8hr Coalition Modeling Objective

• Modeling projects and associated analyses designed to assist in determining best ways of configuring, executing, understanding, and demonstrating modeled attainment

• Alpine’s objective has been to support the scientific and regulatory needs of the Houston 8-hr Ozone Coalition
Summary of Findings

• Based on historical point source strategies, it is difficult to model attainment for all monitors in the HGB domain
  – *One cause, one solution* is no longer appropriate course of action
  – Moving to monitor-centered approach may be more appropriate to achieve modeled attainment

• How could one craft a SIP that shows different strategies to reach individual monitor attainment?
Summary (Con’t)

• The model itself cannot be used to demonstrate attainment
  – Some monitors still show nonattainment
  – Other tools (e.g., weight of evidence) will be required in this demonstration

• Need to review the science that can be used to support control strategies that have real world impact
Summary (Con’t)

• Using TCEQ’s 2012/2017 platform, we present two transport projects that review this issue
  – International and domestic emission contributions
  – Regional and local contributions
    • by domain and source sector

• To guide our studies, we reviewed modeled concentrations and compared to current design value observations
TCEQ 2012/2017 Platform v. Observations
Key HGB Monitors

Model Projections are Lower than Current Observations

Model Projections are Higher than Current Observations

Are these differences due to inputs, configuration, or responsiveness of model to changes in the atmosphere?

Are there trends in where the model shows better/worse skill?
Boundary Modeling Observations

• There is an increasing (modeled) relative contribution of boundary and non-US North American emissions associated with continental U.S. ozone design values.

• There is also a growing body of science that identifies observed international transport impacting domestic ozone concentrations at monitors across the continental U.S.

• As the NAAQS continues to decrease, the relative percentage of this boundary contribution increases preventing as effective control using local and domestic programs.
OSAT Results – TCEQ 2017 Platform

- Daily OSAT processing indicates variable modeled contribution to highest ozone predictions
  - Boundary condition contribution as much as 35 ppb on some days (average of ~ 15ppb/30%)
  - Onroad mobile sources ~ 40% [underlying base concentration]
  - 8 county > rest of TX > outside of TX [regional and local]
Intra-Basin Emission Tracking Project

• Motivation
  – Historical path of industry wide controls appear to be giving way to required monitor-specific strategies
  – In recent years the highest monitors have moved away from the Ship Channel to outlying areas of the metro region (i.e. Aldine, Manvel Croix Park)
Study Approach

• Using source apportionment, allocate the concentrations at monitors into the most important source regions in the basin

• Multi-step process
  – First - rank order contribution from fairly coarsely defined source regions across the basin
    • 36x36 km regions
  – Second – refine source regions (12km) and track by sector for key source regions at critical monitors
First and Second Order Ranking

36km Review

12km Review
Refined 12km Analysis
Subgrids and Categories

- Biogenics
- EGU
- Industrial (non-EGU points)
- On-Road Motor Vehicles
- Nonroad
- Area
- Offshore
- Canada/Mexico
Houston Aldine

Anthropogenic O$_3$ Contribution from Subgrid Cells (ppb)

Largest contributions come from mobile sources in city metro (C4) and next highest from industrial sources east of city center (D4)
Anthropogenic Contribution (ppb)
Manvel Croix Park

Anthropogenic $O_3$ Contribution from Subgrid Cells (ppb)

In contrast to Aldine, largest contributions come from east of city center (D4) and from industrial sources, next highest come from mobile sources in city metro (C4).
Anthropogenic Contribution (ppb)
Initial Conclusions

• Confirmed that current control scenarios alone prove difficult to show modeled attainment across all HGB domain
  – However, some programs like increased and widespread onroad control may have impact across entire domain and all concentration ranges by lowering the number of monitors and concentration levels needed to achieve attainment

• Moving to monitor-centered approach to achieving modeled attainment demonstrations
  – Looking for regional programs that could help multiple monitors while recognizing that many monitors still have unique contribution profiles