

# **Fuels Workshop on Regulatory and Non-Regulatory Fuels Activities for 2006**

**August 25, 2006**

**California Environmental Protection Agency**

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**Air Resources Board**

# Agenda

- Introductions and Schedule
- H&SC Section 43013.1
- California Predictive Model
- Presentations by Others
- Open Discussions
- Closing Remarks

# Tentative Additional 2006 Workshops

- ➡ Sept.22      9:00 to 12:30      Training 1&2
- ➡ October 6    9:00 to 12:30      Sher Auditorium
- ➡ October 25   9:00 to 12:30      Sher Auditorium

- The October workshops will be webcast. All meetings will be available by conference call.
- Next set of workshops will scheduled based progress

**Discussion Topic:  
Health and Safety Code  
Section 43013.1  
(Sher Bill)**

# Sher Bill

- ➡ Staff has made available its interpretation of Health and Safety Code section 43013.1(b)(1), which was enacted by Senate Bill 989 in 1999. This interpretation applies to the applicability of section 43013.1(b)(1) to updates to California reformulated gasoline regulations, as well as to any future ARB regulations that might be developed relating to fuel formulations.
- ➡ Available through Reformulated gasoline webpage

# **Discussion Topic: Predictive Model**

# New Website

- ☞ To facilitate communications with stakeholders, the ARB staff has created a new webpage for Predictive Model development activities
  - The new webpage may be found at:  
[www.arb.ca.gov/fuels/gasoline/premodel/pmdevelop.htm](http://www.arb.ca.gov/fuels/gasoline/premodel/pmdevelop.htm)

# Predictive Model

- ☞ Committed to the Board to review need for update about every 5 years – last updated 1999
- ☞ Currently slated to go to the Board on December 7-8, 2006
  - Hearing notice package filed with OAL on 10/10
  - Staff Report release no later than 10/20

# Predictive Model Reactivity

# Reactivity SubGroup

- Anil Prabhu, Ph. D.
- Dongmin Lou, Ph. D.
- Gary Whitten, Ph. D.
- Cynthia Williams
- Rory Macarther
- Paul Wuebben
- Steve Brisby

# Reactivity Progress

## Draft 2006 Update to MIR Values

- Extracted sample speciation data set from VEDS database
- Calculated specific reactivity from MIR values obtained from the 2003 ARB Board approved list
- Only ~ 66% species match in the 2 lists

# Reactivity Progress

## Draft 2006 Update to MIR Values

- ➡ Research Division provided unique values for the unmatched species to develop a draft 2006 list
- ➡ Draft 2006 list has matches for all species for all datasets to date (ARB EtOH 1999 study, CRC perm studies, ARB in-use data set)
- ➡ Reactivity group is reviewing calculations

# Masses Used in Calculating Specific Reactivity (mg/mile)

applied to sample data set from VEDS database

<b>List Used</b>	<b>Mass (mg/mile)</b>
<b>Using 1998 list</b>	<b>6.85</b>
<b>Using 2003 ARB Board approved list</b>	<b>6.43</b>
<b>Draft 2006 list</b>	<b>7.01</b>

# Specific Reactivity (mg/mile)

(applied to sample data set from VEDS database)

	<b>1998 list</b>	<b>2003 ARB approved list</b>	<b>Draft 2006 list</b>
<b>NMOG</b>	<b>2.42</b>	<b>2.44</b>	<b>3.10</b>
<b>TOG</b>	<b>2.12</b>	<b>2.12</b>	<b>2.73</b>

# Specific Reactivities for Various Studies Based on Draft 2006 MIR List

<b>Process and Study</b>	<b>1998 MIR</b>	<b>Draft 2006 MIR</b>	<b>% Change</b>
<b>Diurnal (ARB EtOH)</b>	<b>1.51</b>	<b>2.11</b>	<b>28.44%</b>
<b>Hot Soak (ARB EtOH)</b>	<b>2.36</b>	<b>3.75</b>	<b>37.07%</b>
<b>Permeation (CRC E-65)</b>	<b>2.61</b>	<b>4.02</b>	<b>35.16%</b>
<b>Permeation (CRC E-65-3)</b>	<b>2.55</b>	<b>3.79</b>	<b>32.68%</b>
<b>FTP (ARB EtOH)</b>	<b>2.84</b>	<b>4.03</b>	<b>29.53%</b>
<b>UC (ARB In-use Testing)</b>		<b>4.01</b>	

# Predictive Model Model Construction

# Statistics Subgroup

- Use new data
- Auto/Oil 17 and 18 in Tech 4
- Averaged Repeats (Posed to Rocke)
- Forward stepwise based on significance level (5%)
- Remove non-significant first order terms (proposed)
- No RVP interaction terms
- Evaluated alternative methods to construct the Tech 5 offset model
- Evaluating a set of CO equations to be used in the hydrocarbon model
  - Methodologies will be the same as HC model

## Predictive Model – Weighting Factors

- ☞ Staff will change how the emission categories are weighted.
- ☞ Each hydrocarbon emissions category will be weighted based on the entire fleet rather than just Tech 3,4, and 5.

# Predictive Model - Hydrocarbons

## ☞ Four Parts

- Exhaust HC% \* IWF \* RF +
- Evap HC% \* IWF \* RF +
- CO% \* IWF \* RF +
- Permeation% \* IWF \* RF

## ☞ Evap HC - Hot Soak, Diurnal, Resting Loss, and Running Loss

**2010 Statewide, Ozone Forming Potential  
Tech 1-5 Vehicles (GVW < 5750 lbs.)**

Pollutant	Emission (tpd)	MIR	OFP	
			(tpd)	(%)
Exh TOG	249	3.35**	833	42
Evap TOG				
DI/RT	118	2.18**	258	13
HS	64	2.88**	184	9
RL	170	2.01**	342	17
Perm	23	3.47	80	4
CO	4378	0.07**	306	15

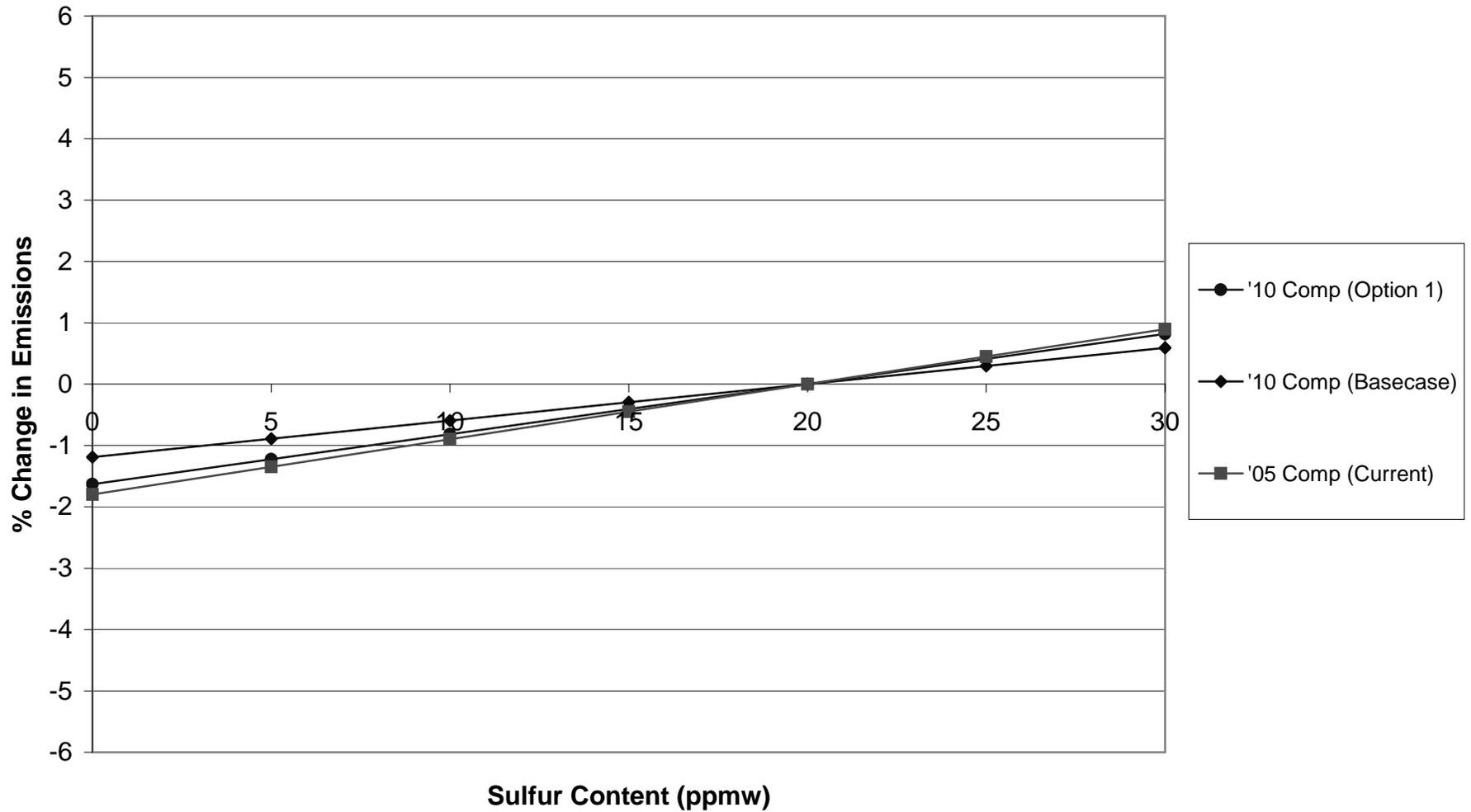
\* EMFAC2007 Working Draft, CA 8-Hr O3 Temp. Profile and Relative Humidity

\*\* Reactivities from 1999 CaRFG3 Predictive Model

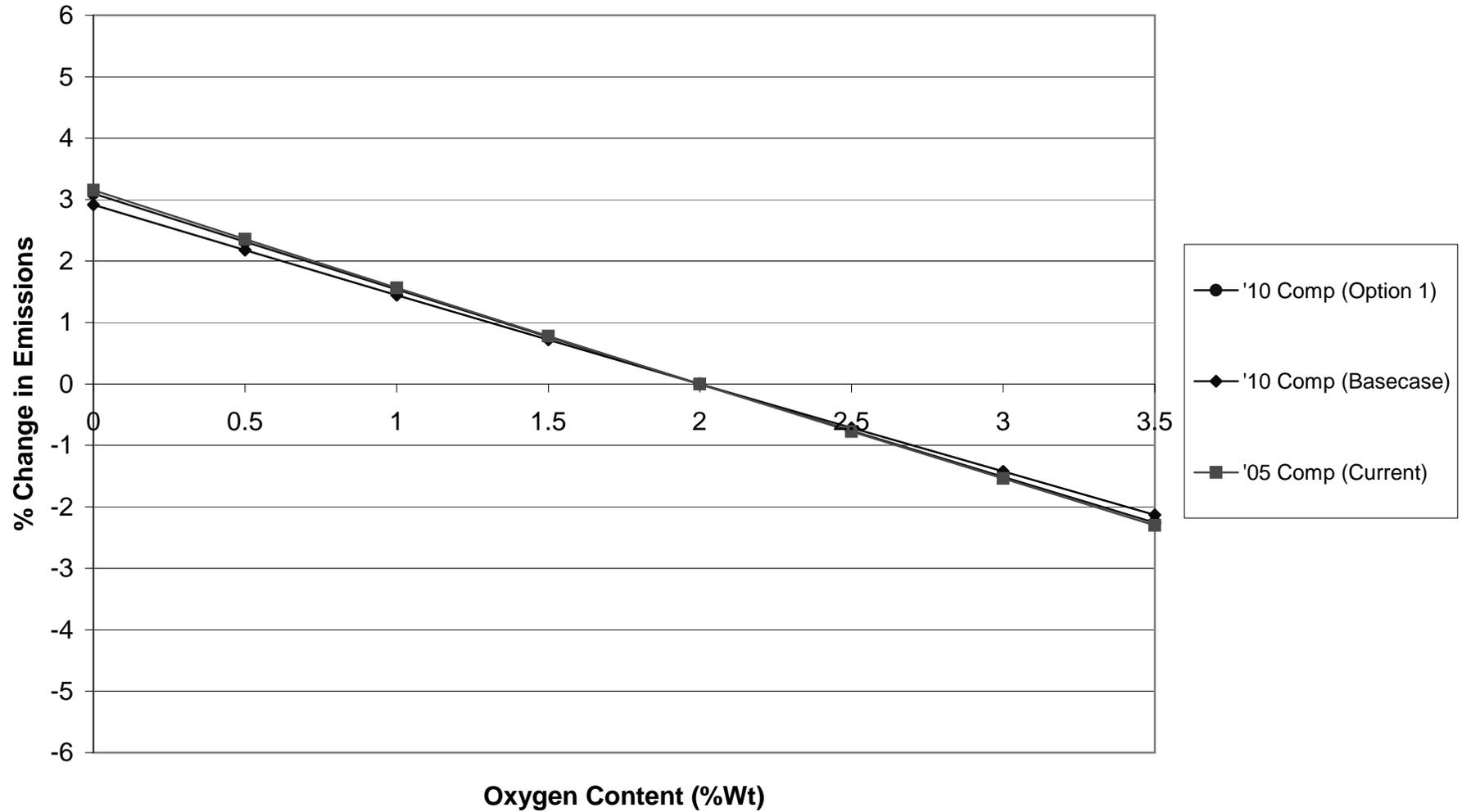
# THC

## Response to Fuel Property Changes

### THC Response to Sulfur (All Other Fuel Properties @ Flat Limits)



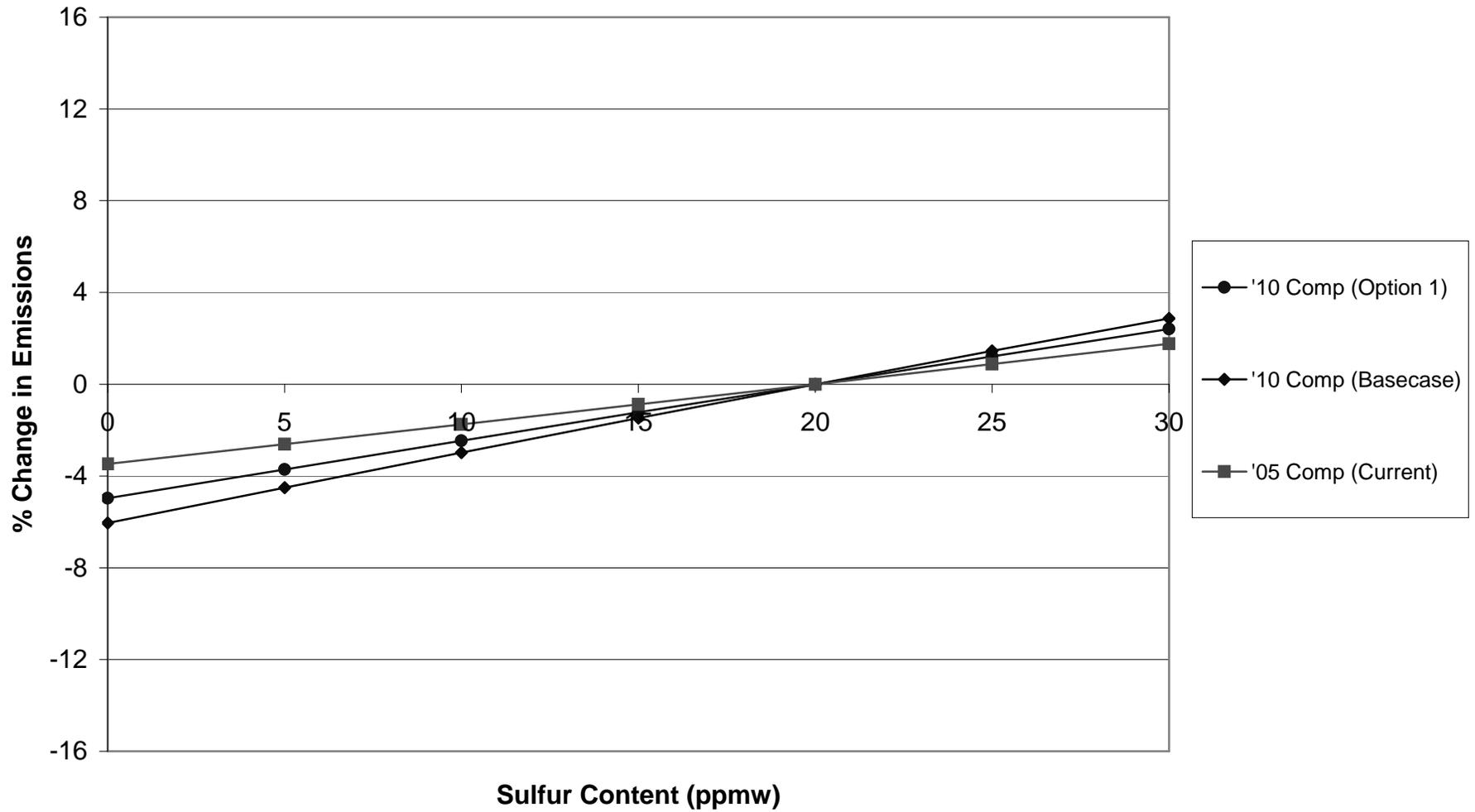
### THC Response to Oxygen (All Other Fuel Properties @ Flat Limits)



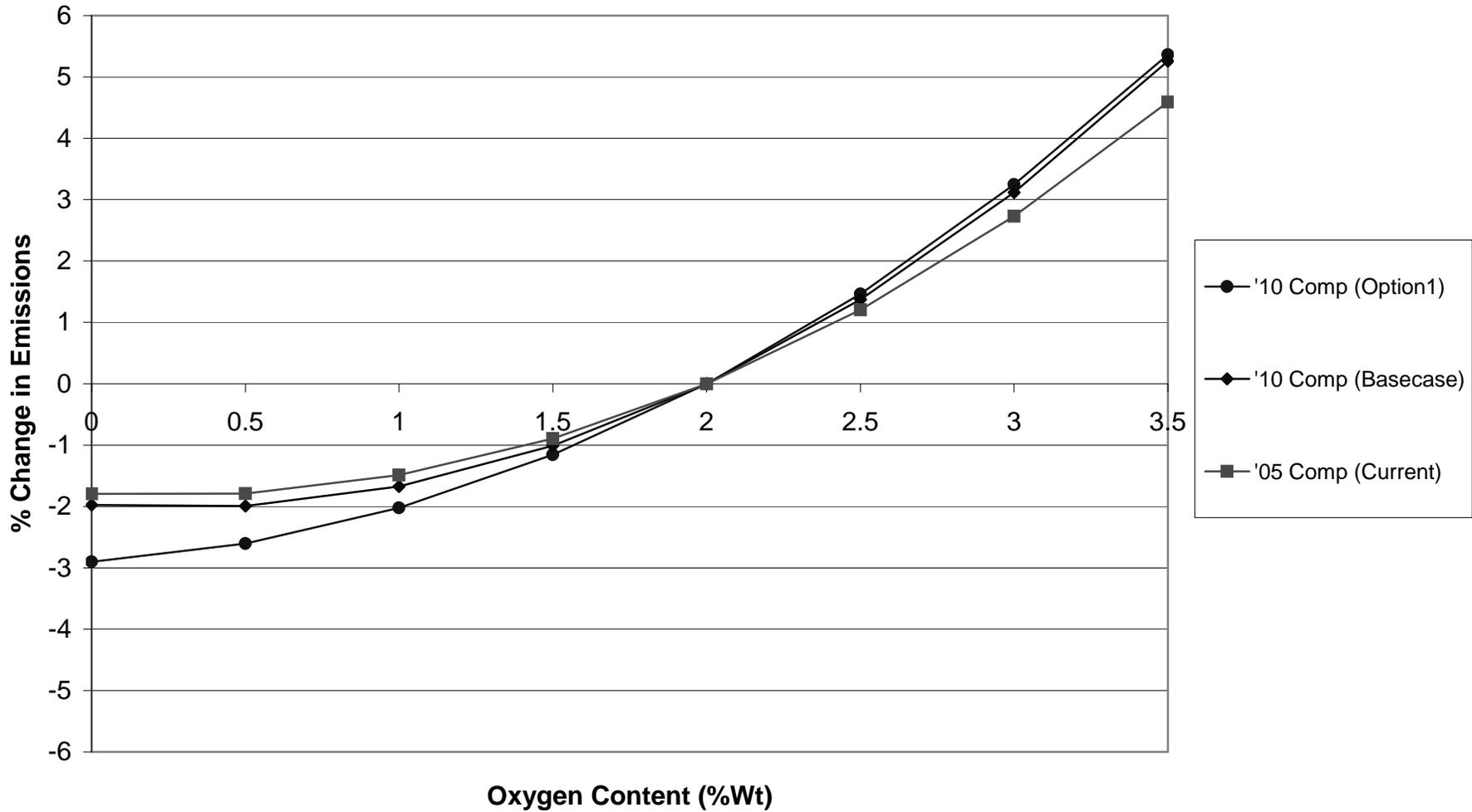
# **NO<sub>x</sub>**

## **Response to Fuel Property Changes**

### NOx Response to Sulfur (All Other Fuel Properties @ Flat Limits)



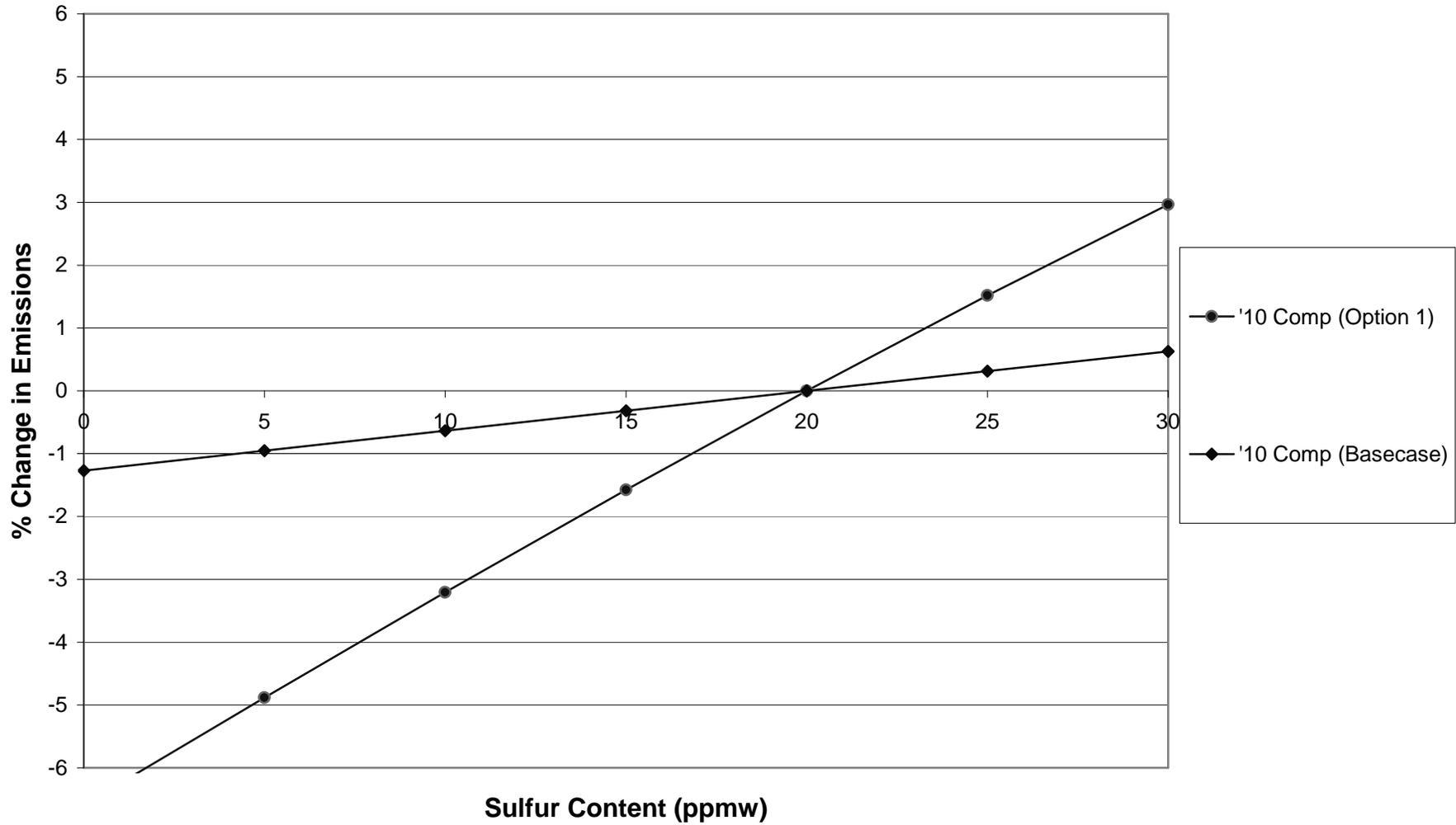
### NOx Response to Oxygen (All Other Fuel Properties @ Flat Limits)



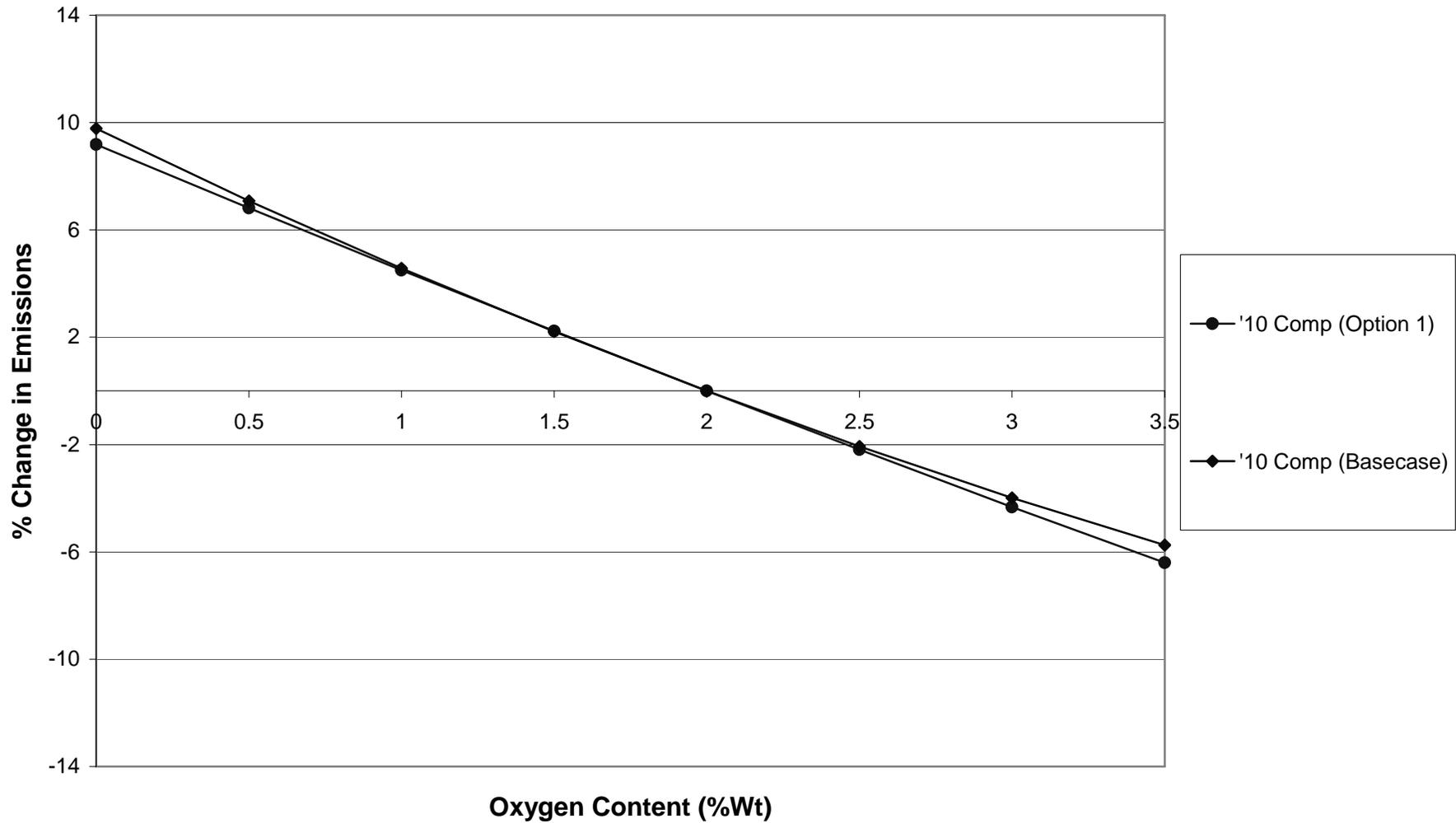
# CO

## Response to Fuel Property Changes

### CO Response to Sulfur (All Other Fuel Properties @ Flat Limits)



### CO Response to Oxygen (All Other Fuel Properties @ Flat Limits)



# Predictive Model Emissions Inventory

# Emissions Inventory

- One mobile source model pre-release workshop tentatively set for September 11 in Sacramento
- post-release workshop are being considered for mid-November in possibly three locations (Sacramento, Fresno, and LA).
- The September workshop would be webcast and teleconferenced.

# New Working SubGroups

## ☞ Inventory SubGroup

- Ben Handcock
- Tom Darlington
- James Uihlein
- Gary Herwick
- Steve Brisby
- Paul Wuebben

# Emissions Inventory Update

- Documentation will be made available through Reformulated Gasoline Predictive Model webpage at:  
[www.arb.ca.gov/fuels/gasoline/premodel/pmdevelop.htm](http://www.arb.ca.gov/fuels/gasoline/premodel/pmdevelop.htm)
- Temperature profile document is posted
- On-road and off-road permeation documentation is posted

# **Presentations by Others**

# Open Discussions

# Closing Remarks