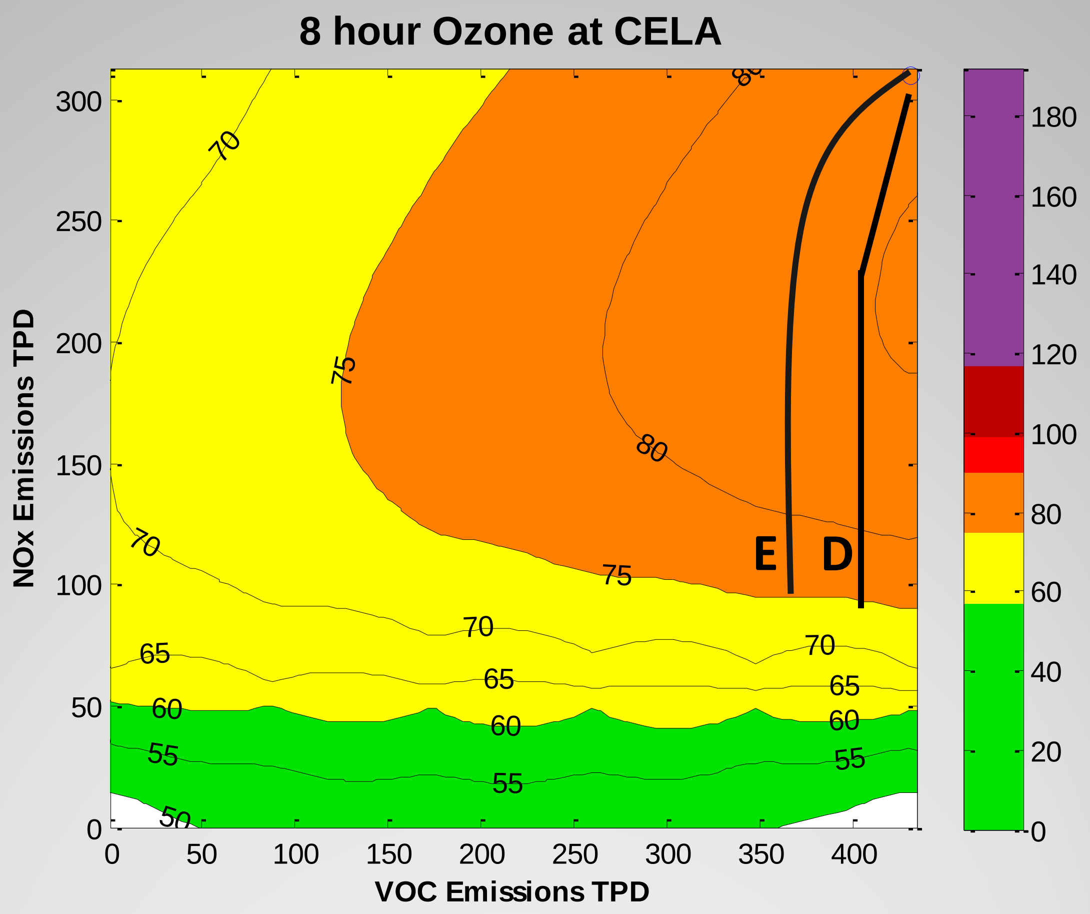
O3 Attainment Plans:
Carrying Capacity Plot for Crestline



Carrying Capacity at Central LA



Avoid Potential Ozone Increase Above 1997 Standard



Control Strategy Summary

Path	Additional NOx Reductions	Additional VOC Reductions	Results
A	0 TPD	All VOC	Not possible to attain standard
B	200 TPD	0 TPD	Increase in O_3 in Western Basin during course of attainment
D	200 TPD	30 to 40 TPD	Avoids increases in O_3 above 1997 Standard
E	200 TPD	100 TPD	Avoids any ozone increases in Western Basin

Recommendations

- NOx-heavy controls with strategic and tiered VOC reductions
  1. **Maximize co-benefits (NOx, GHG, toxics)**
     - Promote technologies for NOx reduction that also lead to reductions in VOCs, GHGs, and air toxics
  2. **Pollution prevention programs**
     - Reducing waste at the source is an efficient and effective way to reduce emissions. Can lead to cost savings.
     - Could involve implementation of enhanced LDAR programs
  3. **Incentivize zero and near-zero VOC materials**
     - In some product categories, super-compliant zero and near-zero VOC materials perform as well as traditional products and are widely available
     - Incentives to promote use of these products, especially during ozone season, could reduce ozone exceedances

Recommendations

- NOx-heavy controls with strategic and tiered VOC reductions

4. **Maximize reductions from existing regulations**
   - Enhanced enforcement
   - Removal of potential regulatory loopholes
   - Expanded reporting programs
5. **Prioritize reductions of most reactive VOCs (ozone & PM2.5 formation)**
   - Reduce emissions of most reactive species (also consider enforceability, toxicity, and climate impacts)
   - Will reduce ozone and PM2.5 concentrations, while minimizing market disruptions
6. **Avoid toxicity trade-offs**
   - Recommend a precautionary approach so that regulatory VOC reductions do not increase the use of chemicals that are known or suspected to be toxic

Recommendations

- NOx-heavy controls with strategic and tiered VOC reductions

7. **Evaluate practicality and effectiveness for time and place controls**
   - Most O3 exceedances occur May through September
   - PM2.5 concentrations are typically highest during winter
   - Implications of seasonal or location-based control can be evaluated with air quality models
8. **Conduct further studies related to VOCs**
   - Optical remote sensing technologies to allow for detection of emissions in locations where traditional monitoring is not practical
   - SVOCs, IVOCs, and LVP-VOCs (emissions, evaporation rates, ambient concentrations, ozone formation, PM2.5 formation)