

A 2nd Opinion on CaRFG3 T50 & Supply

Presented To:

Air Resource Board

**Meeting to Discuss Issues Relating
to the California Phase 3 RFG
Regulations**

August 18, 2000

By:

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A 2nd Opinion, Inc.

Agenda

What Has Changed

- C7 alkylate
cost & supply
- C8 alkylate & isooctane
cost & supply
- Impact on emissions
- CaRFG3 T50 needs to
allow C8 isoparaffins

T50 & Supply are Important

- ARB *increased* T50 limits to maximize CaRFG3 blending flexibility.

That was a good move!

- ARB *traded* T50 for tighter sulfur and benzene standards.

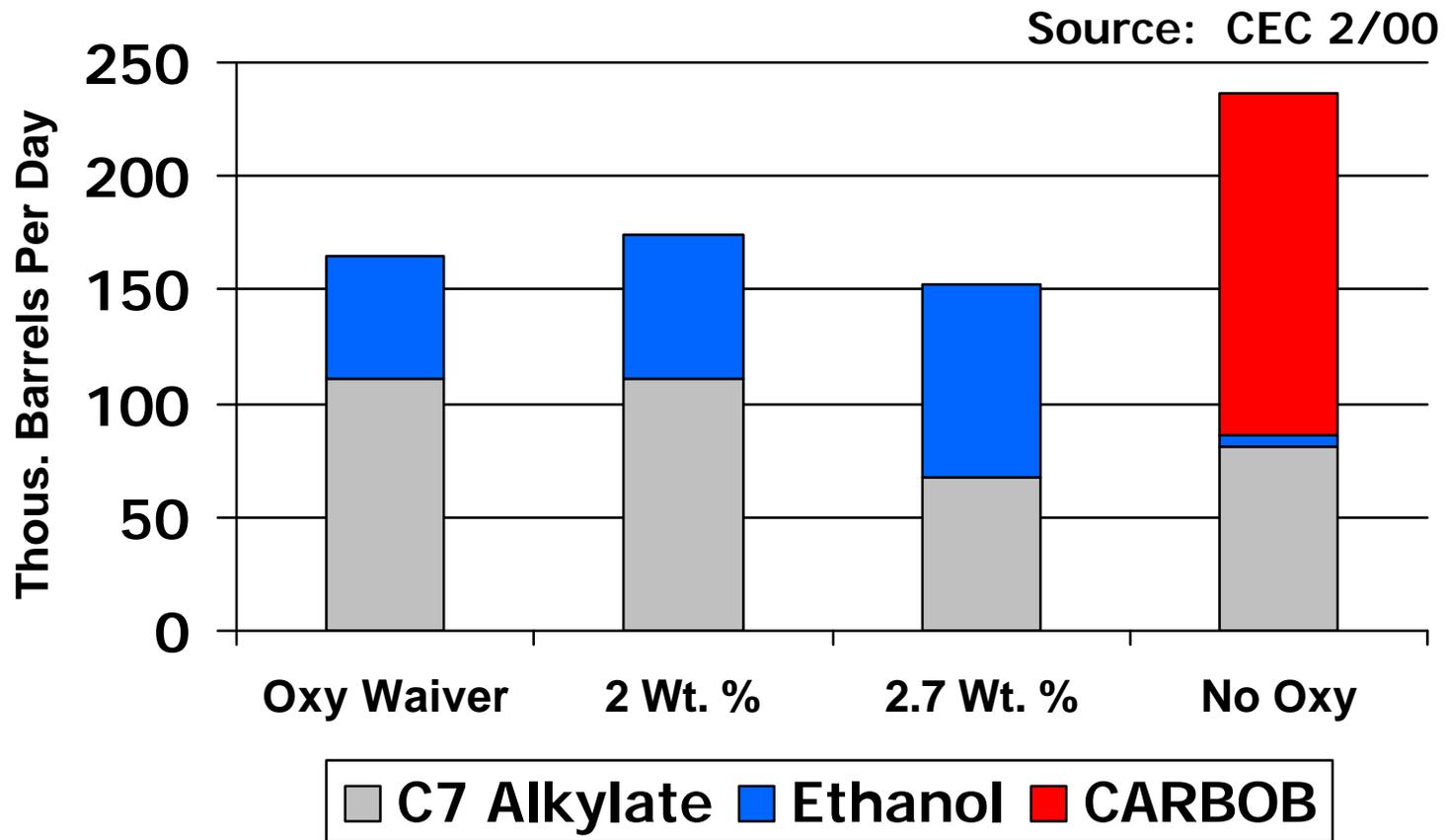
California became more self sufficient.
(2° reduced imports 10 to 15 kbd.)

But there is more data

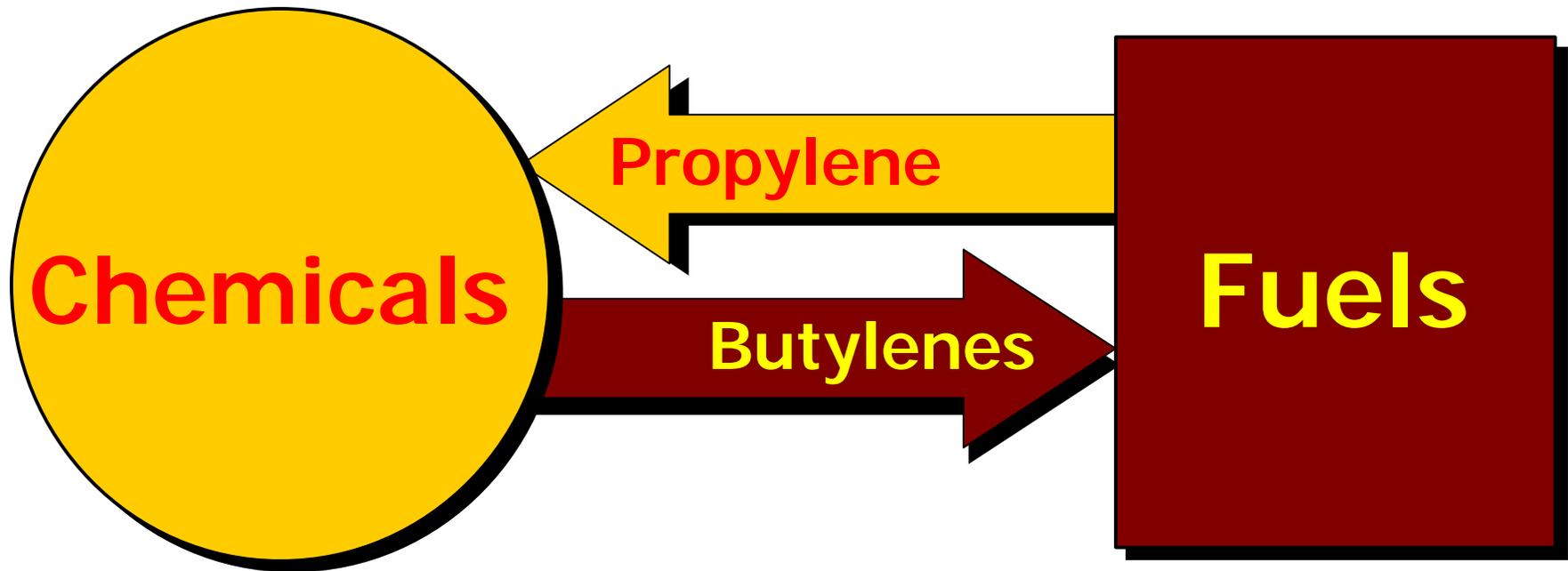
2000 is Different

- **Federal Phase 2 RFG has arrived.**
 - YTD price differential is 6 to 7 ¢/gal.
 - Summer differential is 9 to 11 ¢/gal.
 - Phase 1 differential was 1 to 2 ¢/gal.
- **Alkylate is worth more.**
 - 2000 quotes are typically 15 to 20 ¢/gal. over conventional regular.
 - CEC used 12¢ over in earlier work.
 - CEC's C7 alkylate is 19¢ over.

CEC Analyses Show California Needs C7 Alkylate & Ethanol

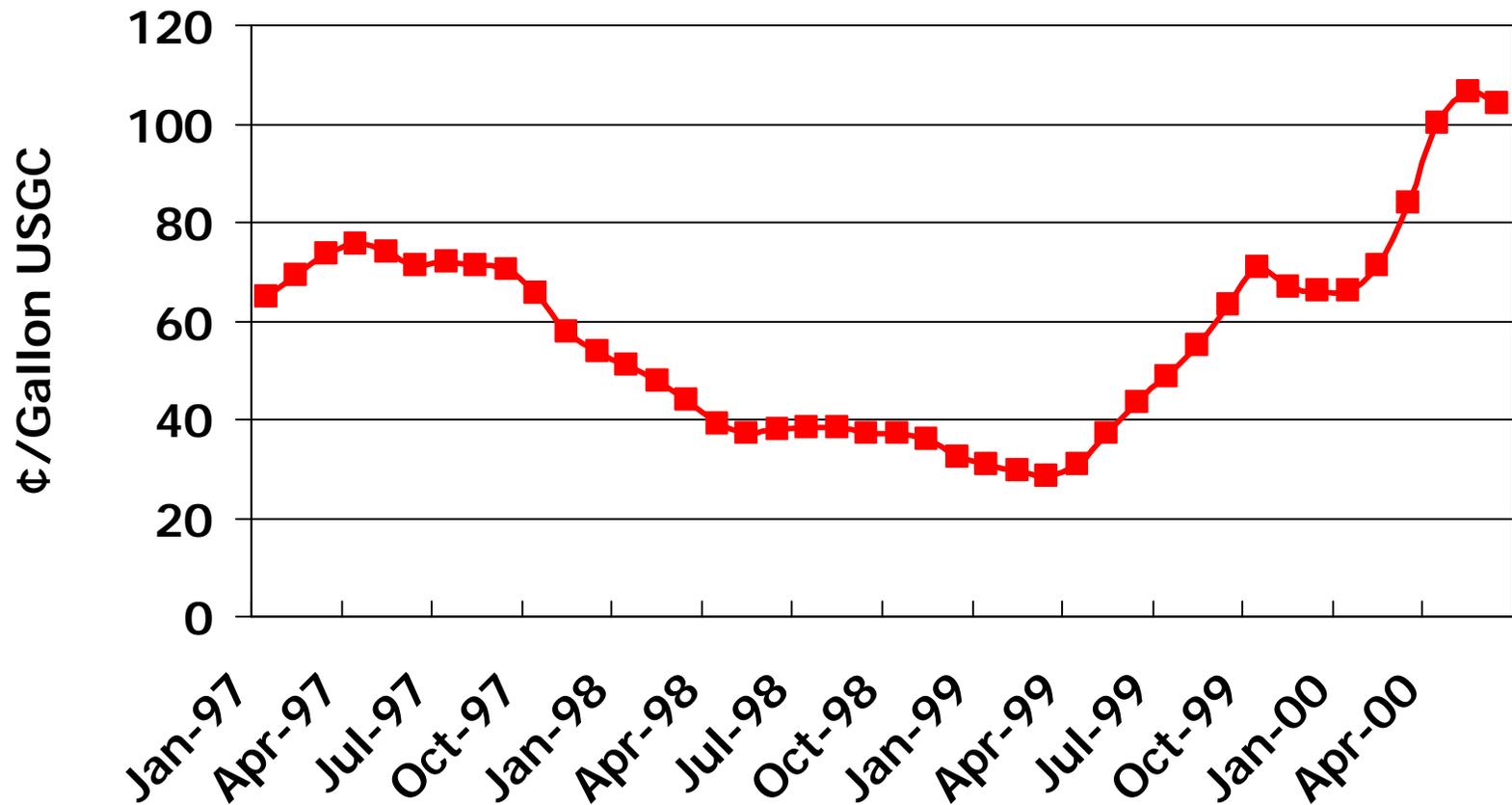


Propylene Used to Make C7 Alkylate is Now a Chemical

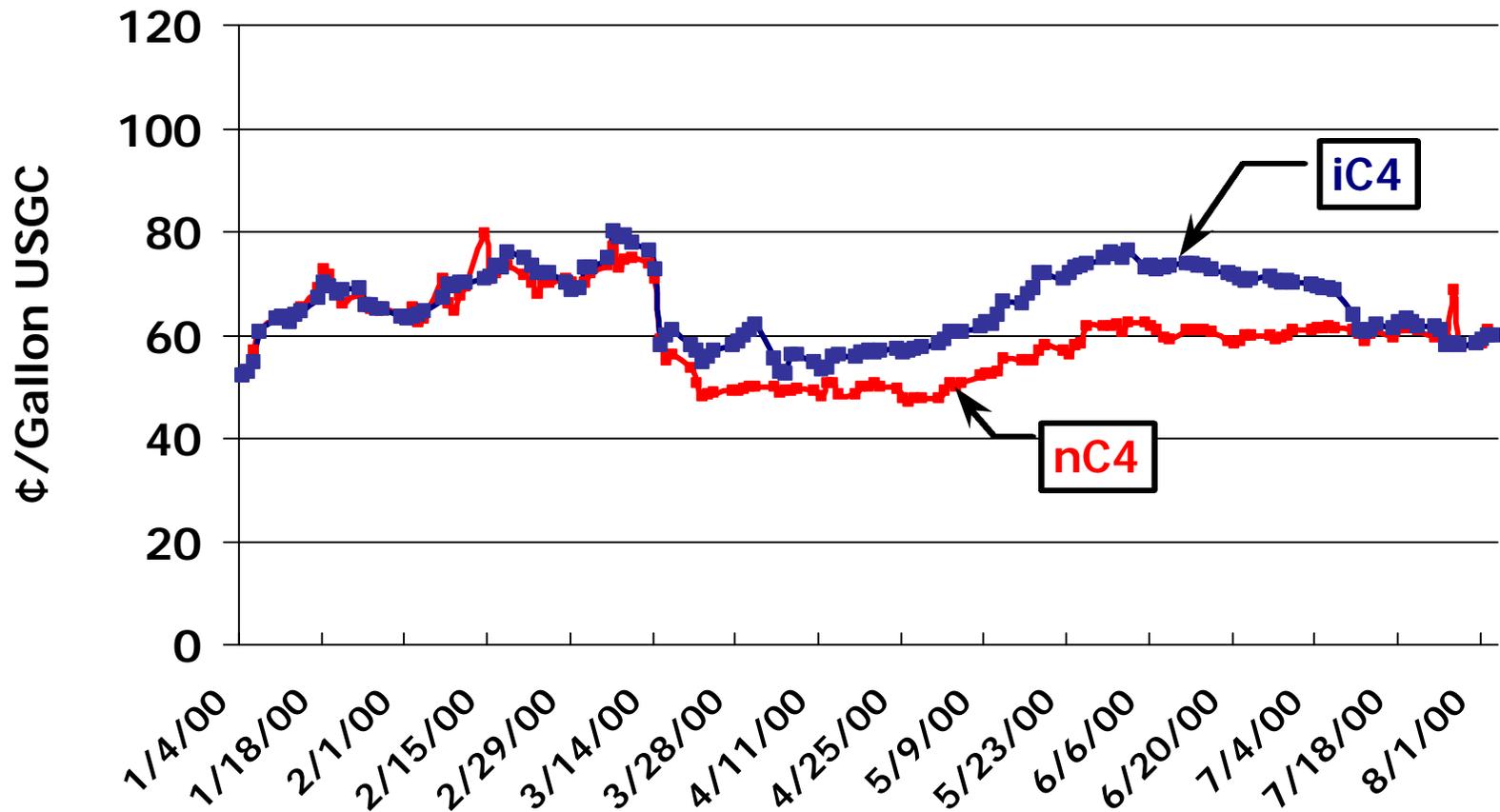


Since 1990 100,000 bpd of
propylene (175,000 bpd C7 alkylate)
has gone from Fuels to Chemicals

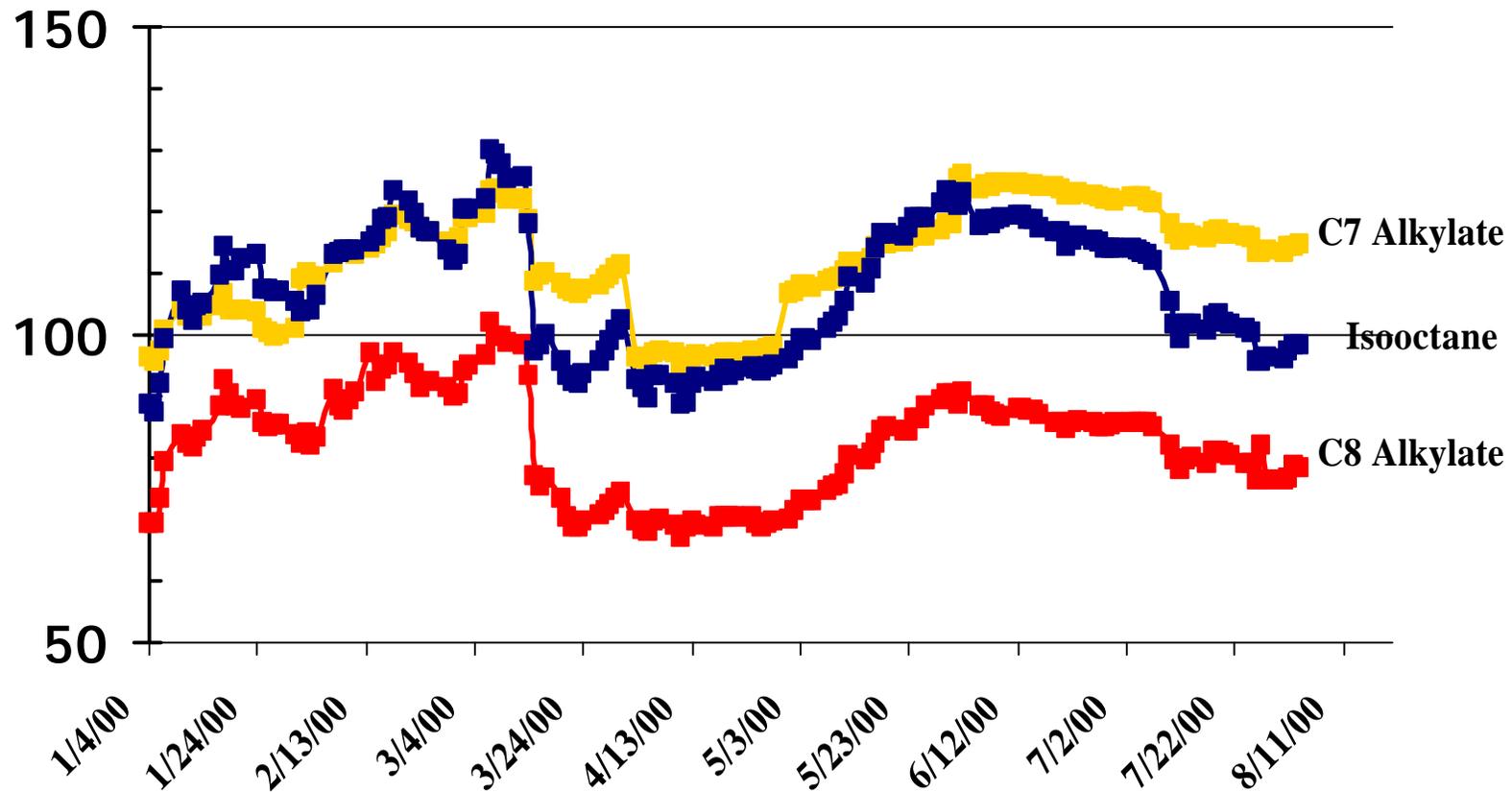
Propylene Now Sells for Over One Dollar per Gallon



Butylene is Worth Butane or about 60¢ per gallon



C7 Alkylate costs 30¢/gallon more than C8 Alkylate



Cost vs Blend Value (¢/gallon)

Variable	Cost	Blend Value	
	Gulf Coast	Gulf Coast	West Coast
C7 Alkylate	112	93	105
C8 Alkylate	82	94	109
Isooctane	107	98	117

Cost vs Blend Value Over GC Conventional Regular

Variable	Cost	Blend Value	
	Gulf Coast	Gulf Coast	West Coast
C7 Alkylate	29	11	22
C8 Alkylate	0	12	26
Isooctane	25	15	34

Market Observations

- West Coast setting Gulf Coast C8 alkylate price.
- Variable cost isooctane from butane in converted Gulf Coast MTBE plants break even but no capital recovery.
- Buying propylene back from chemicals 17-18¢ out of market.

Implications

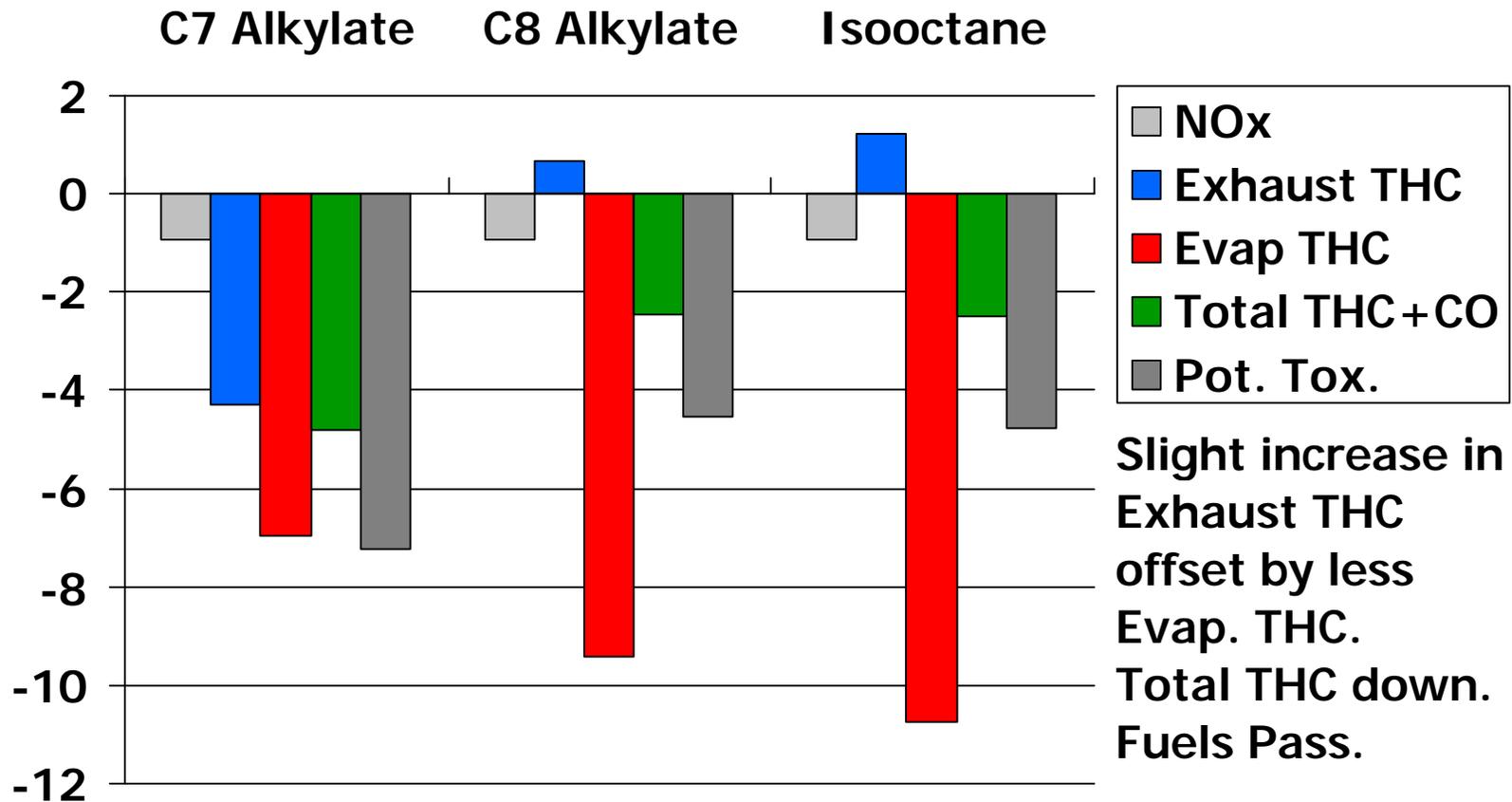
- West Coast can continue buying C8 alkylate away from Gulf Coast.
- ***If Feds ban MTBE*** a West Coast refiner could lock up a supply of isooctane by putting up the conversion capital to assure access if he can use it.
- The trend to chemicals and the economics make C7 alkylate availability doubtful.
- California needs to accommodate C8 alkylate and isooctane.

Replacing MTBE Hurts Midpoint

	Boiling Point	E200	E300
MTBE	131	100	100
Ethanol	173	100	100
C7 Alkylate	174-209*	76	98
C8 Alkylate	211-259*	10	94
Isooctane	211	5	92

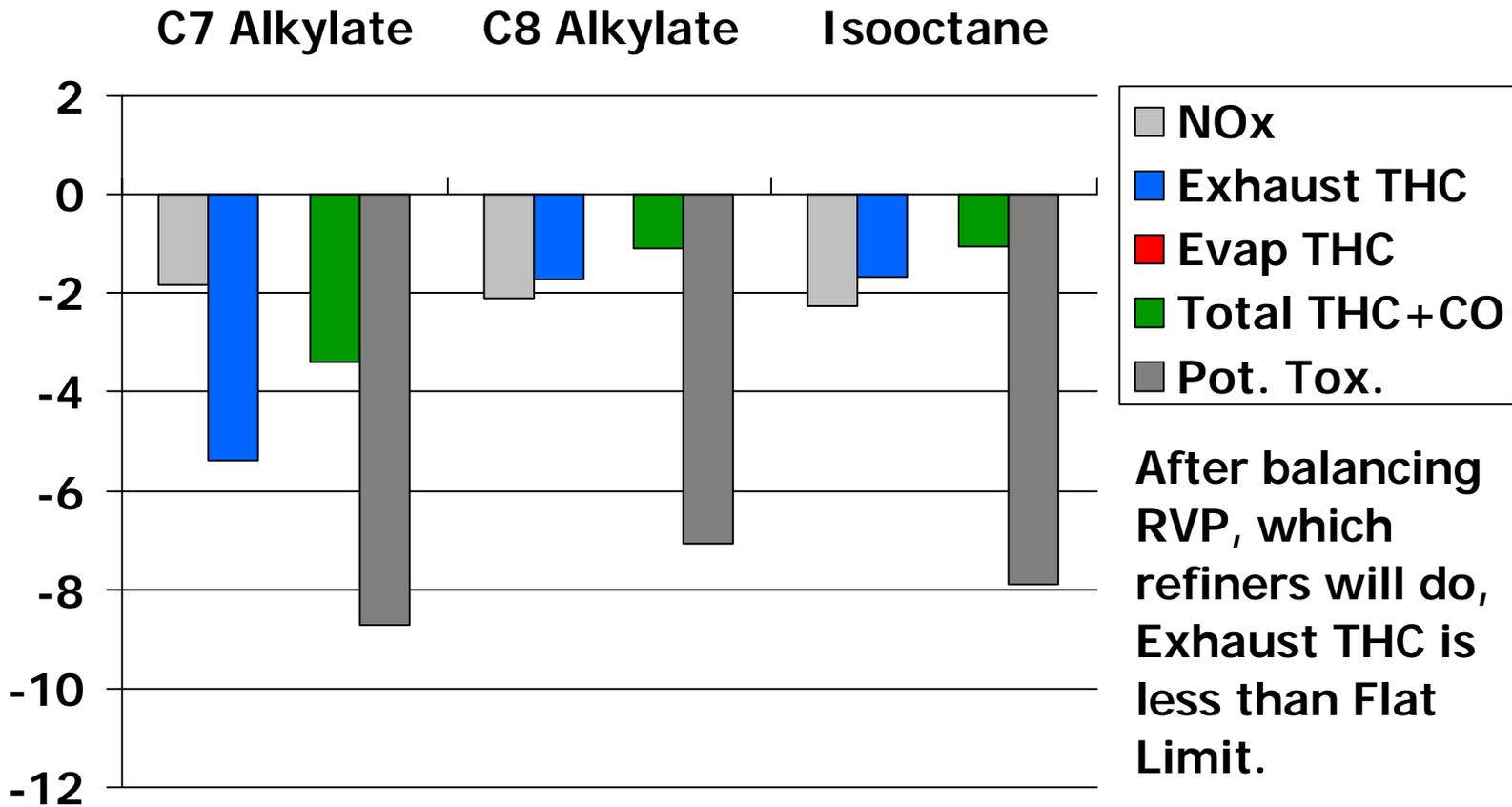
* Boiling Point range of isomers

Change in Emissions for Adding 10% of Component to Flat Limit



Change in Emissions

(Adding 10% Component to Flat Limit And Holding RVP at 6.9 by Adding Isomerate)



Conclusions

- C8 alkylate & isooctane help air quality.
- They cost less than C7 alkylate.
- They ease supply/cost crisis.
- California needs to find a way to allow more C8 isoparaffins into CaRFG3.

Recommendations

- Increase T50 Cap limit to 225.
- Increase T50 Flat limit to 215.
- Increase T50 Avg limit to 205.

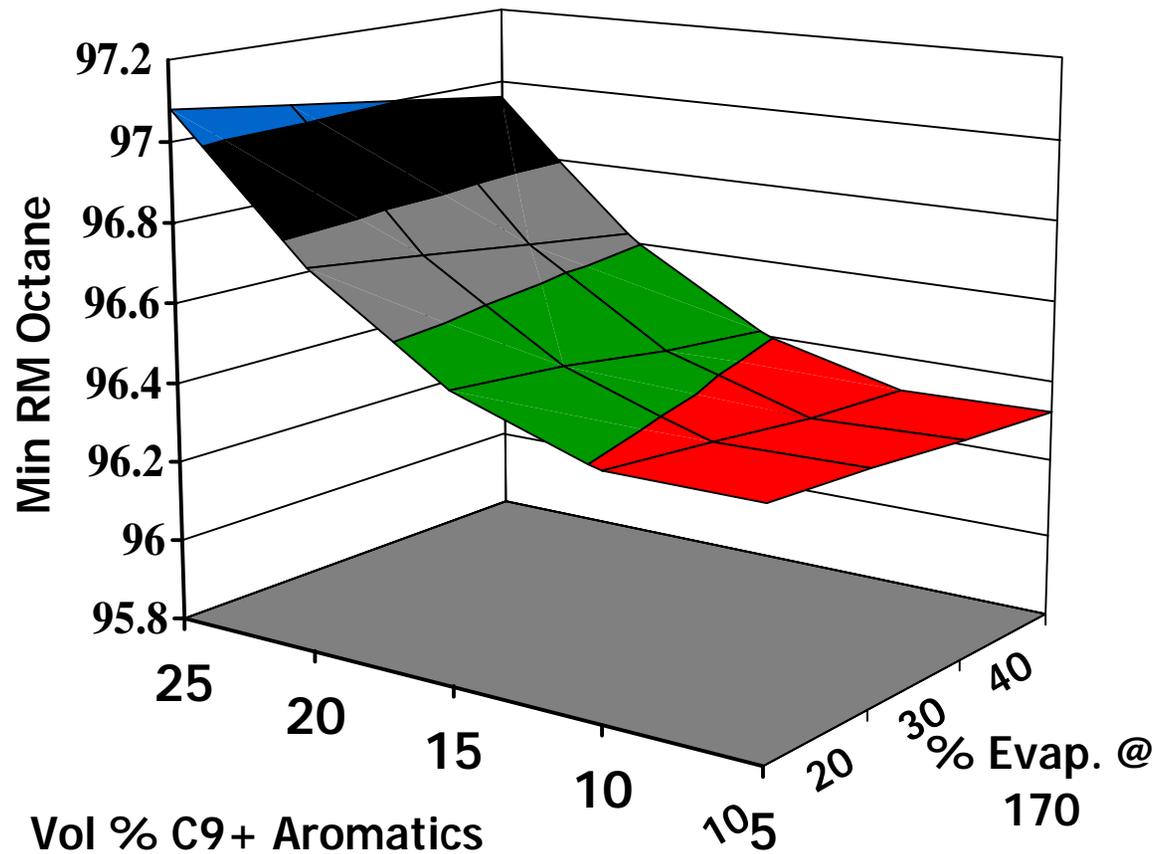
OR

- T50 Cap limit to 220 plus 1° for each Vol % isooctane.
- Set T50 Flat limit to 210 plus 1° for each Vol % isooctane.
- Set T50 Avg limit to 200 plus 1° for each Vol % isooctane.

Some DI Comments

- The auto industry is concerned this will hurt DI.
- Adding paraffins reduces olefin and aromatic contents and improves customer satisfaction.
- T10, T50 & T90 can easily be reflecting aromatic boiling points.
- Heavy aromatics and olefins impact on-road performance (octane needs) more than midpoint.

Heavy Aromatics Hurt On-Road Performance *more* than Midpoint



Olefins Hurt On-Road Performance *more* than Midpoint

