

**U.S. Refining Industry –  
Some Facts and Comments  
Regarding the “Golden Age”**

**Malcolm M. Turner, President  
Turner, Mason & Company**

**OPIS Supply  
2004**

# Bullish Quotes from Refining Industry Executives

- **Valero CEO Bill Greehey:** “Looking backward gives you the wrong answer.” “Record net income through 6/30/04 of \$881 million; expect record third and fourth quarter earnings.”
- **Premcor CEO Tom O’Malley:** “With the U.S. refining business now in a protracted ‘Golden Age’ of strong profit margins, Premcor has ambitious growth plans . . . Wall Street has it wrong when it comes to refining analyses. Analysts don’t realize the market has changed . . . It would be my view that refining as a worldwide activity is going to be a very good business.”

# **Bullish Quotes from Refining Industry Executives (cont.)**

- **Tesoro CEO Bruce Smith:** “The 1990s are the period of time where I think people tend to get stuck and think about the industry. Domestic and worldwide refining pictures are much different now.”
- **CITGO CEO Luis Marin:** “The tightly stretched U.S. refining capacity will keep product prices high for the foreseeable future. We’re going to see high prices at least for the next ten years.”
- **Sunoco CEO Jack Drosdick:** “Refiners are printing money.” Then he cautiously adds: “It worries me when you can’t find anybody who thinks that refining can’t be anything but great.”

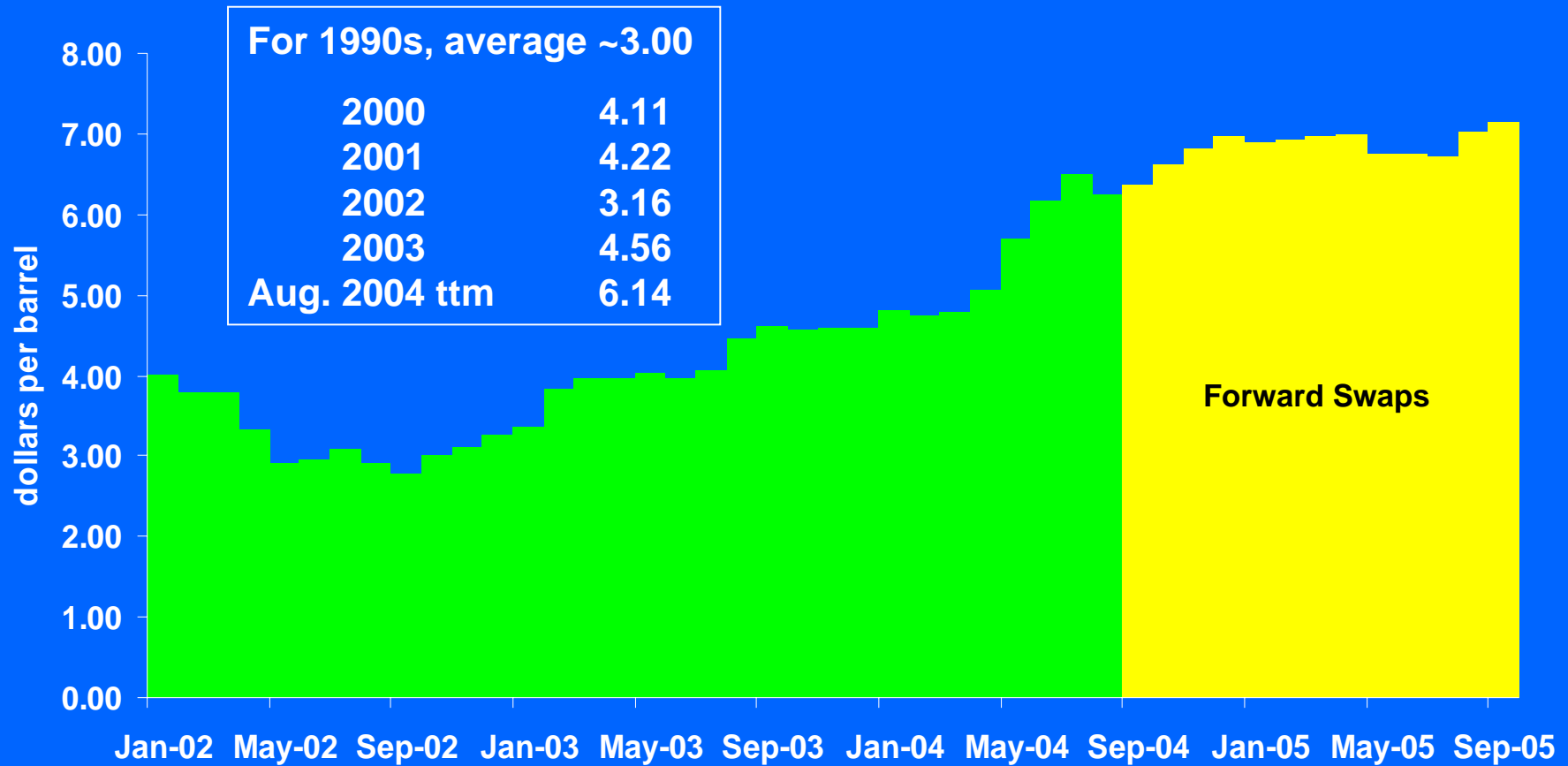
# Have the Fundamentals for U.S. Refiners Changed to Create a “Golden Age”?

- There are certainly more diverse viewpoints than ever before!
- Lack of surplus refining capacity has intensified public interest as “low hanging fruit” expansions have been harvested. Is this the root cause of “high gasoline prices”?
- Products imports to East Coast and West Coast markets have grown to levels that may cause them to be viewed as clearing prices. Will U.S. refiners be limited to “following”?
- Industry analysts have consistently proven themselves wrong in forecasting absolute prices! Is the current outlook shift toward “permanent high priced crude oil” realistic? How would such a scenario impact U.S. refiners?
- These and other matters are addressed in this presentation.

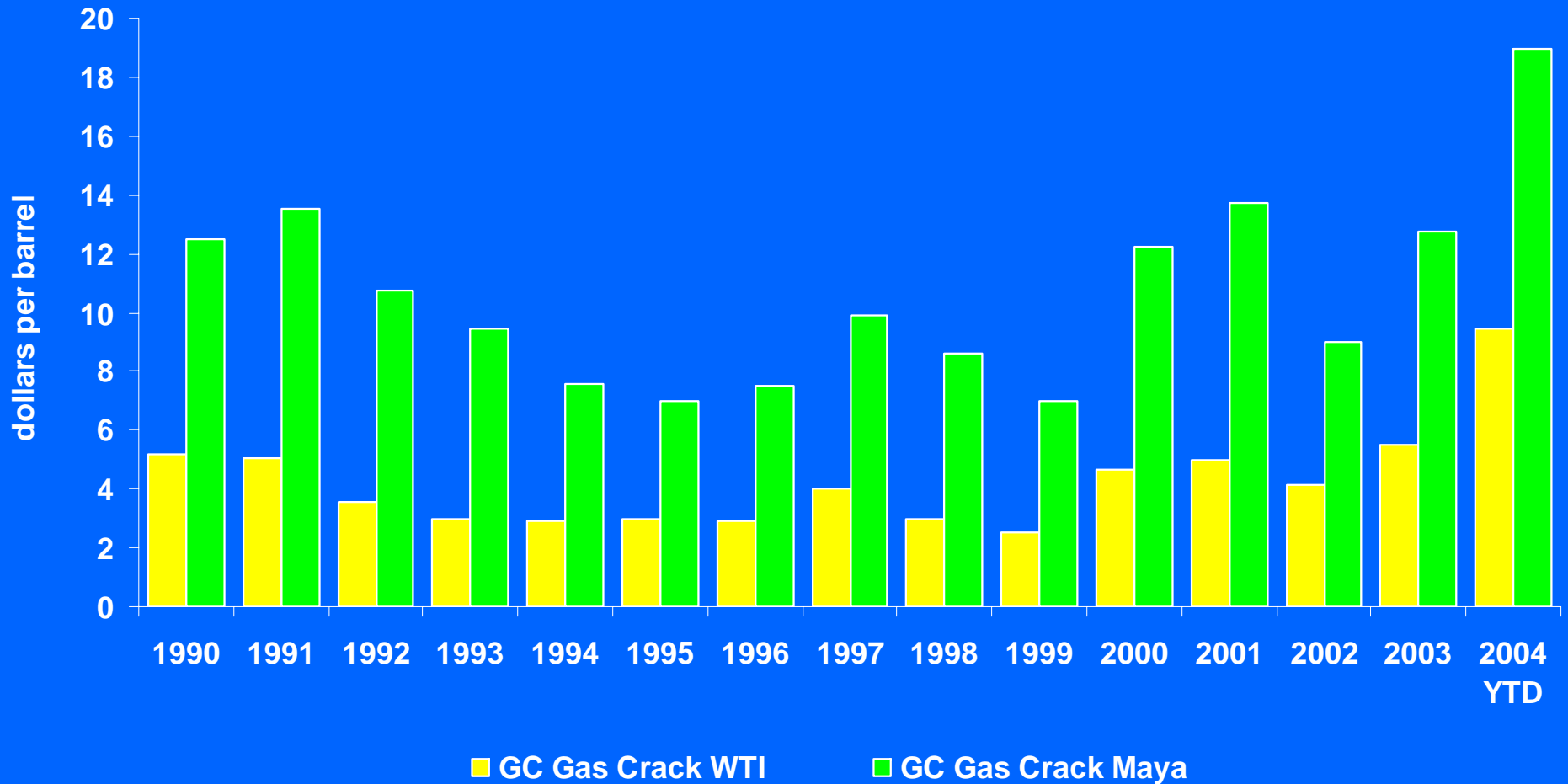
# Snapshot of U.S. Refining Industry

# Gulf Coast 3:2:1 Crack

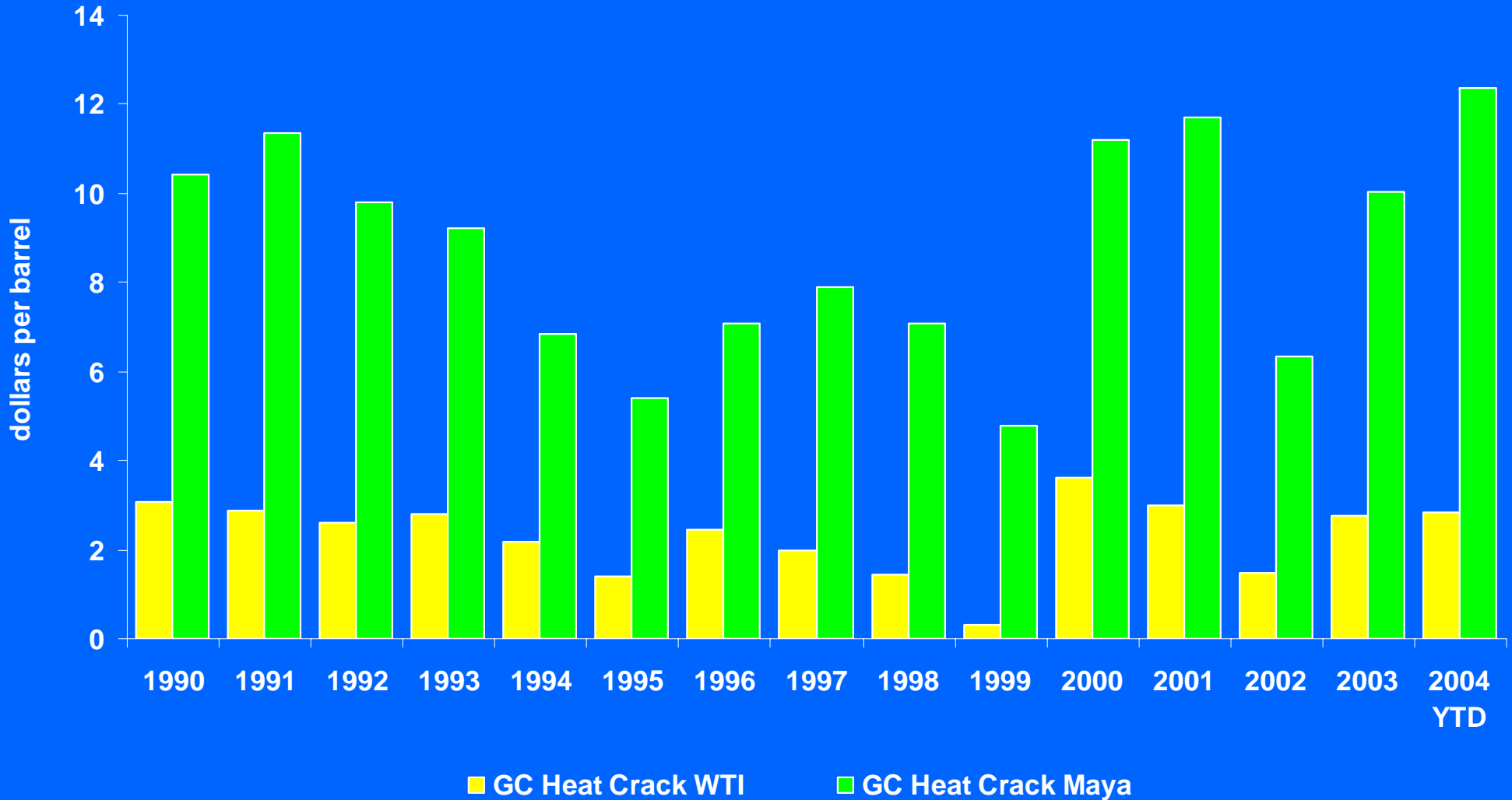
## 12-Month Rolling Average



# Gulf Coast Gasoline Crack

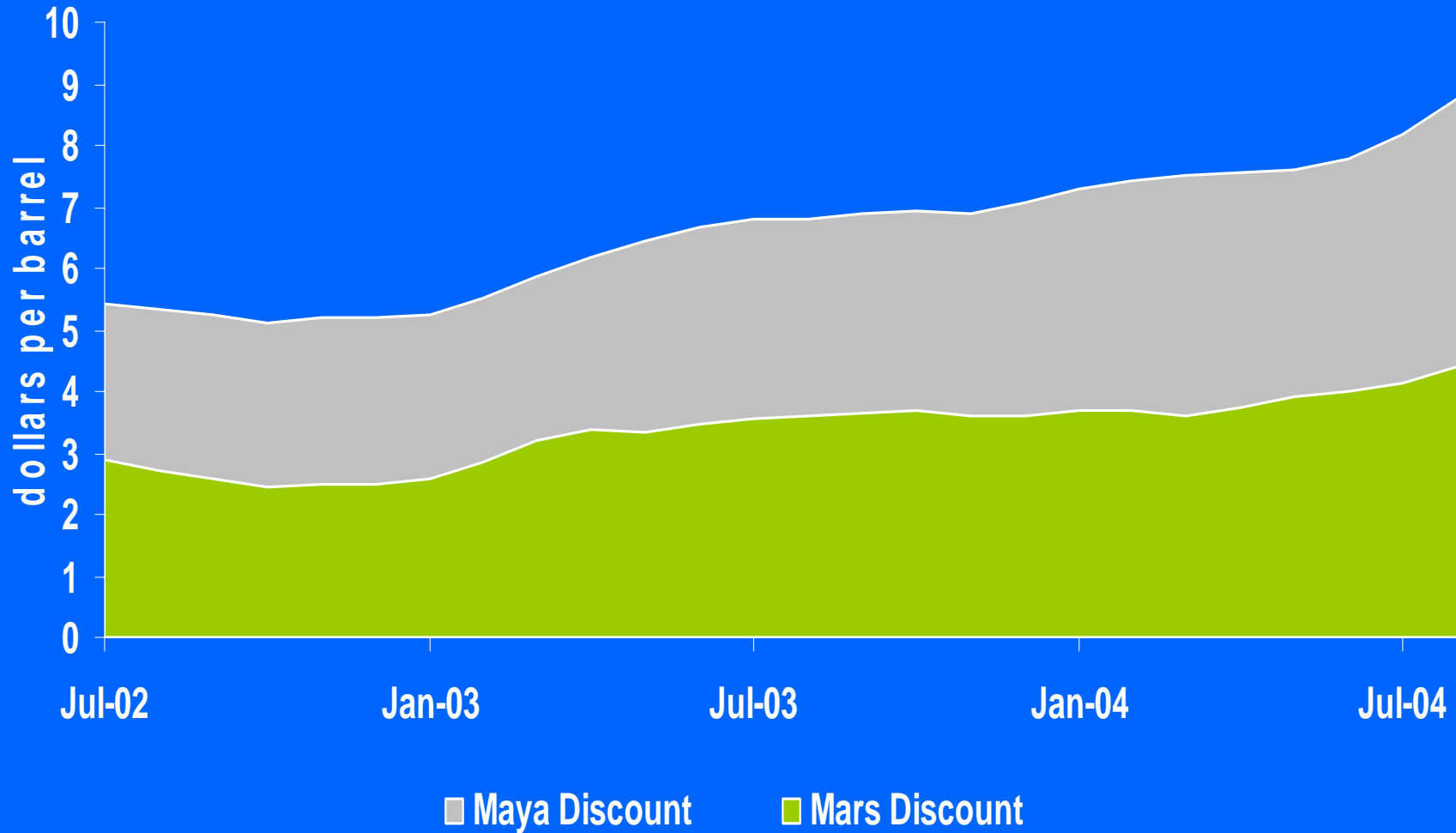


# Gulf Coast Heating Oil Crack

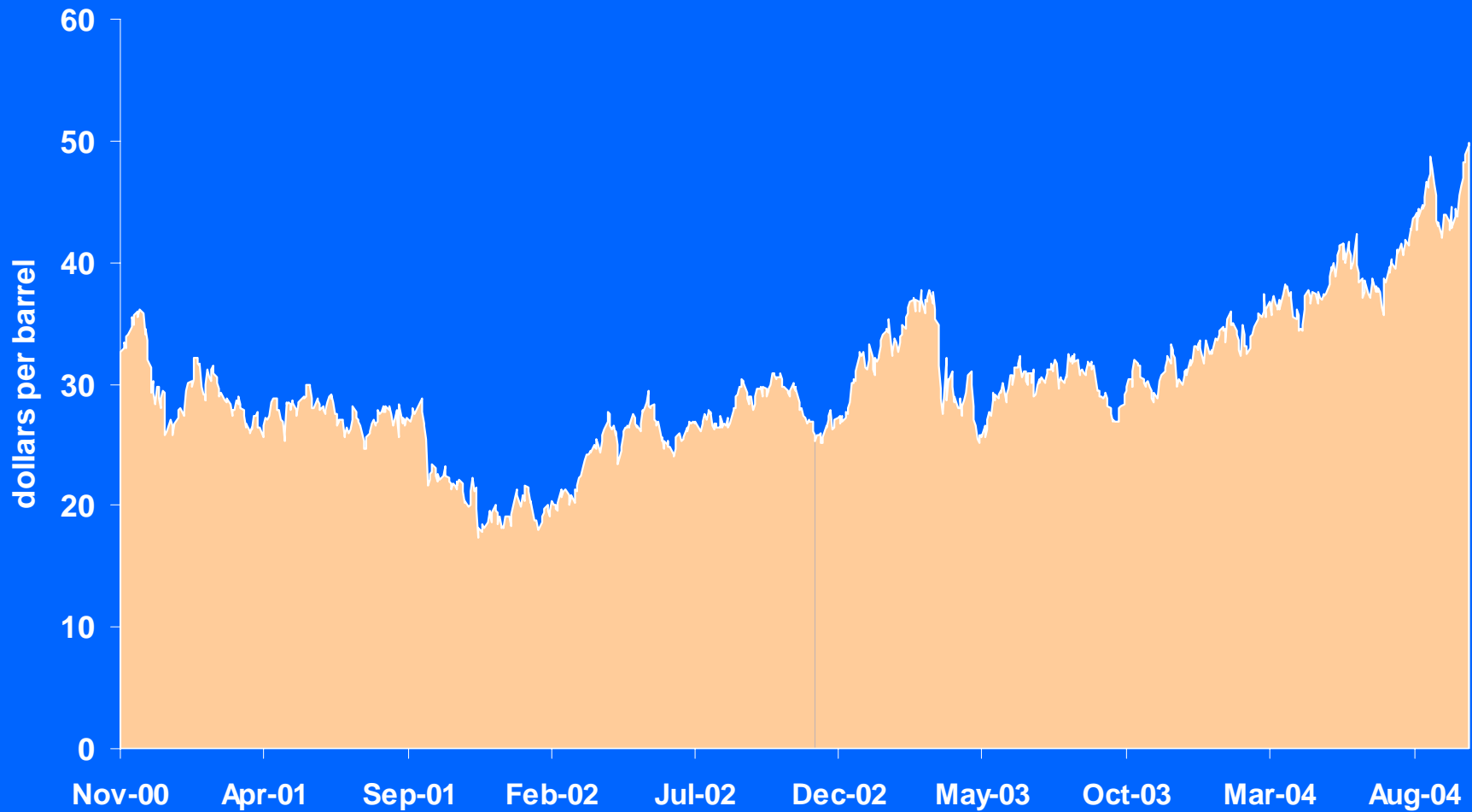


# Crude Oil Discount to WTI

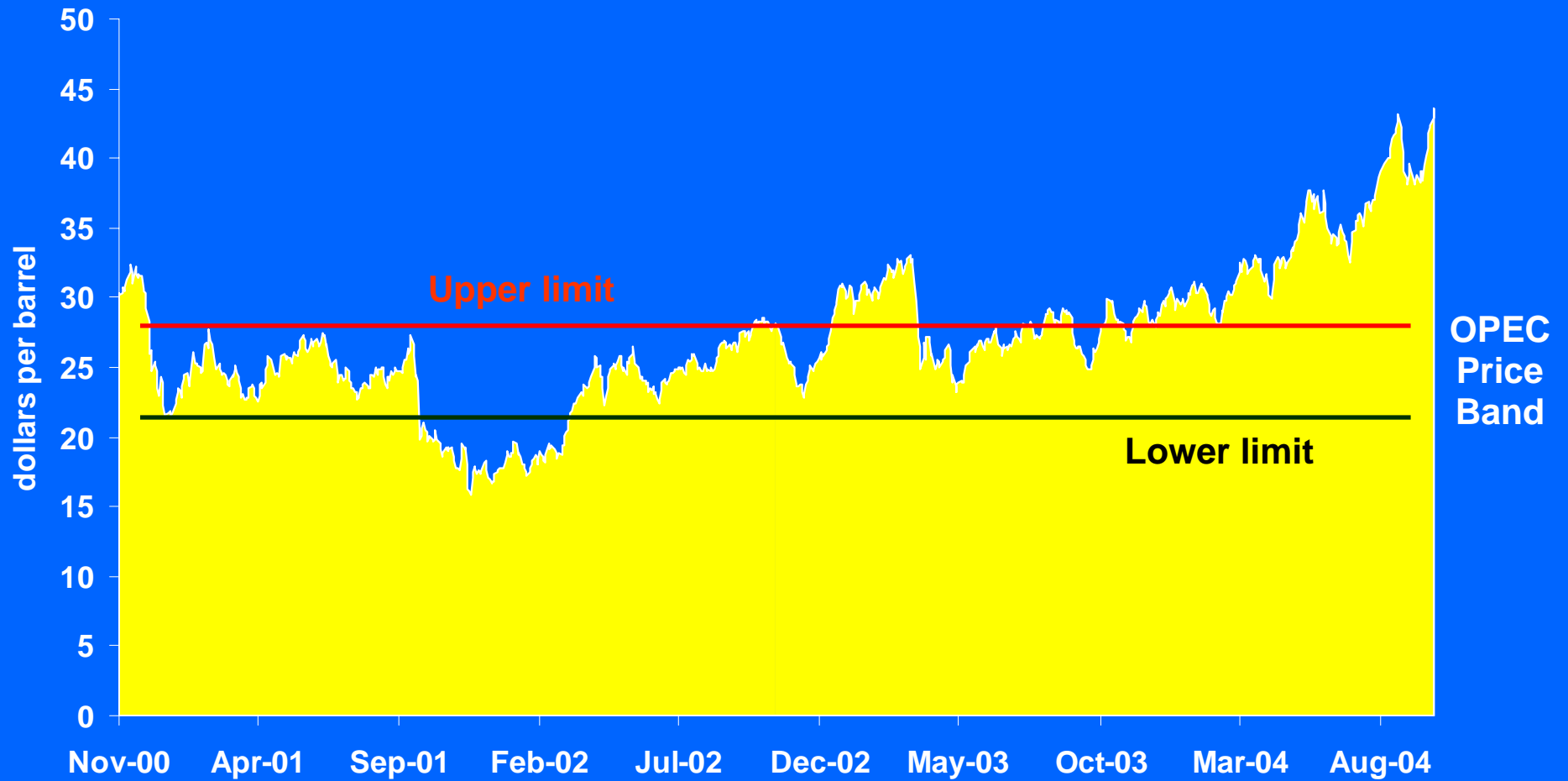
## 12-Month Rolling Average



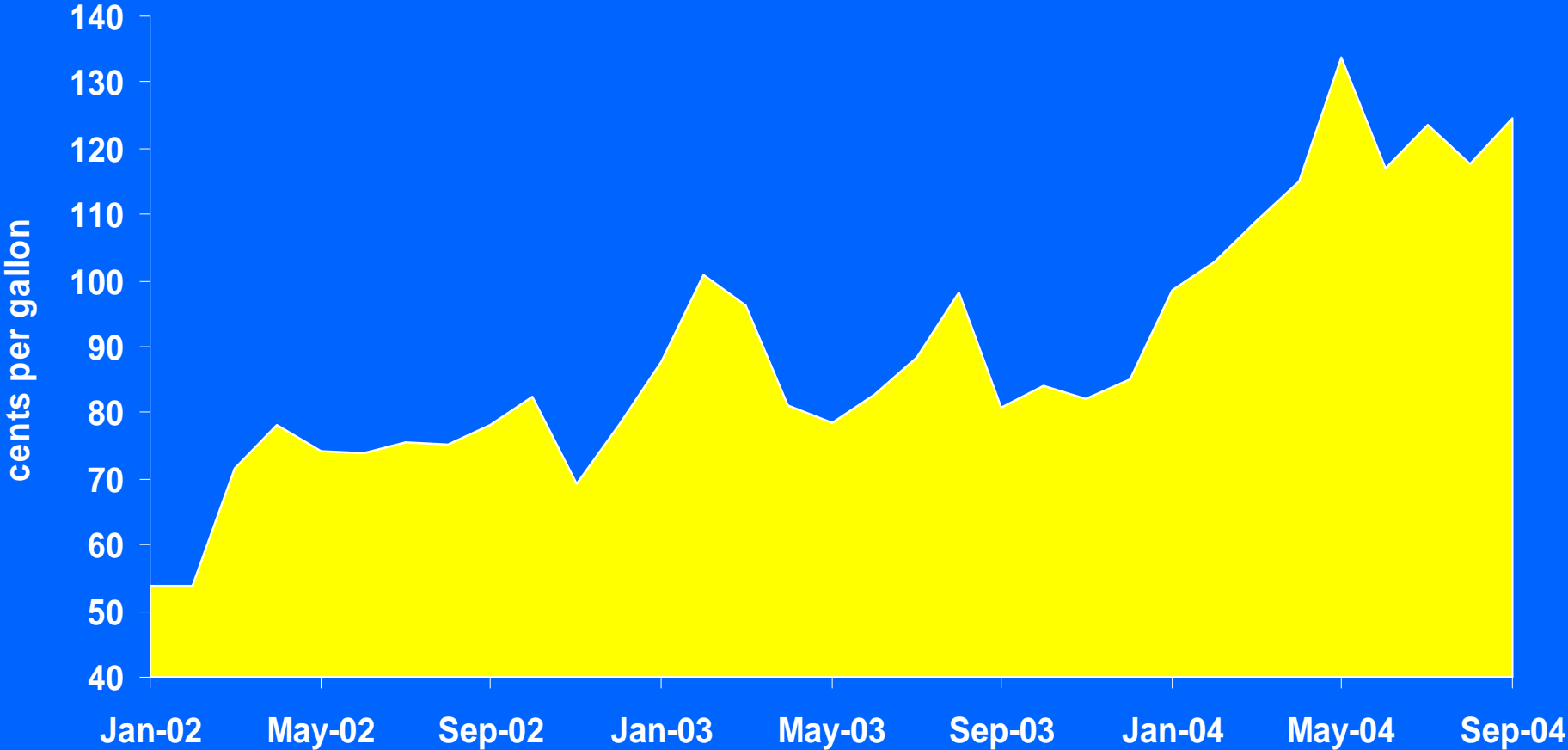
# NYMEX Light Sweet Crude Oil



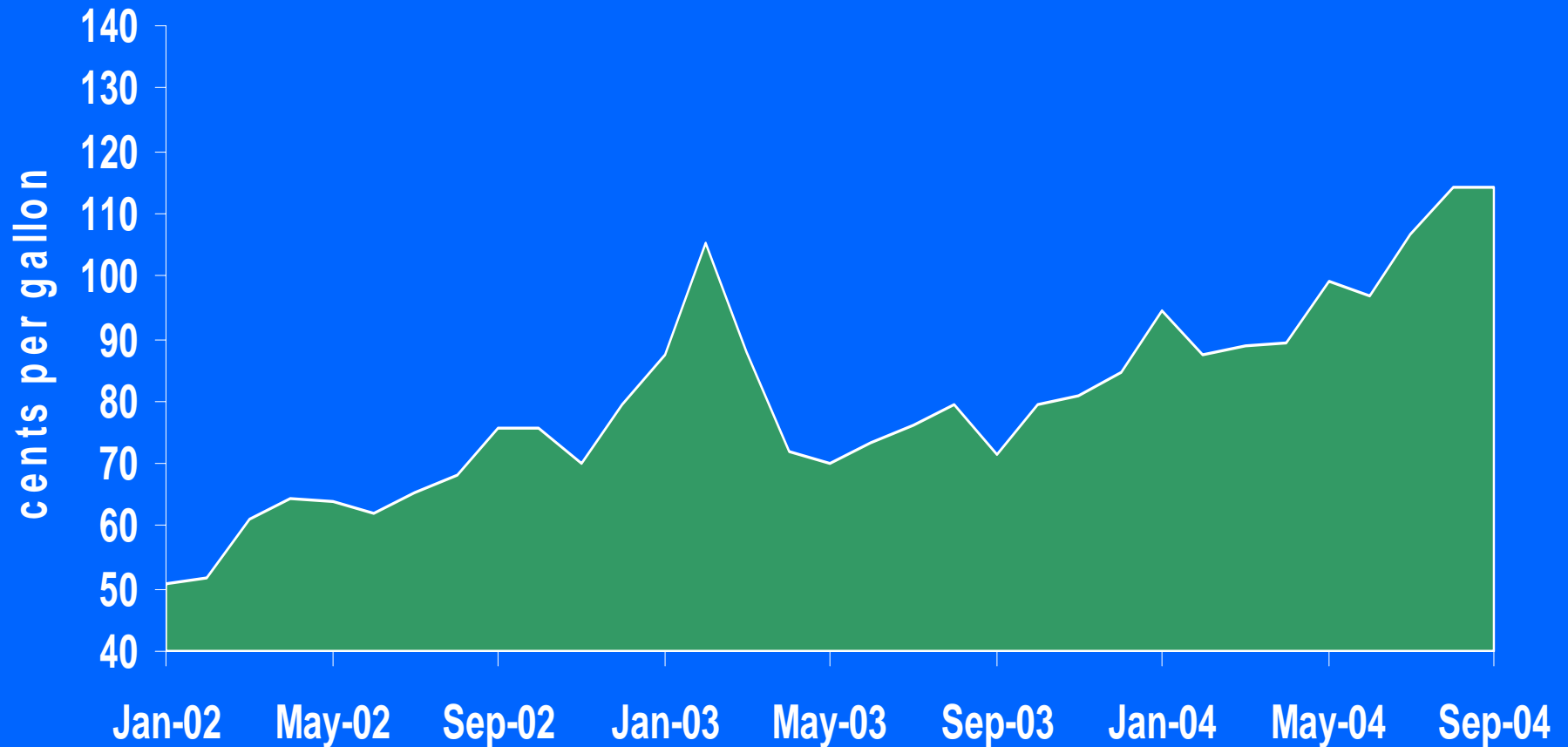
# OPEC Basket Crude Price



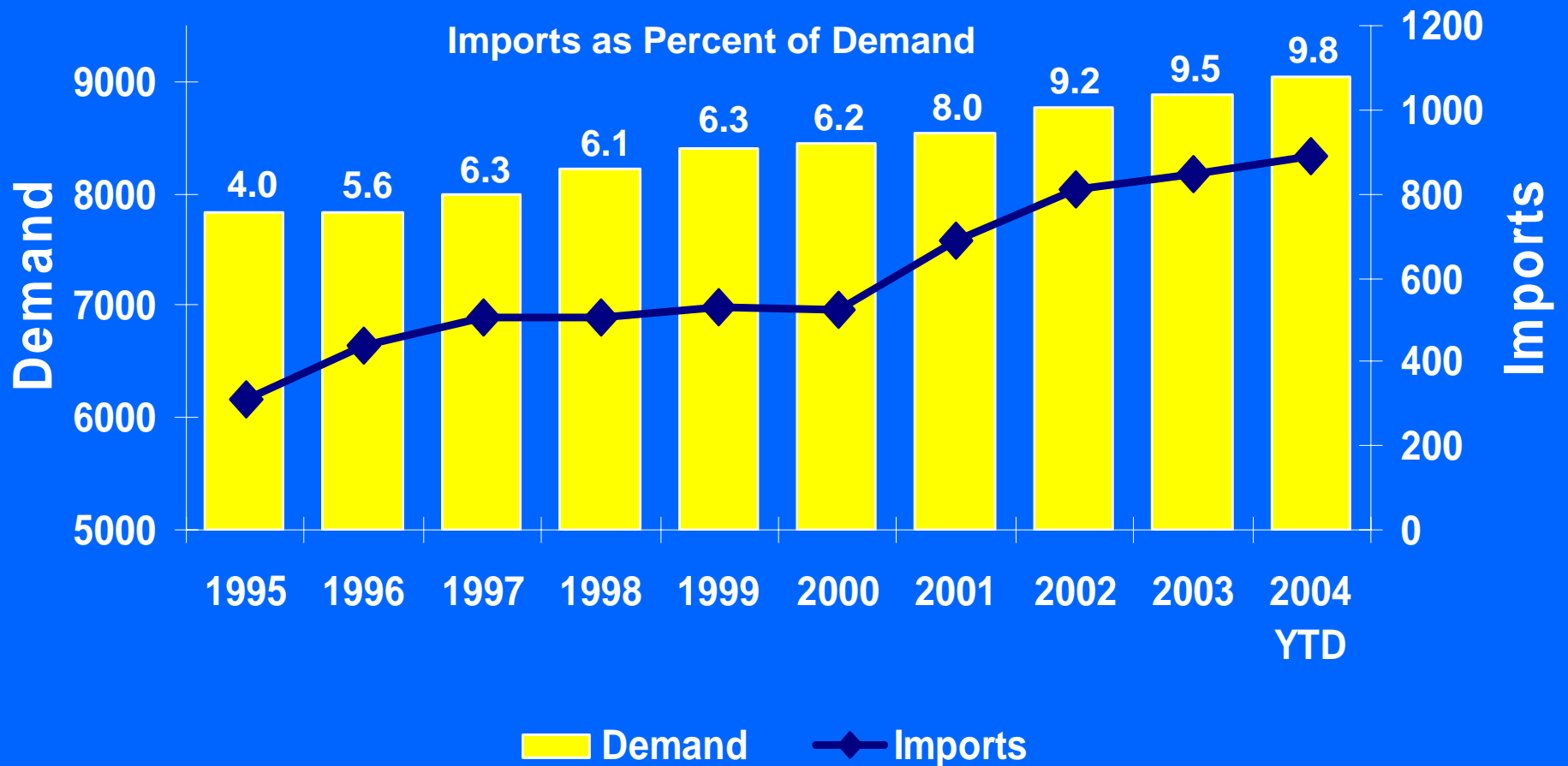
# Gulf Coast Spot Gasoline



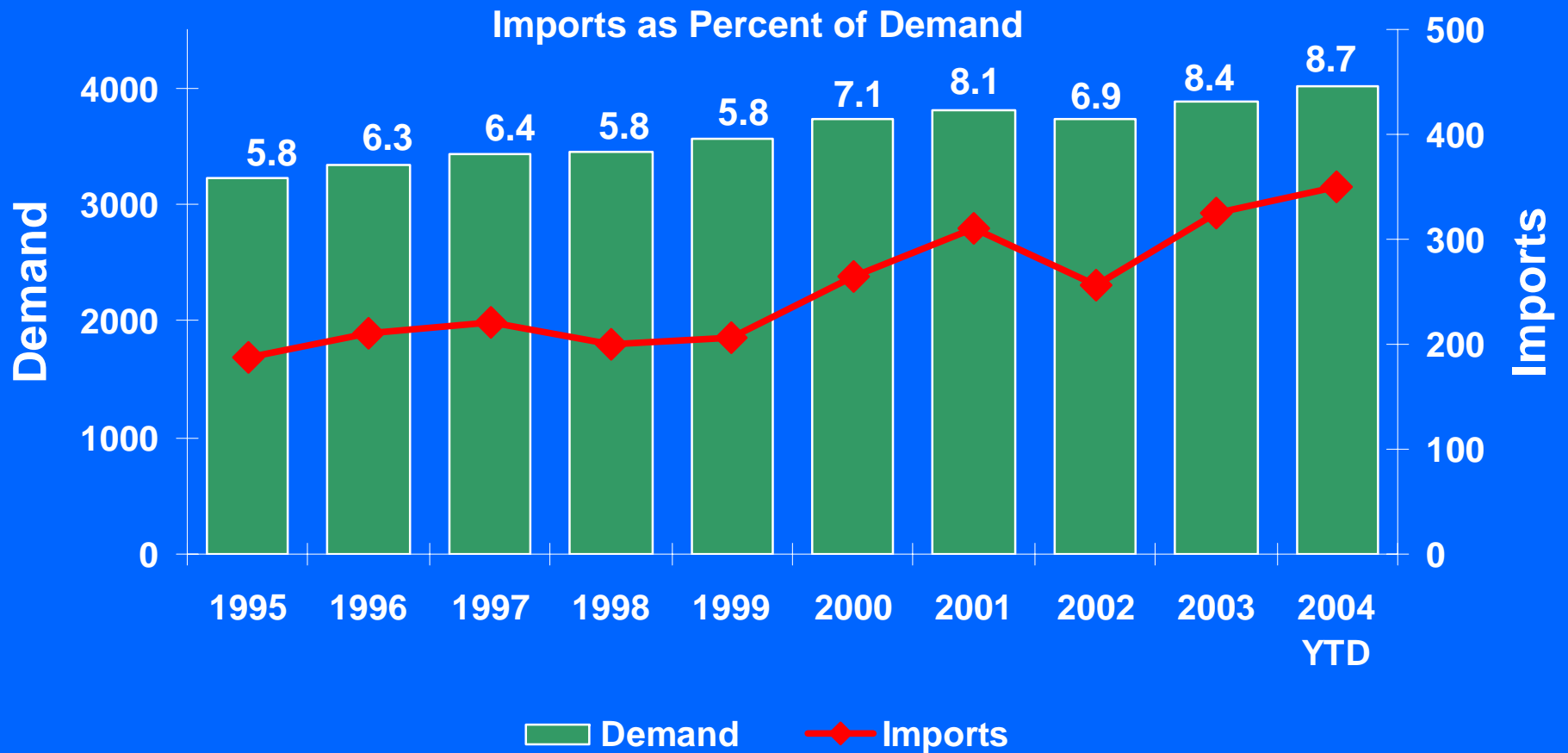
# Gulf Coast Spot Heating Oil



# U.S. Gasoline Demand and Imports (MBPD)

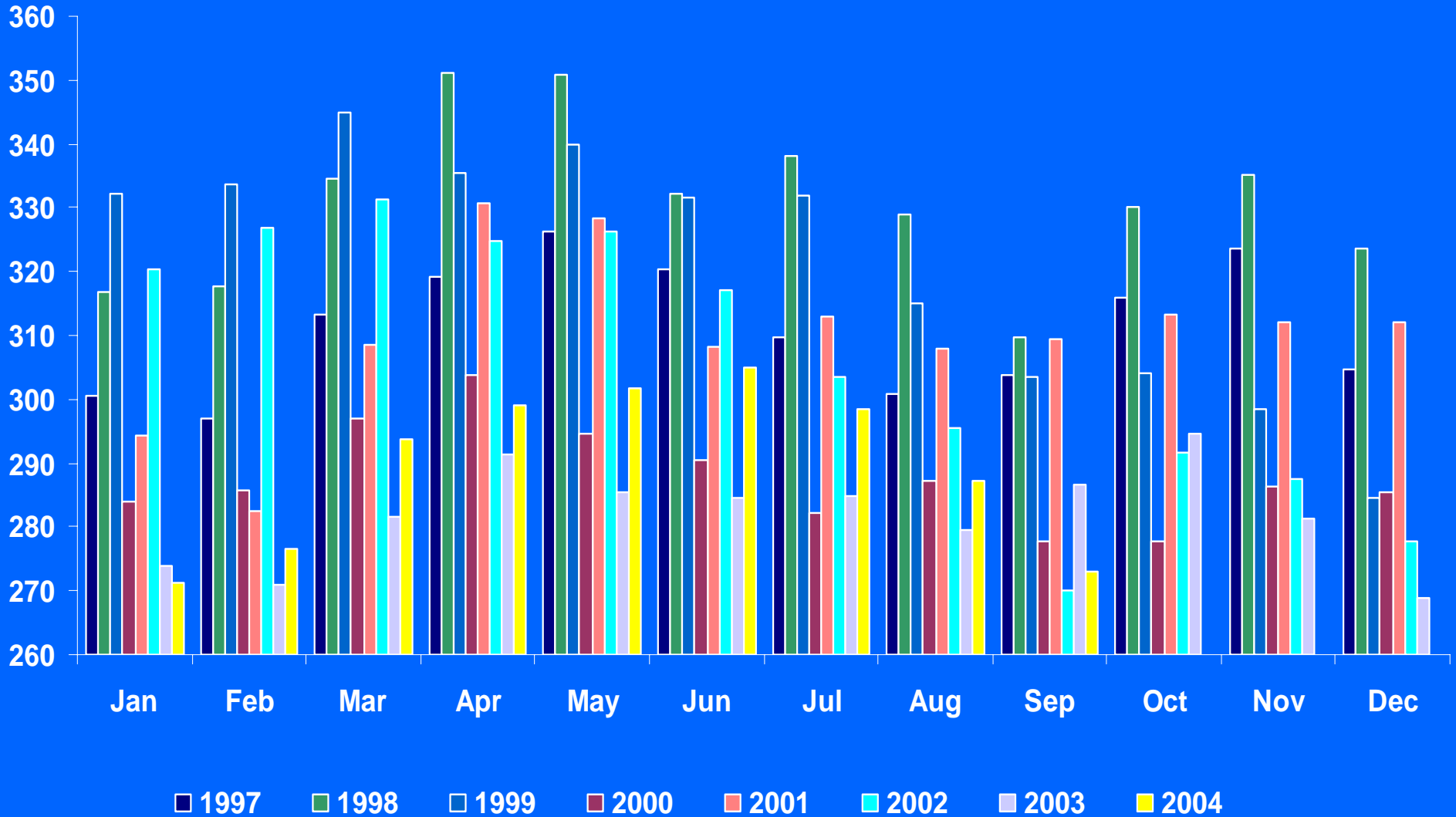


# U.S. Distillate Demand and Imports (MBPD)



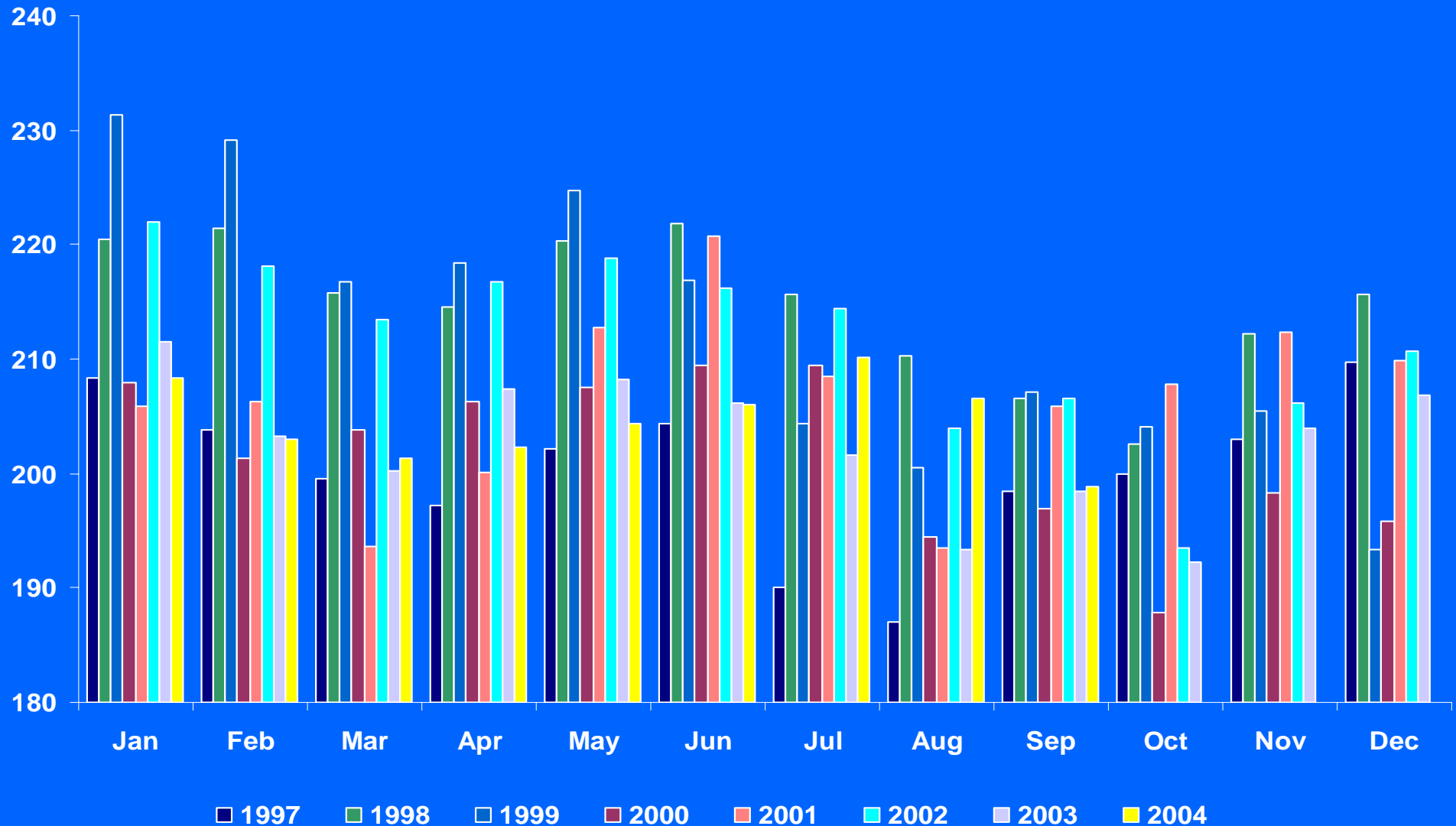
# U.S. Crude Oil Stocks

(millions of barrels)



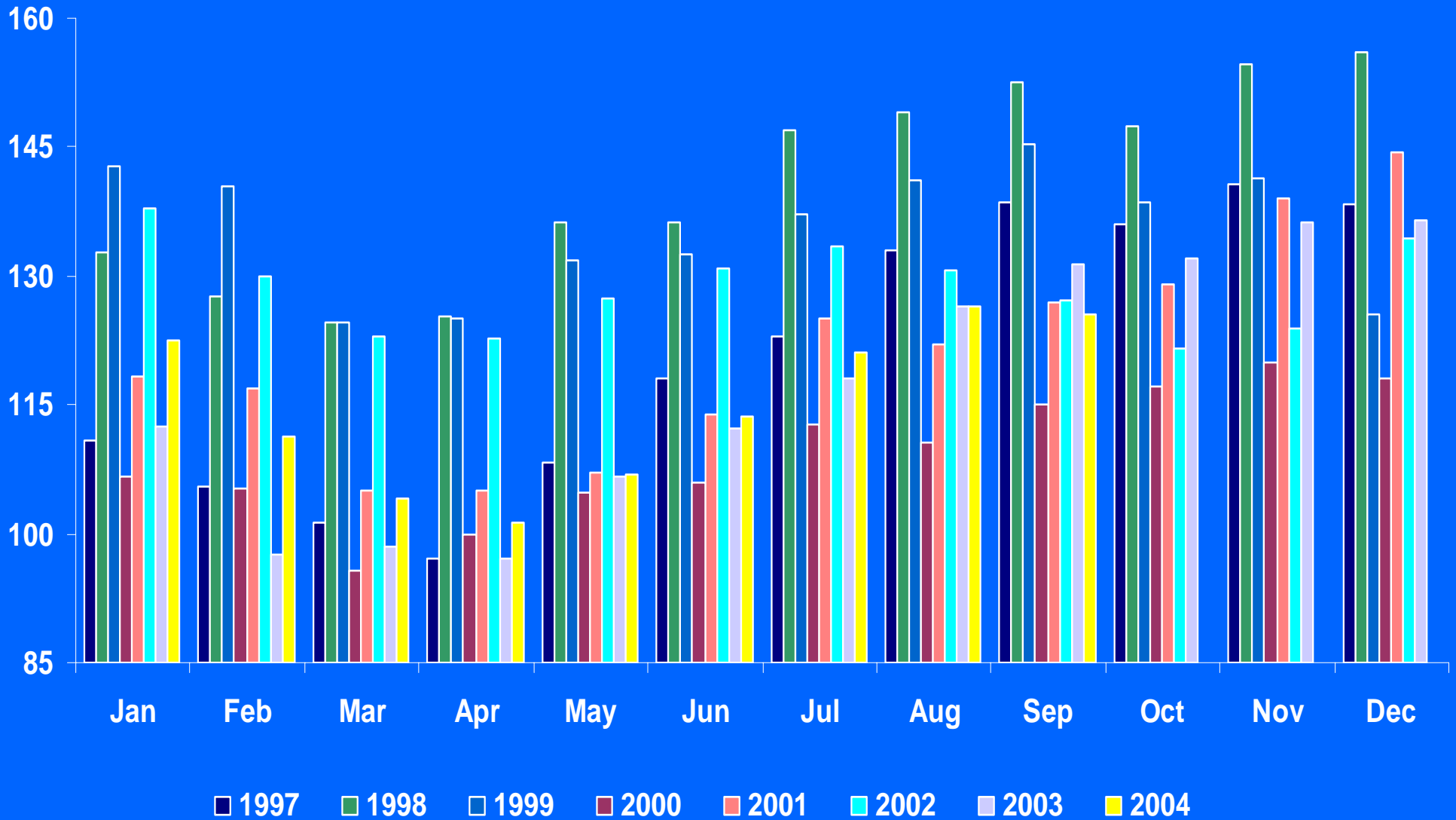
# U.S. Gasoline Stocks

(millions of barrels)

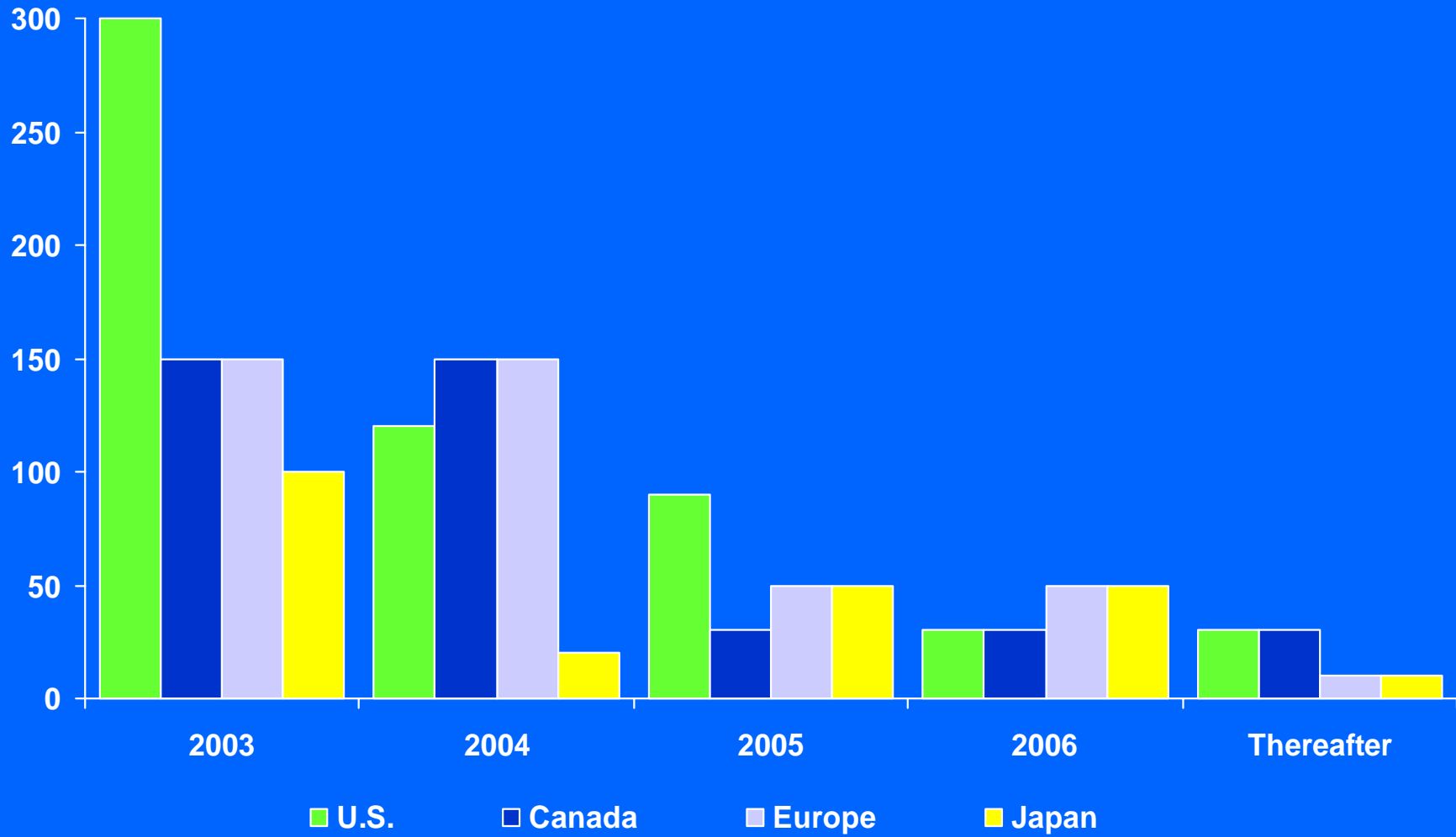


# U.S. Distillate Stocks

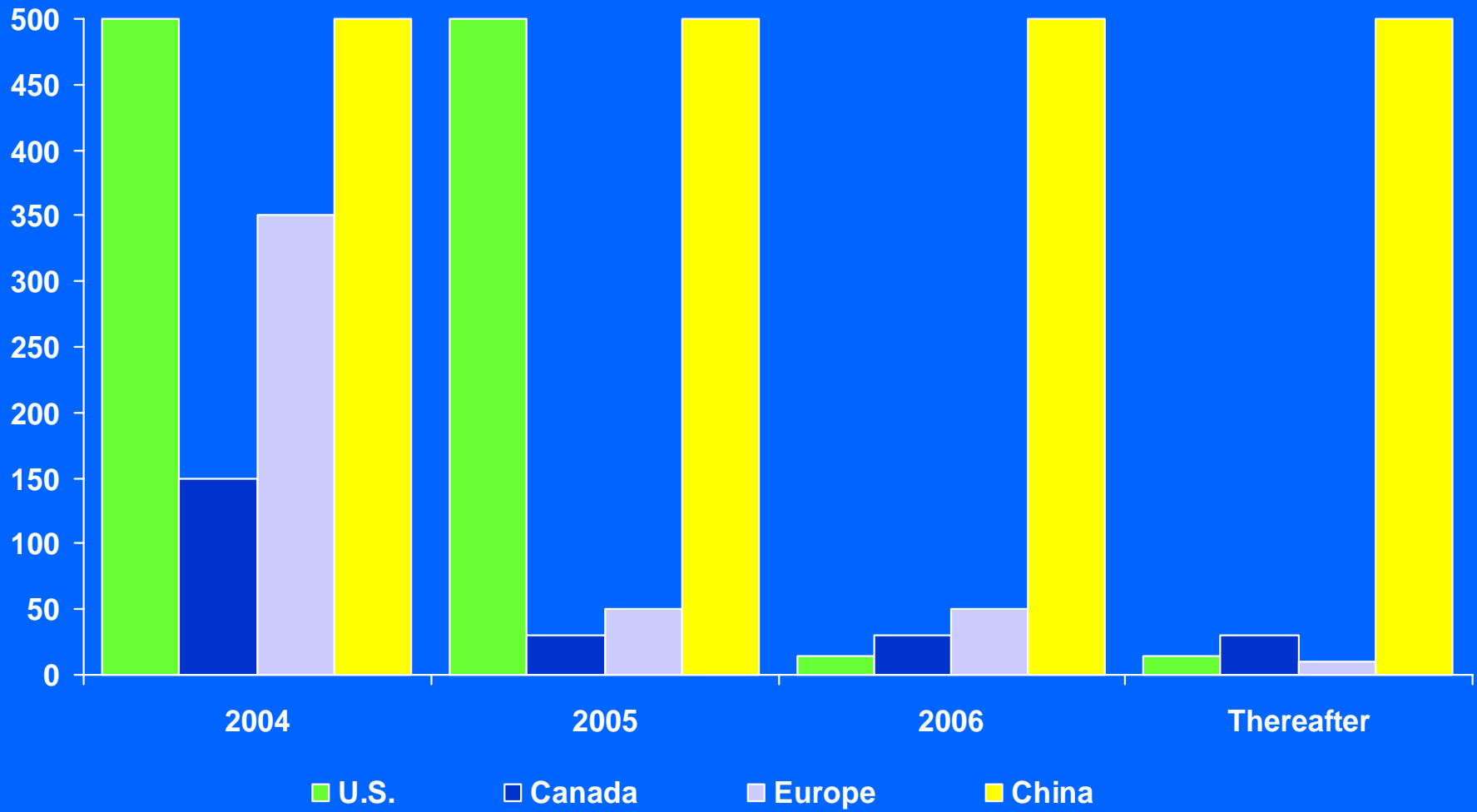
(millions of barrels)



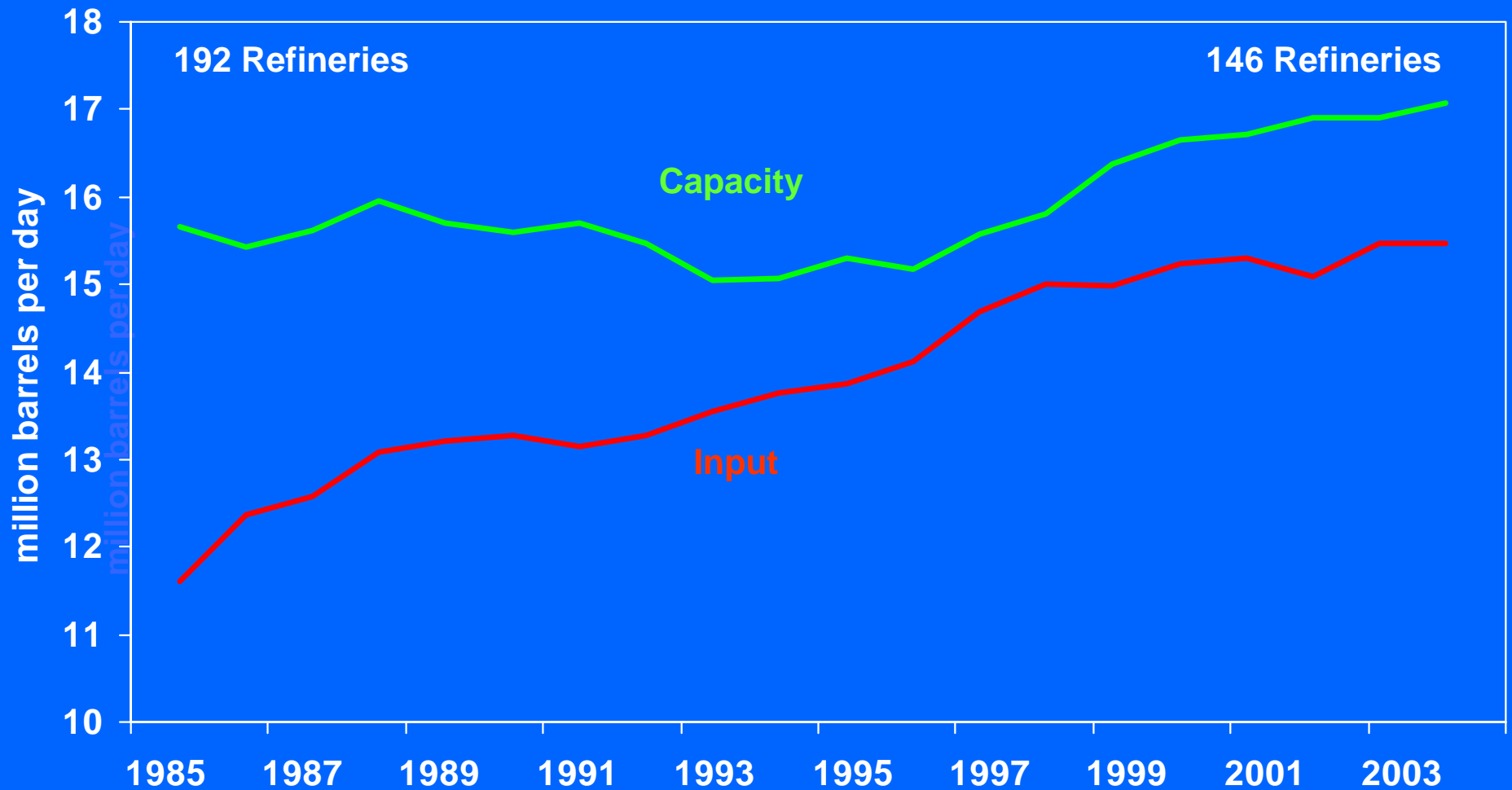
# Maximum Gasoline Sulfur Content (ppm)



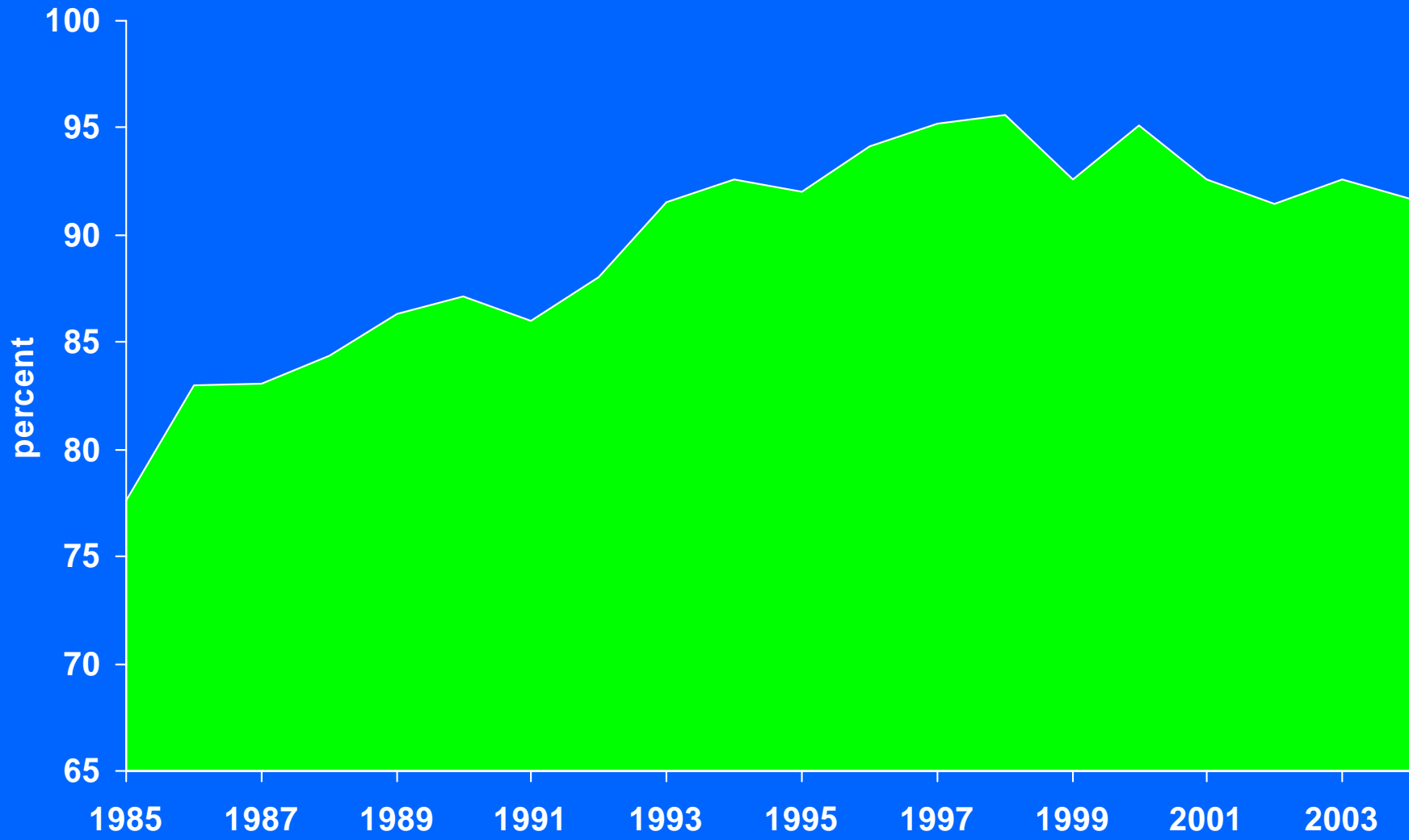
# Maximum Diesel Sulfur Content (ppm)



# U.S. Crude Oil Refinery Capacity and Input



# U.S. Refinery Capacity Utilization



# Earnings for Selected U.S. Refiners

(millions of dollars)

<u>Company</u>	<u>2001</u>	<u>ttm 2004</u>
<b>ExxonMobil</b> (U.S. downstream)	<b>1,924</b>	<b>2,054</b>
<b>Valero</b>	<b>547</b>	<b>1,136</b>
<b>Sunoco</b>	<b>307</b>	<b>460</b>
<b>Tesoro</b>	<b>77</b>	<b>319</b>
<b>Premcor</b>	<b>154</b>	<b>253</b>
<b>Holly</b>	<b>73</b>	<b>80</b>
<b>Frontier</b>	<b>106</b>	<b>53</b>
<b>Giant</b>	<b><u>14</u></b>	<b><u>25</u></b>
<b>Total*</b>	<b>1,278</b>	<b>2,326</b>

\* Excluding ExxonMobil.

**+82%**

# Observations and Analyses Summary

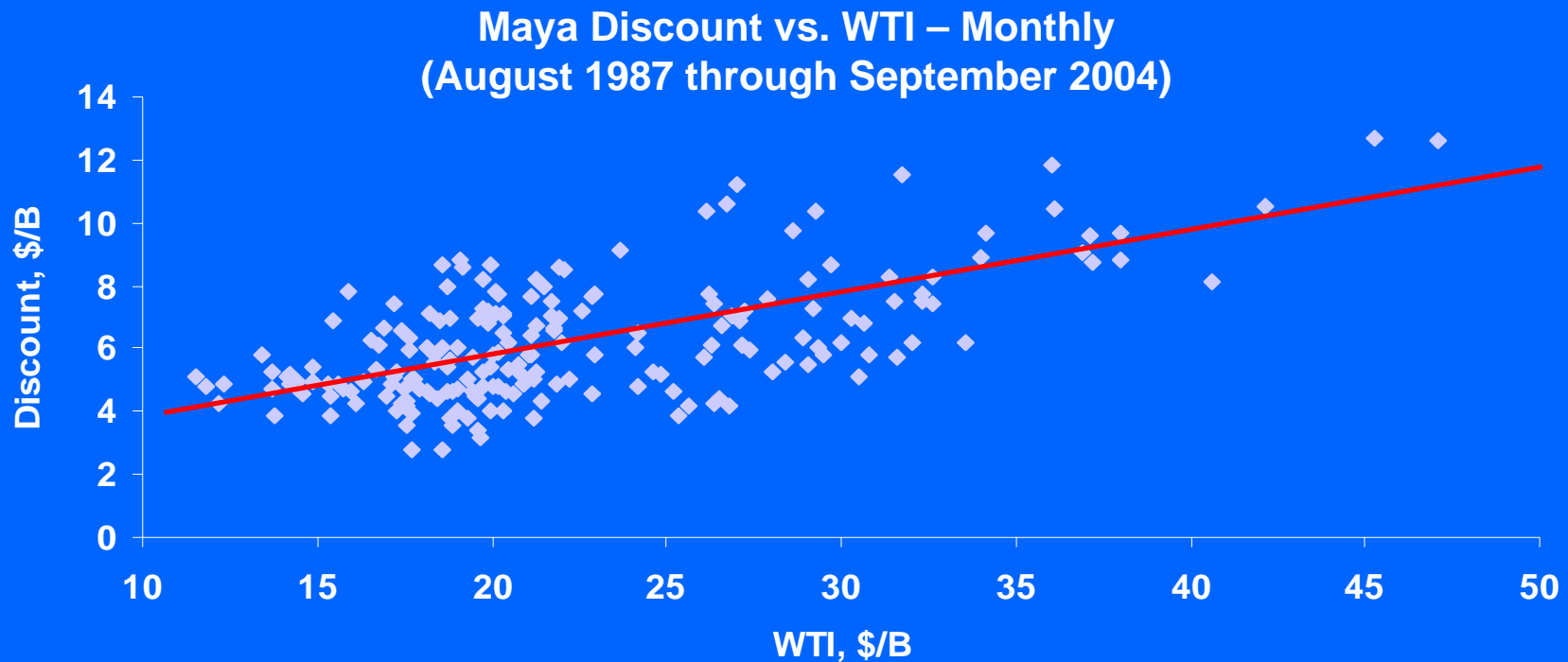
- **For the past 12 months, U.S. Gulf Coast markets have averaged above \$6 per barrel 3:2:1 crack. This is double the average U.S. refiners realized during the 1990s!**
- **Gulf Coast 12-month forward swaps are traded at almost \$10 for gasoline and above \$5 for heating oil. Virtually all operating refineries – sweet or sour, small or large, simple or complex – will be able to generate positive cash flow and fund defensive capital expenditures with these margin levels.**

# Observations and Analyses (cont.)

- Earnings for a group of seven U.S. independent refiners have almost doubled since 2001 (yet giant ExxonMobil's U.S. downstream unit still earns about the same amount).
- Sour crude discounts – both medium and heavy – have moved sharply in favor of refiners. For the past 12 months, the Maya discount to WTI has been about \$9 per barrel – at times reaching above \$13 per barrel – and the Mars discount has averaged above \$4.50 per barrel while reaching above \$8 per barrel. Moreover, the WTI premium over Brent has averaged about \$2.50 per barrel, making North Sea and other light sweet crudes readily available to U.S. refiners.

# Observations and Analyses (cont.)

- TM&C observes that the Maya discount increases rather reliably with WTI price movements. The chart illustrates this correlation, which is in fact supported by basic refining yields and economics, as will be discussed later.



## Observations and Analyses (cont.)

- **Crude price volatility has intensified, and this reality is detrimental to refiners' planning and operations. We have shown that neither OPEC, refiners or governments have developed effective means to "manage" world crude oil prices. Recent record prices for crude oil are not the result of deficient production capability or inventories. All signs point to NYMEX and other commodity speculators, for neither petroleum companies, governments, financial institutions nor consumers relish current petroleum price levels.**

## **Observations and Analyses (cont.)**

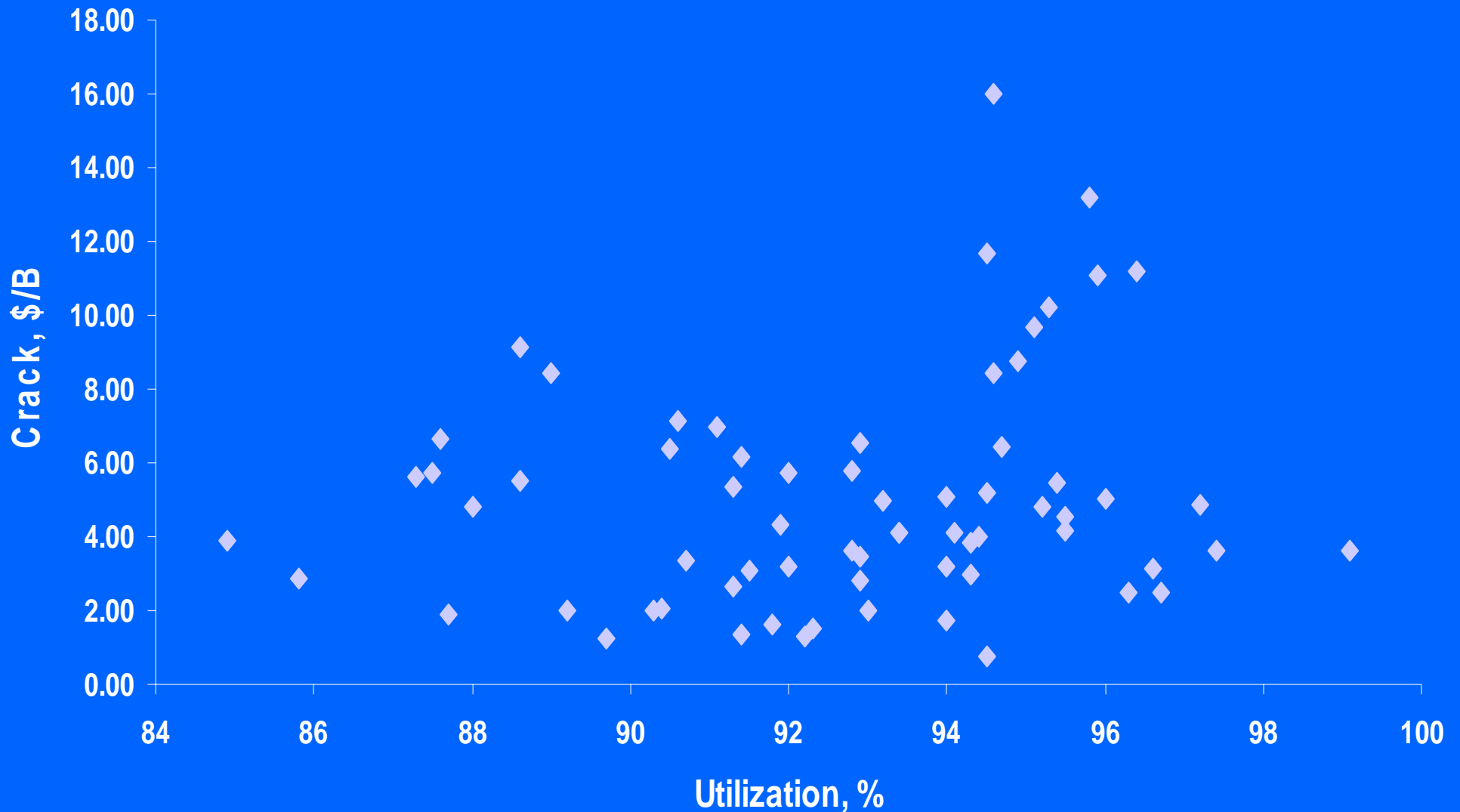
- **Although industry spokesmen and many public officials point to stringent products specifications, manufacturing and transportation limitations and, on occasion, price gouging, it remains true that products prices follow crude oil prices over time. Of course, there are frequent regional price spikes caused by temporary shortages and disruptions, but absolute levels paid by fuels products consumers are driven by refiners' cost of crude oil.**

## Observations and Analyses (cont.)

- **Common sense points to a meaningful correlation between U.S. refiners' percent refining capacity utilization and gross margins for products. Nonetheless, TM&C has not been able to uncover such a relationship. Over the years, we have applied numerous concepts to derive a usable mathematical formula for refiners' margins. TM&C has had no success. Here are some charts that illustrate our frustration.**

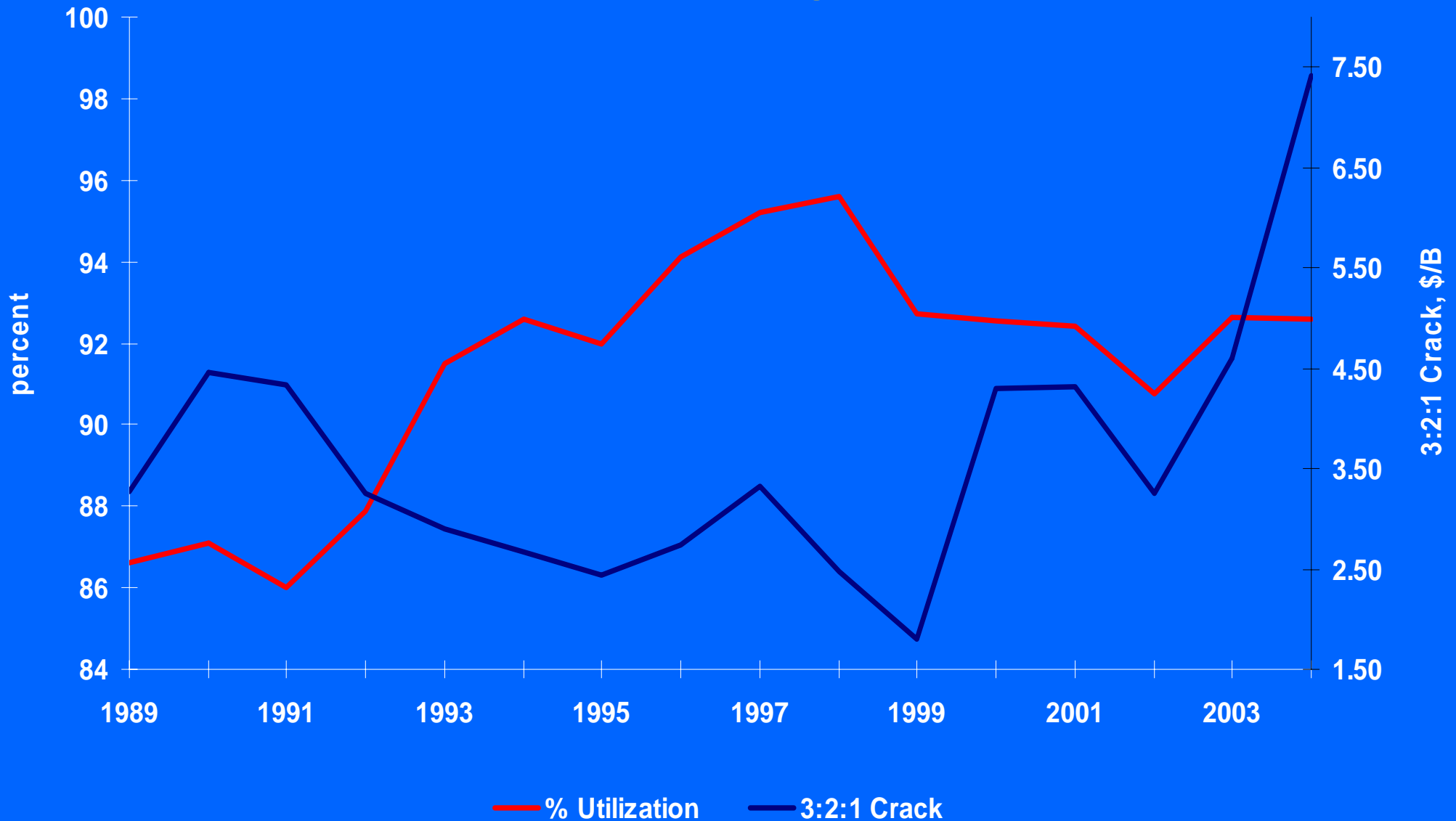
# USGC Gasoline Crack vs. Refinery Utilization

January 1999-August 2004



# Refinery Capacity Utilization vs. UGSC 3:2:1 Crack

Annual Averages



## Observations and Analyses (cont.)

- **UBS, Morgan Stanley and OilAnalytics have recently reported some success using inventories as the relevant factor influencing absolute oil prices or margins. Our review of their reports and TM&C staff failures to find meaningful correlations based on inventories have led to skepticism about the reliability and utility of inventory-based concepts. Admittedly, commodities traders pay close attention to both DOE and API inventory reports, but in reality the information seems to function more like an “on-off” switch rather than provide useful mathematical formula.**

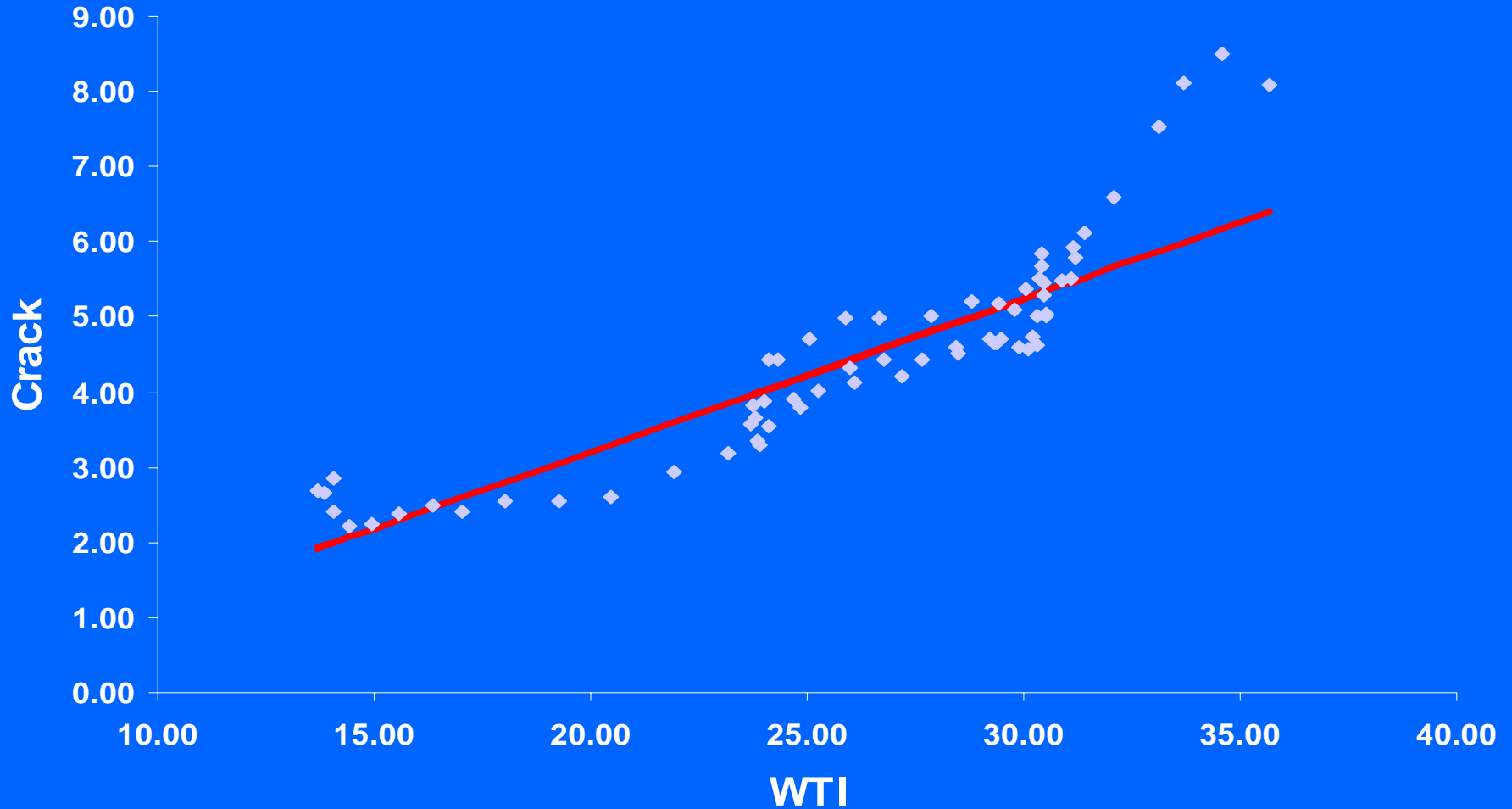
## Observations and Analyses (cont.)

- **As reported previously at OPIS Supply 2002, TM&C has developed a somewhat surprising correlation between gross margins and absolute crude oil prices. Although the results fly in the face of natural reactions, the data (as reported in the following charts) show that refiners' gross margins improve with higher cost crude oil feedstocks.**

# USGC Gasoline Crack vs. WTI

(12-Month Rolling Average – \$/B)

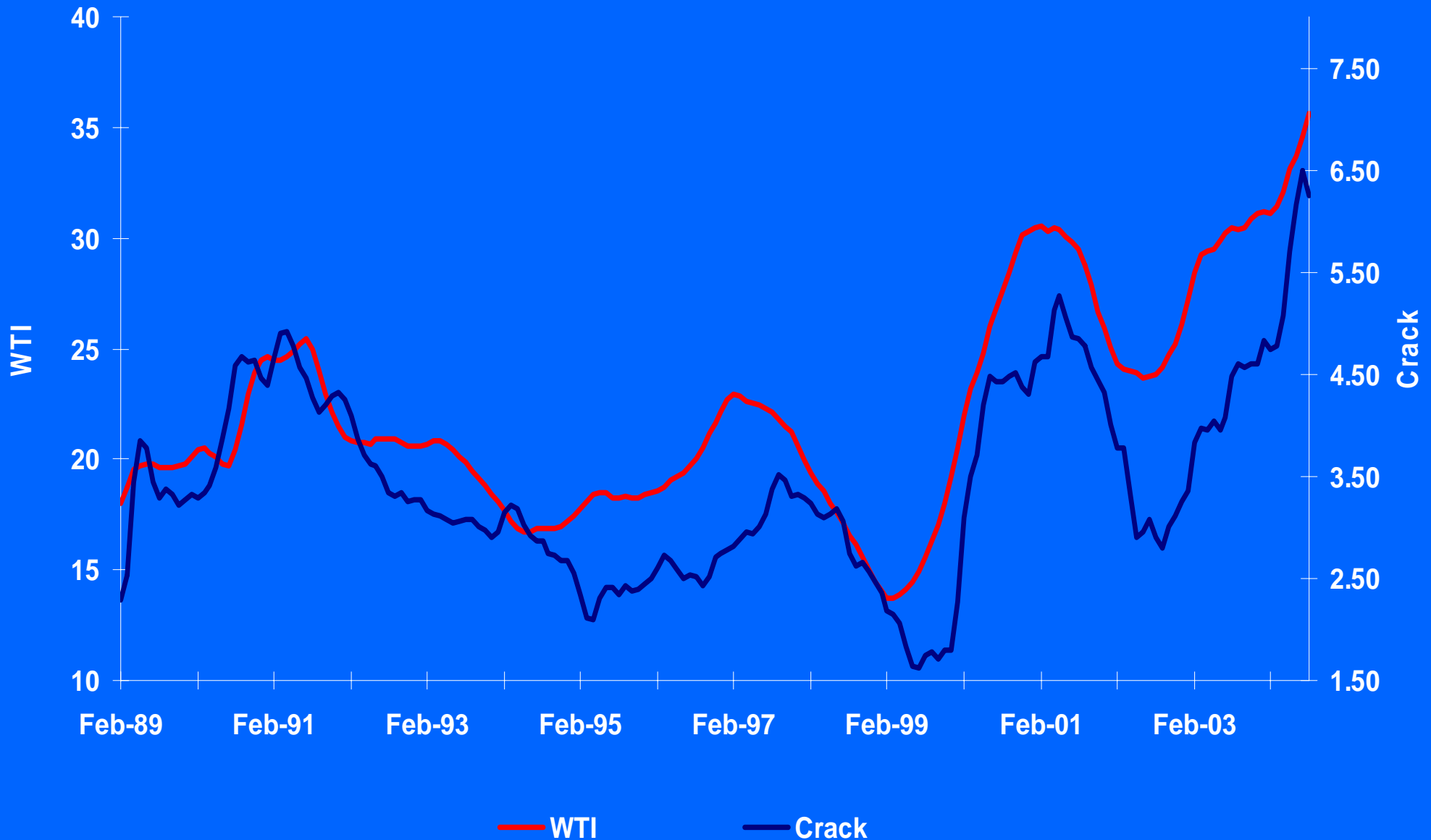
January 1999-August 2004



— Regression

# WTI Spot Price and USGC 3:2:1 Crack

(12-Month Rolling Average – \$/B)



# Gulf Coast Gasoline Crack

## Actual vs. Predicted

(12-Month Rolling Average)



## Observations and Analyses (cont.)

- During the last ten years, U.S. demand for both gasoline and distillates have enjoyed surprising growth. Specifically, gasoline growth has averaged 1.6% per year, and distillates growth has averaged 2.5% per year.
- Crude oil imports have risen steadily, now running at 65% of total demand of about 15.4 MMBPD. Surprising to many, including TM&C, imports of gasoline and distillates have grown steadily during the last decade, reaching about 10% and 9%, respectively.

## Observations and Analyses (cont.)

- For the East Coast, imports have now reached very significant levels of about 27% for gasoline and 21% for distillates. For the West Coast markets, which were historically balanced, imports of gasoline and distillates now amount to about 7% of total demand.

# Observations and Analyses (cont.)

- Recent Senate hearings and other forum have produced testimony that “soaring gasoline prices” are partially the result of government regulatory barriers to new refining capacity plus cumbersome permitting processes and unrealistically stringent product specifications. NPRA President Bob Slaughter and ChevronTexaco CEO David O’Reilly have spoken vigorously on these and related subjects.
- Interestingly, some have suggested that refiners’ profits benefit from these same factors by eliminating competition, curtailing supply and forcing up prices beyond cost recovery. Others add that imports of products to the U.S. become restricted by more difficult-to-meet products specifications.

# Observations and Analyses (cont.)

- There may be some truth in all of these points, but it is still a fact that U.S. refineries sell for steep discounts to replacement costs, and profits as measured by traditional yardsticks have been minimal prior to 2003.
- The rising flow of products imports to the U.S. provides certain evidence that the refining industry has “maxed out” in its production capability for today’s products. As these specifications become increasingly tougher, the future loss of some production capability by U.S. refiners is inevitable. Accordingly, it is appropriate to turn our attention to the subject of refinery shutdowns, capacity creep and the possibility of new plants being built.

# U.S. Refinery Shutdowns

- EIA reports annually refineries operating in the U.S. along with refineries that are shutdown each year. The report indicates that 192 refineries were operable in 1985 and 146 were operable in 2004. This equates to a net loss of 46 refineries.
- The list of shutdown refineries for this period by name, location and capacity totals 103. A perusal of the list confirms that several plants were given multiple opportunities to survive. Indeed, on average the indication is that each of the failed operations was shut down about twice.
- TM&C agrees with the inference of these data that most all of these refineries deserved their fate because they were not commercially and economically feasible. However, in our opinion, there were some exceptions and also several “near miss” candidates on the shutdown list. Some comments follow.

# Selected Shutdown U.S. Refineries

<u>Refiner</u>	<u>Location</u>	<u>Capacity MBPD</u>	<u>Year</u>
Texaco/Indian	Lawrenceville, IL	80	1985/1995
Gary Refining/Landmark	Fruita, CO	15	1985/1992
Chevron (Gulf)	Cincinnati, OH	44	1986
Marion/GAMXX	Theodore, AL	27	1983/1988
Unocal	Nederland, TX	120	1989
Amoco	Casper, WY	40	1991
Fletcher	Carson, CA	30	1992
Golden West	Santa Fe Springs, CA	50	1992
Marathon (Rock Island)	Indianapolis, IN	48	1993

# Selected Shutdown U.S. Refineries (cont.)

<u>Refiner</u>	<u>Location</u>	<u>Capacity MBPD</u>	<u>Year</u>
CIBRO	Albany, NY	42	1993
Pacific	Hercules, CA	50	1995
Powerine	Santa Fe Springs, CA	47	1995
Total	Arkansas City, KS	56	1996
Shell Oil	Odessa, TX	28	1998
UDS (Total)	Alma, MI	51	1999
Premcor	Blue Island, IL	80	2001
Premcor	Hartford, IL	68	2002

# Refinery Capacity Creep

- Today at about 17 million barrels per day (MMBPD), U.S. refining capacity is well below its peak of 19.4 MBPD in 1981. However, the number of U.S. refineries has dropped from 303 to the current level of 146, indicating that the industry has turned to “capacity creep” to meet growing demands for petroleum products.
- For the last ten years, U.S. refining capacity has averaged increases of 1.7% per year, virtually all from capacity creep. About 0.2% per year U.S. refining capacity was lost during the last decade to refinery shutdowns.
- The following chart presents refinery capacity creep for U.S. refining regions, considering only same site conversion refineries.

# U.S. Regional Capacity Creep

<u>Region</u>	<u>Capacity, MBPD</u>		<u>Increase</u>	
	<u>1997</u>	<u>2004</u>	<u>MBPD</u>	<u>%</u>
East Coast	1,441	1,549	108	7
California	1,748	1,835	87	5
Midcontinent	2,427	2,522	95	4
Louisiana	2,334	2,753	419	18
Texas	3,915	4,652	737	19

# U.S. Regional Capacity Creep for Selected Majors

<u>Company</u>	<u>Number of Refineries</u>	<u>Capacity, MBPD</u>		<u>Increase</u>	
		<u>1997</u>	<u>2004</u>	<u>MBPD</u>	<u>%</u>
ChevronTexaco	5	907	931	24	3
Shell	10	1,496	1,564	68	5
ConocoPhillips	12	1,996	2,052	56	3
ExxonMobil	6	1,515	2,050	535	35

# Refinery Capacity Creep (cont.)

- Several U.S. refiners have announced plans to increase capacity at existing sites. At the forefront, Premcor has an expansion project underway at its 250 MBPD Port Arthur refinery. Scheduled for 2/1/2006, this 75 MBPD expansion will certainly insure Premcor's Port Arthur refinery standing as one of the top U.S. competitive facilities.
- Although not technically a U.S. refinery, Valero's newly acquired Aruba plant with nominal capacity of 275 MBPD has been tabbed by the company for potential major expansion. Investors and analysts have been informed that the company is considering raising capacity at its Aruba refinery first to 500 MBPD and then later to perhaps 800 MBPD at an estimated total cost of \$8 billion. This figure equates to about \$15,000 per BPD of capacity, which dwarfs Valero's purchase cost of less than \$2,000 per BPD.

# Upgrades and Conversions of U.S. Refineries

- **Several U.S. refiners frequently tout their ability to run heavy sour inexpensive crude oil and exert a significant economic advantage over competitors. Routinely, upgrade and conversion projects are considered and sometimes pursued. Sunoco is the largest and most vocal rebel to this clan, recently confirming its long-term plans to remain basically a sweet crude refiner.**

# Upgrades and Conversions of U.S. Refineries (cont.)

- In a prior presentation, TM&C presented the backcast economics for typical refinery upgrades and conversions. For the time period considered (1997-2001), our estimates showed that none of these concepts provided attractive economics and acceptable payouts. This result coincides with our firm's broad conclusions that it is virtually impossible, over the long term, for refiners to "outsmart" producers by establishing a refinery configuration based on "distressed" crude oil bargains.
- Notwithstanding this premise, TM&C has updated our analysis of hypothetical upgrade and conversion projects, with results summarized in the following chart.

# Backcast Economics for Hypothetical 150 MBPD Gulf Coast Refineries (1999-2003)

<u>Refinery Type</u>	<u>Estimated Refinery Margin MM\$/Year</u>	<u>Relative Capital MM\$</u>	<u>Payout Over Base (years)</u>
Sweet Fuels	43	Base	-
Sweet Resid Cracking	71	100	3.6
Medium Sour Coking	119	1,000	13.2
Heavy Sour Coking	165	1,400	11.5

# Upgrades and Conversions of U.S. Refineries (cont.)

- For the period 1999-2003, TM&C again concludes that such projects would not have been economically attractive and generated adequate payouts. However, for the last 12 months crude price relationships have shifted drastically, and the conversion project results would have been totally different for this price set.
- TM&C estimates that the upgrade of a conventional 150 MBPD Gulf Coast sweet crude refinery to resid cracking would have provided a one-year payout. The conversion to medium sour coking and heavy sour coking refineries would have provided about five-year payouts for both projects.

# Upgrades and Conversions of U.S. Refineries (cont.)

- **Accordingly, existing crude price relationships will undoubtedly invite numerous U.S. refineries to pursue such capital projects. TM&C will be surprised if world crude producers do not respond to such reconfigurations by implementing crude price adjustments to recover their piece of this pie.**

# New U.S. Refineries

- It is often stated that no new U.S. refinery has been built since Marathon's Garyville plant in 1976. That statement is probably technically correct but could be reasonably refuted by Jack Stanley's expenditures of some \$2 billion during the 1990s for the Good Hope/TransAmerican/Orion refinery (now Valero's St. Charles refinery in Norco, Louisiana). This facility does fit the category of a "new grass roots refinery".

## **New U.S. Refineries (cont.)**

- **TM&C asserts that the real basis for the lack of new plant construction in the U.S. is primarily economic realities. Historical margins have simply not supported the required capital expenditures and operating costs. Periodically, TM&C reviews the economics of a hypothetical new refinery at a time when there is some apparent realistic interest in such a venture.**
- **This spring, Saudi Arabia said it was ready to build two new 500 MBPD refineries in the U.S. to alleviate the evident shortage of refining capacity. Some suggested that this was a symbolic offer to emphasize that crude oil supplies are plentiful in the world, and recent high products prices are the result of lack of U.S. refining capacity.**

## **New U.S. Refineries (cont.)**

- **Phoenix-based Arizona Clean Fuels, headed by Glenn McGinnis, is pursuing the construction of a new 150 MBPD refinery near Wellton, Arizona. Operations would be based on crude oil supplied by Pemex with products delivered to both Mexico and Arizona markets.**
- **The estimated cost of this refinery is about \$2 billion, or some \$13,000 per BPD. The project is moving through the permitting process, and backers remain optimistic that refinery margins will make this venture financeable and successful.**

# Hypothetical Grass Roots Refineries\*

## U.S. Gulf Coast

<u>Refinery</u>	<u>Description</u>	<u>Total Investment \$ Billions</u>
A	150 MBPD sweet crude, resid cracking, complexity: 10.6	1.5
B	150 MBPD heavy sour crude, coking, complexity: 15.7	2.4

\* Capable of producing ultra low-sulfur fuels required in the U.S.

# Hypothetical Grass Roots Refineries (cont.)

- To invite investors, a notional 15% IRR without leverage is targeted for the venture. The following typical price relationships would be required, based on NYMEX crude at \$38 per barrel:

	<u>dollars per barrel</u>	
	<u>Required</u>	<u>ttm</u>
Gulf Coast Gasoline Crack	12.00	8.08
Gulf Coast Heating Oil Crack	6.00	2.57
WTI less Maya	9.00	9.29

# Hypothetical Grass Roots Refineries (cont.)

- U.S. refiners have available to their trading units 12-month and longer forward swaps that could insure attractive margins approaching those required to attract capital for new refinery construction in the U.S.
- As noted earlier, strong forward swaps for both gasoline and heating oil as well as recent market price relationships have made the idea of new refinery construction in the U.S. to not be ludicrous for the first time in memory.

# Hypothetical Grass Roots Refineries (cont.)

- This surprising circumstance does not necessarily mean, in our opinion, that companies will jump quickly to undertake new grass roots refinery ventures. There are indeed real barriers to building new grass roots refineries in the U.S., including permitting requirements, regulatory delays and the NIMBY problem.
- In all probability, however, the industry will be motivated to implement major capacity expansions at existing facilities.

# Closing Comments

- An understanding of the observed Maya Discount correlation with absolute WTI price is gained from comparing the operations and economics of the hypothetical 150 MBPD USGC refineries cited previously.
- Using scenarios with WTI priced at \$25 per barrel and \$50 per barrel, respectively, TM&C calculated that a sweet crude cracking refinery with volumetric yields of about 100% enjoys comparable profitability at each crude price level. Because of the approximate 89 volume % yield realized by the heavy sour coking USGC refinery and other unrecouped product revenues, this refinery requires a significant Maya discount to achieve the same economic performance.

## **Closing Comments** (cont.)

- **Specifically, TM&C estimates that for the crude price scenarios cited, about \$3 per barrel additional Maya Discount is needed for this refiner to stay whole. Recent industry experience supports this reality. (See Slide 26)**
- **TM&C has traditionally viewed historical U.S. products markets as balanced by domestic refining and not dependent on imports. Clearly, this assumption is no longer true for both the East Coast and West Coast markets.**

## **Closing Comments** (cont.)

- **Although U.S. refiners have, in the past, operated unprofitably on many occasions and based on incremental throughput economics on others, TM&C has seen little of these aspects recently.**
- **In contrast to refiners, importers of products to the U.S. virtually always act to make a profit on each transaction. Their decisions depend on product costs, specifications, blending opportunities, tanker and terminaling charges, plus (in some cases) hedging costs.**

## Closing Comments (cont.)

- Now that the volumes of products imports have risen to significance, TM&C believes that these costs, as opposed to basic refining economics, have become price setters. With most bulk U.S. prices for gasoline and distillates directly related to NYMEX markers based on NYH deliveries, imported products impact pricing throughout the nation more than ever.
- U.S. refiners have now become “followers”, with little voice concerning their crude and products prices.

## **Closing Comments** (cont.)

- **Fortunately, the high cost of imports, stemming from relatively tight refining capacity worldwide, more stringent U.S. product specifications and the inherent extra costs of shipping clean products versus crude oil movements, give U.S. refiners an inherent margin advantage.**
- **Thus, the “Golden Age” of refining identified by Premcor’s Tom O’Malley, Morgan Stanley and others may indeed have arrived on clean products tankers along with “maxed out” U.S. refineries.**

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