

EXHIBITS

- Exhibit A** **Marshall Thomas Affidavit**
- Exhibit B** **Comments of Professor Kalt, May 27, 1997.**
- Exhibit C** **Memorandum from Jerry Hill, Associate Director for
Royalty Management, to Director, Minerals Management
Service, dated February 12, 1987.**
- Exhibit D** **Wyoming Asphalt Sour/West Texas Sour Comparison**
- Exhibit E** **Memorandum from Director Quarterman to
Assistant Secretary, dated May 31, 1996,
Land and Minerals Management**
- Exhibit F** **SJV Example**

Exhibit A

Marshall Thomas Affidavit

**AFFIDAVIT OF
MARSHALL THOMAS**

Marshall Thomas, being first duly sworn, upon his oath deposes and states:

1. I am Senior Vice President of PVM Oil Consultants, Inc., an affiliate of the major international oil brokerage firm, PVM Oil Associates, Inc. (collectively "PVM"). PVM maintains offices in New York, Houston, Los Angeles, London, Vienna, Singapore and Tokyo. A copy of my curriculum vitae is attached as Exhibit A to this Affidavit. I submit this Affidavit in support of the comments of the American Petroleum Institute in response to the Notice of Proposed Rulemaking ("NOPR") issued by the Minerals Management Service ("MMS") of the Department of the Interior ("DOI") on January 24, 1997 and published at 62 Fed. Reg. 3742.

I. Qualifications

2. The following comments are based on my personal knowledge of commercial petroleum market processes gained over thirty years. The development and use of market data and commercial intelligence was at the center of my work with Petroleum Intelligence Weekly for some 17 years, and with Platt's Oilgram Price Service and Oil Buyers' Guide (now part of the Bloomberg Information System). Since the early 1970s, I have focused extensively on the issue of commercial pricing mechanisms and was directly involved and responsible for the inception of the modern-day reporting of spot crude oil prices.

3 Since joining PVM in 1992 as Senior Vice President, I have directed the firm's commercial and market-related consulting activities. I have worked closely with the firm's senior domestic crude oil manager, Thomas W. Cain, as well as other PVM brokers and consultants on market and pricing issues. Our clients run the gamut from state oil firms and large major internationals to independents and smaller firms in the U.S. I supervise PVM's database of domestic and international cash crude oil transactions. I have monitored the creation, inception and evolution of crude oil futures trading on the NYMEX since the early 1980s, and have appeared at NYMEX industry briefings and have published articles in NYMEX's newsletter.

4. PVM is involved in many aspects of the domestic crude oil business. Our office in Houston functions as a domestic crude oil broker in the "cash markets," *i.e.*, the crude oil spot markets. This brokerage business involves us in ascertaining the level of market prices for various crude oils at the major market centers, lining up buyers and sellers and assisting in the execution of deals. In carrying out this business -- though we confine our business to the markets further "downstream" from the market at the lease -- we have become thoroughly familiar with all aspects of the domestic crude oil trade. We are a substantial firm domestically, with typical volumes in recent years ranging from 350,000 b/d to 500,000 b/d of crude oil brokerage sales, in addition to our domestic natural gas and electricity brokerage activities.

5. PVM also handles NYMEX-related business on behalf of clients, and at one time held seats on the exchange. In more recent years, PVM has been a Futures

Commission Merchant, i.e., has been registered to place orders into the exchange, and has cleared its NYMEX business via Daiwa Securities America, Inc. The firm (via its New York and London operations) is also a major participant in the Atlantic Basin crude oil arbitrage business revolving around the price relationships between the domestic crudes and North Sea/West African Brent-related trade. PVM's London-based operation holds a seat on the International Petroleum Exchange and is a major brokerage participant in the Brent crude market.

6. PVM's role is as an actual broker intermediary in the marketplace.

PVM does not take a position in the market as a buyer or seller, but simply facilitates transactions. Since we work with both buyer and seller, we make disinterested and critical evaluations of crude oil prices and values based on actual market behavior. Neither PVM nor I have a vested interest in elevating prices or bolstering oil revenues for certain sectors of the trade. PVM's brokerage commissions are flat commissions based on volume (i.e., per barrel transacted), and are not linked to the price obtained. PVM provides the service of matching willing and able participants in commercial transactions, and satisfying both parties that terms are reasonable. Thus, PVM is uniquely qualified to form objective opinions on oil value in the course of doing business and in analyzing market developments.

II. The MMS Proposal

7. MMS's current regulations regarding royalty oil valuation involve determining the gross receipts received by leaseholders for the sale of royalty oil at the lease. The regulations entail looking at the prices in arms-length transactions and other transactions

occurring at the lease to determine the value of the crude oil at the lease. MMS now proposes largely to scrap its current system and instead, with respect to royalty oil produced from leases outside California and Alaska, to attempt to value such crude oil at the lease by working back from the price of crude oil futures contracts trading on NYMEX and, with respect to royalty oil from leases located in California or Alaska, to attempt to value such crude oil at the lease by working back from the reported Los Angeles or San Francisco spot assessment for Alaska North Slope crude oil ("ANS"). MMS's proposed scheme starts with the NYMEX crude oil futures prices or the ANS spot assessment and makes a series of adjustments or deductions to the futures price or the ANS spot assessment in an attempt to work back to the value of crude oil at the lease.

8. With respect to calculating a value for royalty oil outside of California and Alaska, MMS proposes a "location differential" as a purported means of working back from the NYMEX futures price to particular "market centers." As proposed, the differential is the difference between the average spot price for a given month for WTI at Cushing and a given crude oil at the market center. To work back from the market centers to over 200 "aggregation points" identified by MMS, MMS proposes to use either the lessee's location differentials drawn from its own exchange agreements or a fixed "location/quality differential" calculated once a year by MMS using information collected on a proposed new form. Finally, to work back from an aggregation point to the lease, MMS proposes to permit lessees to deduct actual transportation costs from an aggregation point to the lease, if they choose. With respect to royalty oil produced from leases in California or Alaska, the proposed index pricing point (Los Angeles or San Francisco) is the market center, and MMS

proposes that the ANS spot assessments be adjusted using "location/quality" differentials and optional actual transportation costs calculated in the same manner as for royalty oil produced outside California and Alaska.

III. Summary Of Conclusions

9. For numerous reasons, MMS's proposed system will not arrive at a reasonable value for crude oil at the lease, i.e., will not replicate the market value of crude oil at the lease. In particular, MMS's proposal fails adequately to account for the fact that NYMEX futures prices are significantly different from crude oil values at the lease and are subject to differing market forces. The proposed adjustments or deductions from the NYMEX futures prices will not account for these differences. In addition, MMS's proposal uses spot prices reported by price services such as Platt's and Petroleum Argus (hereafter referred to as "spot price assessments") at market centers in an attempt to work back from NYMEX through a market center to an aggregation point. In fact, many of the reported spot price assessments on which MMS's proposal relies are not always reliable indicators of the value of a particular crude oil in the market being "assessed" or "surveyed" by a reporting service. Moreover, such reported spot price assessments are based on the same kinds of buy-sell transactions and exchange agreements that MMS refuses to accept at the lease. It is inconsistent for MMS to reject buy-sell transactions and similar transactions at the lease, while accepting them as the basis of reported spot price assessments at market centers.

10. To "bridge" or "work back" from market centers to aggregation points and from aggregation points to the leases, MMS proposes to use either location differentials

drawn from a lessee's contracts or fixed annual location/quality differentials that MMS calculates and transportation costs from the aggregation points to leases. This proposal will not result in ascertaining accurate or reasonable market values of crude oil at the lease. Relative price differences between crude oils at different locations are volatile and constantly changing. Moreover, the difference in value of crude oil between one location and another is not solely due to the cost of transporting the oil. The crude oil gains value by being moved from the lease to a point where it is aggregated with greater quantities of crude oil and where more buyers, and greater demand, are present. MMS's proposal to use rigid, annual location/quality differentials that are based on data reported from the prior year virtually guarantees that such adjustments will not reflect crude oil market conditions and actual crude oil values. MMS's assumption that the difference in a crude oil's value between the lease and aggregation points is solely due to the cost of transportation ignores market realities. Value is added to crude oil by the aggregation process and other marketing functions.

11. Finally, MMS's assumption that there is no market at the lease is incorrect. Because a market exists at the lease, value can be determined at the lease, and MMS should not abandon its historic focus on the market at the lease to value royalty crude oil.

IV. MMS's Proposal Misuses NYMEX Futures Prices

12. For production outside California and Alaska, MMS's proposal contemplates use of NYMEX light sweet futures contract prices ("the NYMEX futures price"), modified by certain specified adjustments, as the value of federal royalty oil at the

lease. However, while it is true that the NYMEX futures price is a benchmark at which many participants in the petroleum market "take a look" or consider when pricing crude oil, the NYMEX futures price is significantly different from the value of crude oil at the lease and cannot be adjusted in the manner proposed by MMS to arrive at value at the lease. In the remaining paragraphs of this part and in subsequent parts of my affidavit, I describe (1) the nature of NYMEX futures prices, (2) the role of hedging and pure speculation in NYMEX futures contracts trading, (3) the forces affecting NYMEX futures prices that are not present at the lease, and (4) the inadequacy of the mechanical adjustments proposed by MMS for working back from the NYMEX futures price to the value of crude oil at the lease.

A. The Nature Of NYMEX Futures Prices

13. NYMEX (New York Mercantile Exchange) is a commodity exchange, with 749 individual members (with 816 "seats" on the exchange) consisting of bankers, refiners, marketers and individuals. NYMEX is a division of NYMEX/COMEX with its counterpart, COMEX, consisting of 663 members (with 772 "seats"). The primary economic role of NYMEX is to record prices through trades in an open marketplace (the commodity exchange floor). Prices are transmitted immediately (i.e., "discovered") to all present (on an electronic board) and relayed instantly on screens around the world.

14. No crude oil is actually physically exchanged on NYMEX's trading floor in New York City. Instead, what is traded is NYMEX's standardized crude oil futures contract, which is an agreement to sell and purchase a specific amount of light, sweet crude

oil at a specific future date and place. NYMEX's crude oil contract was initiated in 1983, and each contract or "unit" pertains to 1,000 U.S. barrels (42,000 gallons) of what is described in the contract as "NYMEX Division light, sweet crude oil futures" for delivery in Cushing, Oklahoma. The delivery location is further specified as f.o.b. any pipeline or storage facility in Cushing with access to ARCO's or Texaco Trading and Transportation Inc.'s storage. The contracts trade forward for 30 consecutive months, based on a quarterly schedule, and also may be "long-dated," i.e., provide for delivery in the 36th or 48th month.

15. Although the MMS proposal refers to the NYMEX futures contract as if it pertained solely to West Texas Intermediate ("WTI") crude oil, a NYMEX futures contract can in fact be fulfilled with several different kinds of light, sweet crude oil. NYMEX has established that specific domestic crudes with 0.42% sulfur by weight or less, and not less than 37 degrees API gravity nor more than 42 degrees API gravity, are "deliverable" to fulfill a NYMEX crude oil futures contract. NYMEX has deemed the following domestic crude oils to be "deliverable" under a NYMEX futures contract: West Texas Intermediate, Light Sweet Mix, New Mexican Sweet, North Texas Sweet, Oklahoma Sweet, and South Texas Sweet. Similarly, NYMEX has deemed several specific foreign crudes, of not less than 34 degrees API nor more than 42 degrees API, to satisfy a NYMEX futures contract, including U.K. Brent and Norwegian Oseberg Blend (for which the seller receives a 30 cent per barrel discount below any contract settlement price), Forties (for which the seller receives a 35 cent discount) and Nigerian Bonny Light and Cusiana (for which the seller receives a 60 cent per-barrel premium).

16. The NYMEX crude oil futures contract is a heavily-traded commodity instrument. On a good trading day, 150,000 contracts can change hands, though average annual volumes are on the order of 60,000 to 70,000 contracts daily. That is the equivalent of up to 150-million barrels daily on a busy day, and 60 to 70 million barrels a day on average. These volumes are anywhere from 10 to 20 times greater than all of the crude oil actually produced on an average day in the United States.

17. As the foregoing makes clear, what is bought and sold through NYMEX is not the crude oil itself, but futures contracts, *i.e.*, agreements to buy and sell the crude oil at a certain place and future time. The crude oils that may satisfy the contracts are the range of light, sweet crude oils described above. The place of delivery for NYMEX crude contracts is specified as facilities in Cushing, Oklahoma, with access to other storage facilities and pipelines.

18. NYMEX trading volume far exceeds the approximately 350,000 to 400,000 b/d of physical capacity at Cushing and Cushing's 25-million barrel storage capacity. Actual physical deliveries of crude taking place after expiration of a NYMEX contract are on the order of 50,000 to 100,000 b/d, or 0.08% of total NYMEX volume. EFP (*i.e.*, Exchange for Physical) transactions also occur, which are buy/sell transactions conducted outside the exchange but prior to the deadline for declaration of physical deliveries. EFP volumes are on the order of 1.5-million b/d, or about 2.3% of total volume. In sum, physical deliveries either upon expiration of NYMEX futures contracts or through EFPs constitute only approximately 3.1% of total NYMEX trading volume.

19. As I stated in a recent article published in NYMEX's own magazine,¹ NYMEX futures prices are important and serve as a general benchmark with respect to trading in U.S. domestic crude oils. "The degree of activity is such that the NYMEX Division quote sets a baseline yardstick for U.S. domestic crude prices, and represents the primary price line for the oil industry in many parts of the world." Exhibit B at p. 16 (emphasis added). The fact that NYMEX futures prices may serve as a benchmark in some levels of crude oil trading, however, does not mean that one can easily mechanically adjust or "net-back" from the NYMEX futures price in the manner that MMS proposes and arrive at the market value of crude oil at specific domestic leases. The market for a crude oil at the lease is very different from the market for NYMEX crude oil futures contracts, and the two cannot be linked in the manner proposed by MMS, as will be discussed further below. The market at the lease existed before NYMEX existed, and if NYMEX disappeared tomorrow, wet barrels would continue to be bought and sold at the lease market.

¹M. Thomas, "Energy in the News," Winter 1996/1997 Edition (the full text of which is attached as Ex. B).

B. Hedging And Speculation Are The Principal Reasons For Trades In NYMEX Crude Oil Futures Contracts.

20. The primary function of trading in NYMEX crude oil futures is the shifting (or hedging) of price risks through trading in the futures. NYMEX, itself, emphasizes its role as a hedging instrument, i.e., a tool for end users to protect against the risk that market prices will change in the future. For example, throughout its presentations to the MMS, NYMEX rightly highlights the appropriateness of its crude futures contract as a hedging tool. NYMEX states that the governments of Mexico, Norway and Columbia use its futures contracts as a hedging tool, as well as the states of Texas, Delaware and Massachusetts. NYMEX encourages government agencies to trade in NYMEX crude oil futures contracts to hedge the financial risks associated with future oil production revenues.

21. Despite the use of NYMEX crude oil futures as a hedging tool by some governments, the acceptance of such futures contracts is not universal. Many major oil producing nations (e.g. Saudi Arabia) still view NYMEX and other futures instruments as speculative, and refuse to link their prices directly to such instruments.

22. Indeed, NYMEX crude oil futures trading is clearly dominated by speculative interests. Participation in NYMEX (i.e., crude futures -- open interest) in 1996, as detailed by NYMEX in documents provided to MMS, shows that crude oil producers constituted only 3% of the futures market, and indeed their role seems to have diminished from prior years. Refiners, marketers and integrated oil companies represented a combined

25% of the market, and their share has been relatively constant for nearly a decade.

Speculative interests constitute approximately 70% of the total volume of open interest and, if anything, the percentage held by speculative interests has increased since the late 1980's.

The 70% category includes traders (some of whom are involved in the physical oil business), financial institutions (and funds), and other speculators on the trading floor, as shown in the following table:

NYMEX CRUDE MARKET PARTICIPATION*

	1987	1991	1992	1993	1996
Producers	8.0	4.0	0.6	...	3.0
Refiners	17.0	7.3	7.6	7.2	10.0
Integrated	25.0	14.6	17.2	17.4	10.0
Marketer	15.0	1.7	1.2	2.8	4.0
End Users	...	1.1	1.3	0.7	...
Traders	35.0	55.4	46.6	42.9	32.0
Speculators	...	7.9	16.7	13.9	12.0
Financial	...	8.0	8.8	15.1	**28.0

*Samplings of open interest volume % share

**Funds represent 5% and other financial institutions 23%

Clearly, oil-the-commodity, i.e., as the paper futures instrument that can be bought and sold at will without physically taking title to any crude oil, is the engine that drives NYMEX trading, and oil the physical barrel that moves from the wellhead is merely the foundation from which the futures market complex rises.

23. NYMEX crude as a futures commodity is very different from most non-commodity grades of crude oil. In fact, the variations between crude oils can be almost as large as between crude oil and gasoline, though much more subtle. In simplest terms, NYMEX represents the futures market price at a moment in time for a generic light sweet crude oil delivered to Cushing in a specified month in the future. The NYMEX futures price cannot be linked to value at the lease in the manner proposed by MMS.

C. **NYMEX And WTI Are Not Synonymous And Involve The Different Worlds Of Crude Oil Futures Pricing Versus Markets For Physical Supplies**

24. The MMS proposal fails to recognize the differences that exist between NYMEX Division Light Sweet Crude ("LSC") and WTI. The crude that the U.S. industry refers to as WTI is largely synonymous with the NYMEX Division light, sweet futures contract, but the two are not the same. Numerous grades other than WTI are deliverable against the futures contract, and *"the Exchange very pointedly discourages references to its contract as WTI. . . ."* Exhibit B at p. 16 (emphasis added), from NYMEX's magazine, *Energy in the News*. Traditionally, the benchmark crudes are referred to by grade type, such as WTI, or Brent, which implies a direct connection between the price and a physical supply of that oil. With the commoditization of oil, *i.e.*, the development of benchmarks relating to crude oil futures rather than to crude oil itself, the connection is less well-defined.

25. The NYMEX LSC is not the same as actual barrels of WTI at Cushing, and it is worlds apart from physical supplies of WTI at the lease, and even further different from other domestic grades. Market participants at all levels "look at" or consider the NYMEX benchmark, but there is a very big difference between "looking" at NYMEX future

prices and building a system that uses the NYMEX quote as the starting point for royalty valuation. The MMS proposal is an attempt to bridge very different worlds -- the "apples" world of commodity futures pricing, on the one hand, and the "oranges, pears, cherries, etc., etc." world of "wet" physical supply at the market centers, aggregation points and the very distant lease, on the other.

D. NYMEX Prices Are Influenced By Factors Not Present At The Lease Market.

26. The differences between a commodity futures benchmark like NYMEX LSC and physical wellhead supply are numerous. First, while deliveries of physical oil can be made against the commodity contract, physical supply is secondary to price considerations as the primary rationale behind futures trading. The ease with which NYMEX crude oil futures contracts can be traded gives the contract an added value over the cumbersome physical barrel at the wellhead.

27. The fact that crude oil is a physical product at the lease makes the creation of a valuation relationship between the NYMEX futures price and oil at the lease more complicated. The oil must be pumped or, in the absence of a pipeline, stored and put on a truck, and ultimately moved to an aggregation center. The buyer of oil at the lease is dealing with concrete issues: the well pump must be working, the valves must function, the quality must be maintained and monitored, schedules tracked, and barrels counted. On the other hand, the futures market participant is dealing with an abstraction, a paper barrel that they may never see, never receive, and never handle.

1. The Structural NYMEX "Premium"

28. For all the volatility risks associated with the NYMEX, it is a structured trading instrument with a vast array of built-in administrative protections. NYMEX provides financial surveillance and audits and maintains the financial integrity of the contracts with position limits and margin requirements. NYMEX provides trade surveillance to prevent manipulation and anti-competitive activity, assure proper trading procedures and compliance. Numerous other operational and management functions are undertaken to assure sound operation, clearing of contracts, financial integrity and other safeguards. These protections enhance the NYMEX crude oil futures contract's prices (all other things being equal). However, these protections are not built into the major trade center cash markets, or the lease markets. The entities that purchase crude oil as it changes hands after leaving the lease take on those costs and risks as they move the crude oil to downstream markets -- often across hundreds of miles, through complex physical systems, and through several layers of high risk commercial transactions.

29. The NYMEX premium is not without cost. A seat to trade directly on the NYMEX floor costs about \$600,000. Even if one does not want to directly hold a seat, but simply participates via member firms, there are still substantial costs. There is a brokerage fee for execution of a "round turn" (i.e., a complete transaction). An initial "margin" (i.e., deposit) of \$2,025 per crude contract (1,000 barrels) must be posted by non-NYMEX members. If a participant in NYMEX trade chooses to execute an Exchange for Physical ("EFP"), that is, cash out a futures position by either giving or receiving wet physical oil at Cushing, there would be another fee for scheduling and other

related costs at Cushing. These direct costs are minor elements of the overall costs associated with active participation in the oil futures trade. There exist much greater indirect costs associated with managing an oil trading operation and the inherent risk associated with such speculative activity, as described in further detail in paragraphs 54-56, infra.

30. Participation in the NYMEX necessarily involves a commodity trading/marketing role that goes far beyond the marketing of production at the lease. Lessees can bring crude oil to the point of sale at the lease. However, they cannot realize NYMEX-like values without going into another line of business — trading paper futures instruments rather than actual physical barrels of crude oil. Moreover, as previously noted, it is physically impossible for every barrel produced in the United States outside of California and Alaska to make it to Cushing, and Cushing lacks the capacity to handle such production.

2. The Impact Of Timing

31. The price of crude oil futures contracts is also affected by timing and the prices of other futures contracts pertaining to delivery for the same period. Timing is a critical element. Oil at the lease is priced each day as it is produced, in contrast to the NYMEX commodity quote, which applies to future barrels. The primary NYMEX contract (the "prompt month" or "front month" contract) presently involves crude for delivery in July 1997. That contract started trading in September 1995 -- which is 22 months prior to delivery. As shown in Graph 1 of Exhibit C, the price variations over the life of the contract were huge, ranging from \$16.75 a barrel in 1995 to \$23.33 a barrel in early 1997, and back down as low as \$19.69 in early May and up again to the \$21-22 range more

recently. Futures market participants earn their rewards, if any, by determining when to buy and sell specific supplies over the life of each contract. This largely "speculative" activity takes enormous work, involves substantial costs, and entails risks. Active participation in this market is a different line of endeavor than producing oil at the wellhead and selling it.

32. The MMS proposal to use a rolling "prompt month" or "front month" NYMEX quote as the valuation benchmark does not solve the big financial/price impact caused by timing. The "first" month price on the NYMEX can carry very big premiums or discounts versus other subsequent time frames, a process known as "contango" or "backwardation." These differences are evident over even a 30-day time period, the time between the first month and second month NYMEX contract. See Graph 7, Exhibit C. The simple difference in timing can affect realizations on a first month sale dramatically, typically affecting values by as much as 50 cents to \$1 a barrel, and sometimes as much as \$3 a barrel. The timing choice is a downstream commercial decision that has no relation to market value at the lease. Royalty value is established at the time when actual production occurs.

3. The Cushing "Supermarket"

33. Furthermore, moving to consideration of the actual physical market -- Cushing, Oklahoma -- onto which the speculative NYMEX crude oil futures trading is added -- there are major structural differences between the market at Cushing and the primary oil field sources of crude oil. The crude oil that physically reaches Cushing is in many ways a "finished" product, and it is selling in almost a retail showroom setting, ready for the buyers

to "take home." NYMEX Cushing crude goes one step further in that it is "commoditized," i.e., turned into a paper trading instrument, and does not require physical handling like a "wet" barrel at Cushing.

34. Cushing, unlike any individual lease, has approximately 25-million barrels of crude oil storage, and more than a dozen major pipeline linkages and interchange connections for Midwest destinations. The Cushing complex facilitates the fungibility of sweet crude at the interchange, providing the ability to substitute other crude grades for WTI, making the location much like a supermarket. The Cushing reference location, with its substantial physical storage and vast inter-connecting pipeline systems, gives the futures contract added value from a physical standpoint. The seller at Cushing is at a central distribution point with access to a large array of potential buyers, giving added value to his product. In contrast, the vast majority of crude oil produced in North America (from approximately 575,000 oilwells) does not have direct access to this huge infrastructure. The average oilwell in the U.S. produces at a rate of 11.4 barrels per day, based on data published by the Independent Petroleum Association of America ("IPAA"). See *The Oil & Natural Gas Producing Industry In Your State (1996-1997 Ed.)* published by IPAA. The smaller "stripper" wells produce only about 2 b/d on average, and all the larger-volume (non-stripper) wells average about 41 b/d of output. Even the offshore Federal oil lease areas with much larger volume oilwells average only 234 b/d of production. These supply volumes at the lease are a far cry from the 800,000 b/d of total WTI crude flow, or the 50-million to 150-million b/d that change hands on busy NYMEX trading days. Few of these

barrels ever find their way to Cushing for physical delivery to satisfy NYMEX contracts, and many of the barrels could not even physically reach Cushing.

E. No Simple, Consistent Relationship Exists Between NYMEX Futures Prices And The Values Of Specific Non-NYMEX Crude Oils.

35. While world oil markets consider NYMEX, that fact does not mean that NYMEX futures prices can be easily linked in the manner proposed by MMS to the vast diversity of domestic crude oil grades at the lease. Aside from WTI, there are perhaps a half dozen widely traded domestic "grade" crudes in the Gulf Coast/Mid-Continent area, plus Alaska North Slope crude oil and a variety of California crudes. In addition, there are at least another 35-to-40 domestic grades for which U.S. purchasers "post" prices at which they are willing to purchase a particular grade.

36. Beyond the valuation that NYMEX places on generic LSC in the Cushing location, there is an additional component of basis risk, i.e., the difference in value that exists between the NYMEX value and the actual values of all other crudes. These differences in value vary by quality, location, infrastructure, timing, class of trade and other factors. The prices of all other non-NYMEX crudes do not move in lock step with NYMEX. For example, even crudes like Light Louisiana Sweet, which typically trade at a differential against WTI, can range from a premium of \$1 a barrel over WTI to a discount of \$1 under WTI. See Exhibit C, Graph 3.

37. The linkages between the many individual crudes and NYMEX are as volatile as the NYMEX basis itself. There is no simple, mechanistic or consistent means of determining those variables. Everyone in the oil trade has opinions on what those variables against basis should be and the answers are received each day in the commercial arenas of trade. In attempting to establish a single methodology to determine differentials between NYMEX LSC and numerous specific crudes at hundreds of specific locations, MMS's proposal offers the illusory appeal of simplicity, but ignores the realities of the commercial market.

38. Beyond looking at NYMEX, WTI and domestic crudes, some U.S. oil markets pay attention to important foreign benchmarks, like North Sea Brent crude. The International Petroleum Exchange ("IPE") and price assessments for Brent influence the coastal U.S. crudes (i.e., crude oils produced in close proximity to the Gulf Coast refining centers). Prices of these U.S. crudes, like Light Louisiana Sweet ("LLS"), often respond to trans-Atlantic arbitrage economics as much as to NYMEX or WTI values. When it is economic to move incremental supplies of Brent (or sweet West African crudes) into the U.S., prices for many U.S. crudes (sweet and sour) respond to the volumes of imports that are en route to or arriving in the U.S. As I noted in the NYMEX magazine article, "Both the New York and London crude futures markets are utilized, singularly and in unison, by the cash markets, depending on the needs of each transaction the oil trade thus far finds it useful to work with multiple instruments" Exhibit B at 16. I mention foreign benchmarks not to suggest that the infirmities in MMS's proposal can be remedied by adding

references to foreign benchmarks, but to show that a host of factors influence crude oil value, even at market centers, which are not captured by the NYMEX prices.

39. Many market participants "look" at or consider the NYMEX futures price, "look" at the reported spot price assessments created by Platt's, Petroleum Argus and others for crude oils in domestic cash markets, "look" at imports, and "look" at Brent and other benchmarks. Many markets respond to a whole array of such indicators and benchmarks. The responses are often complex and multifaceted. MMS's simplistic proposal to adopt NYMEX for calculating a royalty value at the lease ignores both the complexity and the realities of the crude oil marketplace.

V. In Attempting To Bridge The Gap Between NYMEX And The Lease, MMS's Proposal Oversimplifies Crude Oil Markets.

40. The MMS proposal suggests that a single methodology can be used to bridge the gap between the NYMEX futures price and values in the lease markets. But MMS's proposal ignores basic differences in value and oversimplifies the existing crude oil markets.

A. One Oil Price. Or Many Oil Prices

41. The use of NYMEX or ANS spot assessments as a price base in a methodology such as that proposed by MMS for valuing different grades of crude oil at numerous lease locations is flawed. Prices vary, even at the same location, for the same oil depending on where it is going, how it is sold, who sells it and who buys it. A classic example is the case of the world's biggest oil exporter, Saudi Arabia. When it sells its primary Arabian Light crude oil f.o.b. its big Ras Tanura loading port, numerous prices are used (often varying by a dollar or more a barrel). There are three prices for Arab Light at Ras Tanura -- one for U.S. buyers, one for European buyers and one for the Far East. For example, Petroleum Intelligence Weekly in its Crude Oil Handbook shows the price of Arab Light in July and August 1996 as follows:

	Europe	U.S.	Japan	----- U.S. -----	
				vs Europe	vs Japan
July	\$19.11	\$19.82	\$18.68	+\$0.71	+\$1.14
August	\$20.79	\$20.96	\$19.51	+\$0.17	+\$1.45

42. The price relationships between the different markets vary by some 30 to 50 cents from one month to the next for the same crude oil. That is the nature of oil markets, and any attempt to impose a more rigid order, where there is none, runs contrary to market realities.

43. The U.S. crude markets are more complex than Saudi Arabia's market. Saudi Arabia loads the same oil in similar size ships from the same location, and deals with multi-level prices. The U.S. has many more crude grades, many more locations, numerous

different size transactions, and many more different classes of customers than the Saudis. Alaska North Slope -- one of the larger U.S. domestic grades -- provides a further example of price variation related to destination. In the first quarter of 1996, the ANS contract price (as cited in the PIW Crude Oil Handbook) varied anywhere from 18 cents to 58 cents a barrel depending on sales destination, as shown in the following table:

	<u>US Gulf</u>	<u>California</u>	<u>Difference</u>
Jan. '96	\$17.59	\$17.01	\$0.58
Feb. '96	\$17.60	\$17.29	\$0.31
Mar. '96	\$17.98	\$17.80	\$0.18

These price differences are not simply the result of transportation costs. The price differences reflect a difference in realizations at the source in Alaska that is not accounted for by transportation costs.

44. There exist more differences than just those related to destination which cause the same oil to frequently have more than one price or market value. For example, there are price variations in U.S. domestic crude grades reflecting differences in contract duration and starting date of supply. Typical deals involve timing "strips" of either three or six months duration. Prices for crude oil will vary based on the starting month of supply and on the duration. For example, here is a sampling of the spread between LLS and WTI prices in effect in early May 1997 for three different starting dates and two different time periods or durations:

LLS/WTI PRICE SPREAD

Contract Duration

Contract Start Date:	Three Months:	Six Months:
June, 1997	-5 cents	+ 5 cents
July, 1997	-2 cents	+10 cents
Aug., 1997	+6 cents	+16 cents

B. Spot Versus Term Supply

45. MMS's use of NYMEX and market center reported spot price assessments essentially involves reliance on the spot market to determine values for longer term ongoing contract sales. The longer term time frame imposes special obligations and benefits on both buyer and seller. The buyer gets assurance of continuing supply, and the seller a predictable and known outlet. In times of a supply crisis the term contract usually fetches a premium (reflecting security of supply); in times of stable or surplus markets, term contracts incorporate an effective discount (reflecting security of disposal).

46. The reliance on spot prices by MMS's proposal is likely to lead to inaccurate valuation. In times of short supply or supply crisis, spot prices are prone to increase dramatically and far outpace the prices received for crude oil under term contracts. During the 1979 oil crisis, for example, the U.S. Government took the lead (within the 20-nation International Energy Agency) in establishing a "quick response system" to identify and discourage "unacceptably high prices" in both spot and term transactions (see PTW Oct. 1,

1979, pp. 1 & 4 and PIW Nov. 12, p. 3). During the more recent Gulf war oil upheaval, skyrocketing spot and NYMEX crude oil prices were widely criticized in Congress. In sum, the MMS's proposed reliance on spot price assessments may lead to serious valuation problems in times of supply dislocations. Moreover, by using values based on spot transactions, MMS's proposal would incorrectly value the crude oil sold in the lease markets.

C. Classes Of Trade In Crude Oil Market

47. The upper tier of crude oil trade in terms of bulk size is in the cargo markets, characterized by Very Large Cargo Carriers ("VLCC") ranging from 1.7-million to 3-million barrels. The lower tiers of cargo trade size in areas like the North Sea typically involve smaller, but still substantial, lots of 600,000 barrels. The pricing of these massive quantities is fairly visible given the comparable infrastructure, loading and movement mechanisms, and is well-reported in the trade press. These extremely large volume transactions are a substantial component of the 7-to-8 million b/d of crude oil imported into the U.S. NYMEX and WTI prices interact with the prices of North Sea supplies like Brent, which typically account for 600,000 b/d to 750,000 b/d of total U.S. imports. These quantities far eclipse the small volumes associated with domestic U.S. crude trading business, and therefore constitute an entirely different class of trade.

48. The domestic U.S. crude trading business is far different from that of the cargo markets. The basic unit for wet pipeline crude transactions is 1,000 b/d for a one month period (some 30,000 barrels). Unlike tanker lots, the points of sale are almost

infinite, from any one of 575,000 wellheads to thousands of secondary locations where oil may be moved by truck or pipeline and some 267 aggregation points identified by MMS.

49. The quantities of oil sold in a "transaction" can involve volumes ranging from a few barrels produced daily by a stripper well, to thousands of barrels a day collected at aggregation points, to much larger volumes at market centers like Cushing. The logistics involved as oil moves to its ultimate destination may require numerous transactions in which title changes hands that affect the value of the crude oil as it moves farther away from the lease. The number of transactions depends on the size and location of the initial oil flow, the quality of oil, and the nature of the infrastructure involved in moving it to market. Each of these sales and their related prices is commercially valid. Each deal represents a slightly different "class" of trade, and each class has "costs" associated with doing business.

D. The Downstream Change Of Value

50. As crude oil moves downstream from the lease, events occur that frequently change the value of the crude oil, sometimes making it less valuable but often rendering it more valuable. A firm that MMS consulted when drafting the proposed rules, Summit Resources, describes the chain of transactions in which crude oil moves away from the lease as a "downstream marketing function" that "adds value away from the lease." For purposes of illustration, I here follow Summit Resource's outline of a typical flow of crude, and describe the associated marketing transactions involved which add value to the crude oil.

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51. According to Summit, the first level of trade is at the lease, presuming that the owner is not "taking" the crude at the lease, but selling it. If the oilwell is not physically interconnected to a primary pipeline system, the first sale at the lease would likely reflect the cost of "gathering and transporting" the crude downstream from the point of first sale. This function, which adds value to the crude oil, is often assumed by "resellers" who purchase crude from a number of oilwells in an area, aggregate the barrels, bring them into a pipeline and move them downstream.

52. According to Summit, the "gathering and transportation" function that occurs downstream from the point of sale includes:

- Contracting For or Providing Transportation
- Scheduling of Volumes
- Providing Pipeline Fill
- Tracking of Volumes Delivered
- Providing "de facto" Credit Services

The initial transactions may also necessitate storage, which Summit describes as:

- Constructing or Leasing Facilities
- Scheduling of Storage Volumes
- Maintaining Inventory

53. The Summit outline also shows the various complex marketing functions involved beyond the gathering, transporting, and storage of the crude. The participants in the downstream cash markets, as in the NYMEX, assume the added costs and risks associated with obtaining a knowledge base of marketing and market information, which Summit describes as follows:

- Types of Crude Oil
- Location of Customers
- Customer Preferences

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- Aggregating Supplies
- Availability of Transportation Facilities
- Area Market Price Structures
- Timing and Transaction Costs

54. In addition, participants in downstream cash markets assume and manage substantial and unpredictable risks, which Summit Resources describes as follows:

- Price Fluctuation (Basis Risk)
- Transport Failure (Risk of Loss)
- Spills (Environmental Risk)
- Credit-Worthiness of Purchasers
- Force Majeure

55. The risks and costs of participation in these cash markets downstream of the lease market are substantial, with bankruptcy a possible result. They are in addition to the direct costs associated with NYMEX trading as outlined earlier. Serious participation in the downstream commercial oil markets is expensive. A typical "small" trading/market function (two traders and two or three support staff) can easily cost \$1 million a year in out-of-pocket operating overhead. Beyond the cost of personnel, equipment, office space, etc., any trading operation of consequence would require a committed credit line on the order of \$10 million. With interest costs at prime-plus 2% (currently about 10.25% total), the expenses and risks mount up fast.

56. Based on my observations of the crude oil trade, retaining a third party "contract trader" to market lease oil downstream would cost either a per-barrel fee or possibly be done on a "results" oriented contingency basis. On whatever basis obtained, a contracted marketing program entails added costs for management supervision, and the

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implicit risk associated with having a third-party act on one's behalf, as well as the costs detailed in the preceding paragraph.

57. Crude oil buyers compete for supply at the lease, and at virtually every system interconnection, tank farm, and pipeline center. The desirability of the crude (quality, location and available volume) determines both the intensity of competition for a given supply, and the level of prices (relatively high or low). The further downstream the oil flows, as it is bought and sold, the more complex the infrastructure, the more choices for the seller, and the higher the price of the oil may be due to added risk and cost. The various levels of market trade involve numerous participants from the major international oil companies to small resellers and marketers (including firms like Summit).

VI. MMS's Proposed Rules Involve Misplaced Reliance On The Price Assessments Of The Trade Press At Market Centers.

58. MMS is looking to the trade press to assist it in defining crude oil values at the following market centers: Cushing, Oklahoma; Midland, Texas; St. James, Louisiana; Empire, Louisiana; Guernsey, Wyoming; and Los Angeles and San Francisco, California. To determine market center values, MMS says it will periodically publish a list of "acceptable" publications, which it defines as those frequently used by buyers and sellers, frequently mentioned in contracts, or employing "adequate survey techniques." In the case of ANS, MMS proposes to use spot price assessments at Los Angeles and San Francisco based on surveys made by the trade press.

A. Lack Of Reliability

59. The MMS proposal's reliance on the reported spot price assessments published for various crude oil grades at market centers is misplaced. First, the number of transactions reported to the trade press for certain crude oils at certain locations is too small to permit corroboration of such reported prices, thereby creating varying degrees of uncertainty with respect to the accuracy of the reported assessments.

60. The trade press services generally avoid detailed descriptions of how they determine their published spot assessments. Ultimately, the published prices represent assessments of prevailing market prices arrived at in numerous different manners. It may be an average of reported transactions; in the absence of transactions, it may be an assessment of the price at which deals would have been done -- had there been any; or it may be the "last deal done." In fact, the pricing services officially warn the oil trade that any use of published numbers is "at your own risk." For example, Platt's states in its Guide to Petroleum Specifications that "Platt's neither encourages nor solicits companies or individuals to use its price data in contractual arrangements." See attached Exhibit D.

61. In part, the degree of reliability of reported price assessments depends on the skill of the journalist covering the market on a given day. The degree of perfection and/or imperfection in the cash market assessment process varies from one service to another, especially over time. Accuracy depends on the skills and efforts of the individual journalists that are covering a market on a given day. The level of accuracy may change with the turnover of price reporting personnel, and variations in the experience level

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of individual staff members. The competent reporter endeavors to contact a wide and diverse swath of market participants, and minimize over-reliance on a narrow band of contacts.

62. More importantly, even with skilled journalists, the reliability of any trade press price assessment depends primarily on the degree of liquidity of the market for the crude oil being assessed. Judging by my own knowledge and the information and comments I have received from trade reporters, I believe that the relative degree of liquidity and accuracy of crude market price quotes varies appreciably. In short, several of the reported spot price assessments that MMS proposes to rely on to bridge the difference between the NYMEX futures price and the value at the lease are likely to have reliability and accuracy problems because of limited market liquidity. Nowhere in its NOPR has MMS addressed the issue of the variations in reliability of these reported price assessments.

B. MMS's Reliance On Price Assessments At Market Centers Conflicts With MMS's Stated Views On Buy-Sell Transactions, Exchange Agreements And Similar Transactions At The Lease.

63. In the NOPR, MMS states that it does not trust the values placed on crude oil in buy-sell transactions, exchanges and other similar transactions at the lease. Yet, the very reported price assessments at market centers that MMS relies on in its proposed rule are based on values derived from buy-sell transactions, exchanges, and other similar transactions.

64. The reported spot assessments selected by MMS as index pricing points purportedly provide a basis for valuation of a cross section of domestic crudes on a

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cash market basis adjusted from the NYMEX futures prices. The fact that such published price assessments are on an "absolute" or "outright" basis, i.e., they show a complete price (as opposed to a spread or differential between two crudes), suggests that the numbers are based on crude oil transactions in which crude oil is sold for a single, expressed price. But such transactions are not the norm.

65. The reality is that the cash markets being assessed by reporting services at market centers largely involve one or more of the following elements: (1) buy-sell transactions; (2) spread or differential values (not outright prices); (3) more than one crude grade or location; and (4) various delivery time frames or multiple time frames.

66. For example, a reporting service may be informed of a transaction in which one party takes WTI at Cushing and gives the second party WTI at Midland plus \$1.00 a barrel. No outright price for the oil at either location is actually expressed. Yet, because relevant NYMEX futures prices may be at or around \$20.00 per barrel, the reporting service may assign values of \$19.00 at Midland and \$20.00 at Cushing. The prices would be treated as "outright," i.e., single, complete prices by the service, rather than as a differential. Similarly, transactions may have many components involving crude oils of different grades and locations, yet reporting services will assign single, outright prices to the crude oils involved in the transaction and use these prices to arrive at the services' reported spot assessments.

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67. In short, the very kinds of transactions that MMS alleges are unreliable and cannot be used to value crude oil at the lease are built into, and form the basis of, the reported spot price assessments that MMS proposes to use at each of the market centers. It is inconsistent for MMS to reject use of such transactions occurring at the lease, yet rely on such transactions at market centers. Such transactions are commonplace in the crude oil markets at the lease and at market centers. Moreover, moving away from the lease to the market center leads to MMS's adoption of fixed, non-market-based adjustments as an attempt to build a bridge back to the lease.

68. Judging by PVM's transaction database, NYMEX participants who are speculators are playing a substantial role in the trading of physical barrels of crude oil occurring at market centers, rendering market center prices even less appropriate for valuing or working back to the value of crude oil at the lease. The largest segment of market center participants is speculators comprised of Wall Street firms and oil traders, not the producers or gatherers of crude oil, or even the major oil companies. Of necessity, independent refiners are active market center participants. It must be emphasized that these market center transactions are considerably downstream of the lease; thus they are another line of business (commercial trade), and are not the appropriate basis for lease market valuation. The following table shows the participation of oil traders and Wall Street firms, as well as other entities, in market center trading on a volume basis:

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PARTICIPATION IN MARKET CENTER TRADING

	Category	JULY, 1993	FEB., 1994	FEB., 1996
BUYERS	Majors	3.1%	9.0%	14.8%
	Mini-Majors	2.6%	3.4%	5.3%
	Traders	36.0%	25.4%	5.1%
	State Firms	1.8%	4.5%	0.6%
	Wall Street	19.5%	12.4%	33.5%
	Independents	20.2%	30.1%	11.3%
	Producers	5.6%	6.3%	5.4%
	Gatherers	11.2%	8.9%	23.5%
SELLERS	Majors	2.2%	5.8%	17.8%
	Mini-Majors	1.8%	4.0%	2.7%
	Traders	27.4%	23.1%	1.9%
	State Firms	2.0%	4.0%	6.9%
	Wall Street	20.7%	30.0%	32.6%
	Independents	19.5%	15.6%	7.6%
	Producers	5.2%	8.9%	8.8%
	Gatherers	21.3%	8.6%	21.5%

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VII. MMS's Proposed Location/Quality Differential From The Market Center To The "Aggregation Points" Does Not Replicate Actual Prices.

69. To calculate a "location/quality" adjustment from market centers to aggregation points, MMS proposes to use either location differentials drawn from a lessee's contracts or fixed adjustments that MMS will calculate. With respect to the latter, MMS proposes that it will collect data with which to calculate location/quality adjustments for various crude oils from the many market centers to the large number of aggregation points. In sum, MMS would calculate and impose a single, fixed, annual location/quality adjustment between the market centers and the aggregation points. MMS proposes not only to use single, fixed annual figures, but also to calculate the adjustment based on the prior year's data.

70. MMS's proposal to impose a fixed annual location/quality adjustment will not replicate actual market prices at the lease. The relative difference in value between crude oil at two locations, even crude oil of precisely the same quality, is constantly changing. MMS's proposed fixed adjustment figure would fail to capture the volatility of the relative differences in value between crude oil at the market center and at aggregation points. The fixed adjustment figure would fail in at least two respects: it would fail to capture the volatility in relative values between the market center and aggregation points, and it would be based on stale data from a prior year.

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71. The volatility of relative values between two locations can be demonstrated simply by looking at the prices reported for WTI between two index points, Cushing and Midland. In this example, oil of the same grade and quality is used. Graph 2 in Exhibit C shows the wide fluctuations in relative values between WTI at Midland and WTI at Cushing. Moreover, these fluctuations bear little or no relationship to the costs of pipeline transportation between the two locations. Fluctuations between Cushing and Midland values for WTI range from plus 40 cents a barrel at Cushing over Midland to minus 20 cents a barrel at Cushing vis-a-vis Midland, as shown in Graph 2. The differences in values are nowhere near the transportation tariff rate, exposing the weakness of any argument that "costs," such as transportation costs, between two locations can be used to establish the relative "value" of crude oil between these locations.

72. The fluctuations in value between crude oils at different locations may become even greater when the crude oils are of somewhat different quality. For example, as shown in Graph 3 in Exhibit C, in prior one-year periods there have been large fluctuations in value between LLS at St. James and WTI at Cushing. There is great volatility in prices between market centers and great volatility at the lease, resulting in volatility between market center prices and aggregation point prices.

73. The use of changing spot price assessments averaged each month as market center values by MMS's proposal is an implicit recognition of price volatility in markets beyond NYMEX. It is an inescapable fact that similar volatility exists all the way from the market centers to the aggregation points, and from the aggregation points back to

the lease markets. It is inconsistent for the MMS to recognize volatility between NYMEX and the market centers, but then impose a fixed, annual location/quality adjustment back to the aggregation points and lease. There is no rationale offered in the NOPR for choosing fixed adjustments over the constantly changing price relationships that characterize trade between the market centers and the lease.

74. Similar degrees of volatility and fluctuation are evident between the other index market centers and WTI Cushing, as shown in the supporting graphs included in Exhibit C comparing WTI Cushing prices with those of WTS, LLS, Wyoming Sour and Alaska North Slope crude oil. In addition to location, these price disconnects encompass substantial differences in quality and, in some cases, mode of delivery.

VIII. MMS's Reliance On Spot Assessments For Alaska North Slope Crude Oil Is Misplaced.

75. With respect to royalty oil produced from leases in California and Alaska, MMS proposes to use published spot price assessments for Alaska North Slope crude oil ("ANS") delivered at Los Angeles and San Francisco as the index or market center prices from which to work back to the value of royalty crude oil at the lease. However, MMS does not provide support for using ANS spot assessments as such an index, and MMS's reliance on the ANS spot assessments is misplaced.

76. MMS's recognition that some index or benchmark other than NYMEX is needed for California and Alaska certainly raises a question as to the logic of using

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NYMEX for all areas outside of California and Alaska. The West Coast crude oil markets certainly "look" at NYMEX each day, much as the other U.S. markets do. As with many U.S. crude oil market centers, there is a large degree of volatility between published ANS California spot price assessments and WTI assessments at Cushing. As shown in Graph 5 in Exhibit C, the reported spot price variations between ANS and WTI range from \$1 to almost \$4.50 a barrel, with swings of this magnitude sometimes occurring within the same year. While this degree of volatility is greater in degree than that between WTI at Cushing and certain eastern crude oil grades (like LLS and WTS), it underscores the point that price relationships between WTI at Cushing and crude oil grades in the eastern market centers are in constant flux, just as are such relationships between WTI reported spot assessments and ANS reported spot assessments.

77. With respect to using ANS reported spot price assessments as an index, the only rationales offered by MMS for using ANS as a benchmark or index are that: (1) ANS is an important source of supply, accounting for some 700,000 b/d of the California market; (2) ANS is widely used by refiners in the area and it is a leading value indicator for the region; and (3) ANS is both a base load crude and an incremental "swing" crude for refiners.

78. Despite the foregoing MMS rationales, ANS is a highly problematic indicator of overall regional crude oil values for numerous reasons, including that (1) published ANS price quotes in the trade press are mainly indicative of the value of ANS delivered in waterborne cargo-volumes, not of the value of onshore California crude oils

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delivered by pipeline, and (2) the features of the crude oil lease markets that the MMS criticizes (i.e., buy/sells, exchanges and transactions between companies that do business on many levels) also exist in the ANS trade monitored and assessed by the reporting services. It is inconsistent for MMS to reject such transactions as indicators of value at the lease, yet accept them as indicators of value as to ANS.

79. Furthermore, MMS proposes to adjust the ANS Los Angeles and ANS San Francisco spot assessments with a fixed location/quality differential calculated once a year based on state data reported for the prior year to work back from Los Angeles or San Francisco to aggregation points. As with the location/quality differentials proposed to be used outside of California and Alaska, these location/quality differentials would fail to reflect the volatility of the relative market values of West Coast crude oils and therefore would not reasonably replicate market values at the lease. MMS apparently believes that the only value that is added to crude oil by transporting it from the lease to an aggregation point is the actual cost of transportation. By only permitting lessees or designees to deduct the actual cost of transportation, MMS fails to account for and deduct other value added to crude oil when it is moved to an aggregation point.

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IX. No Changes In Crude Oil Markets Since 1988 Merit Imposition Of MMS's New Proposed System

80. There has been no significant change in the crude oil markets at the lease since MMS adopted its current regulations in 1988 that supports abandonment of the current regulatory system for valuing royalty crude oil. Indeed, the record before MMS indicates that the markets at the lease have grown more robust over the past several years. Since 1988, the number of producing wells has grown. A greater percentage of production from federal leases is owned by independent producers, especially with respect to OCS leases. In 1996, federal leases produced the greatest volume of crude oil in any of the last nine years, over 550 million barrels, and federal production as a percentage of national production reached its highest level for the period. See Barents Report at pp. 3-4.

X. A Market Exists At The Lease.

81. The central contention of MMS is that there is no legitimate crude oil market at the lease. MMS's support for this argument consists largely of pointing to the attention given NYMEX and market center trading by the industry and the trade press. In effect, MMS contends that because reported price assessments are not published for trading at the lease, no lease market exists. That view is clearly wrong.

82. There is a market at the lease and aggregation centers, and trading at this level of trade is based on posted prices. The postings are market-sensitive instruments that have evolved over the years. In addition to using posted prices, transactions in the lease

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markets frequently involve longer term arrangements than the transactions that occur in the market centers and in the commodity futures world of NYMEX.

83. Generally, the prices received for crude oil in the spot transactions that occur in downstream market centers are higher than the posted prices for the same crude oil in the lease markets. This difference occurs because the buyer of crude oil at the lease incurs numerous risks that downstream buyers on the spot market do not incur, and hence the buyer at the lease pays a lower price for the crude oil. At the same time, such a buyer eschews the benefits that could have been obtained through the "instant" buying and selling available in the downstream market center spot markets or on NYMEX. The benefits to be gained from buying at the lease on a posted price basis are only achievable at substantial risk to the buyer of lease production, and hence a different price is paid at the lease than at downstream markets.

84. The producer who sells crude oil at the lease at posted prices gains certain benefits and avoids the costs and risks associated with marketing the oil downstream, which accounts for the generally lower level of posted prices compared to downstream market center spot prices. The producer gains an outlet for the crude oil and avoids the cost of locating downstream buyers as well as the risks and costs associated with doing business at the market centers or in the commodity futures markets. If the producer chooses to retain ownership of all or a portion of production for eventual sale into the spot market, certain risks would remain with the producer, i.e., the potential for gains or losses.

85. The differences between the posted price market at the lease and the more distant and instantaneous spot markets are fundamental. Both markets and tiers of market prices exist; they are real, and the prices differ because costs and risks are borne differently between buyer and seller.

86. In many instances, the MMS proposal even favors the use of MMS-derived deductions over actual third-party sales transactions. A primary element of the proposal triggers use of index pricing (instead of actual proceeds from arms-length sales) in cases where an oil seller has purchased any crude oil from an unaffiliated third party in the last two years. This feature of the proposal reflects an apparent lack of understanding of the commercial rationale behind market transactions and effectively rules out consideration of most lease level deals in determining crude oil valuation.

87. My view of the crude oil markets, based on decades of observation and analysis, is that any royalty valuation process that strays away from the lease is mistaken.

EXHIBIT A

PVM
Oil Consultants*Biography - Marshall Thomas*

Marshall Thomas is Senior Vice President of PVM Oil Consultants, Inc., an affiliate of the major international oil brokerage firm, PVM Oil Associates, Inc. He is a leading oil market and pricing analyst, and has been active in the petroleum industry since 1967. In his work with PVM, Mr. Thomas has been involved in a variety of large projects including: major commercial audits of strategic planning/oil trading system management for refining and marketing firms; representation of buyers seeking to obtain U.S. downstream assets; evaluation of crude oil producing assets; and a feasibility analysis for potential oilfield expansion.

Mr. Thomas was previously based in Washington, DC as Group Editor & Publisher of The Oil Daily publishing group for several years and was a founding editor of The Energy Compass. He was also a director of the annual London & Singapore Oil & Money conference programs in conjunction with the International Herald Tribune. Prior to joining the Oil Daily, Mr. Thomas was associated with Petroleum Intelligence Weekly (PIW) as primary pricing and market specialist, Editor-in-Chief and creator of PIW's monthly Petroleum Market Intelligence. Mr. Thomas was on the editorial staff of McGraw-Hill's Platt's Oilgram Price Service in 1967 and 1968.

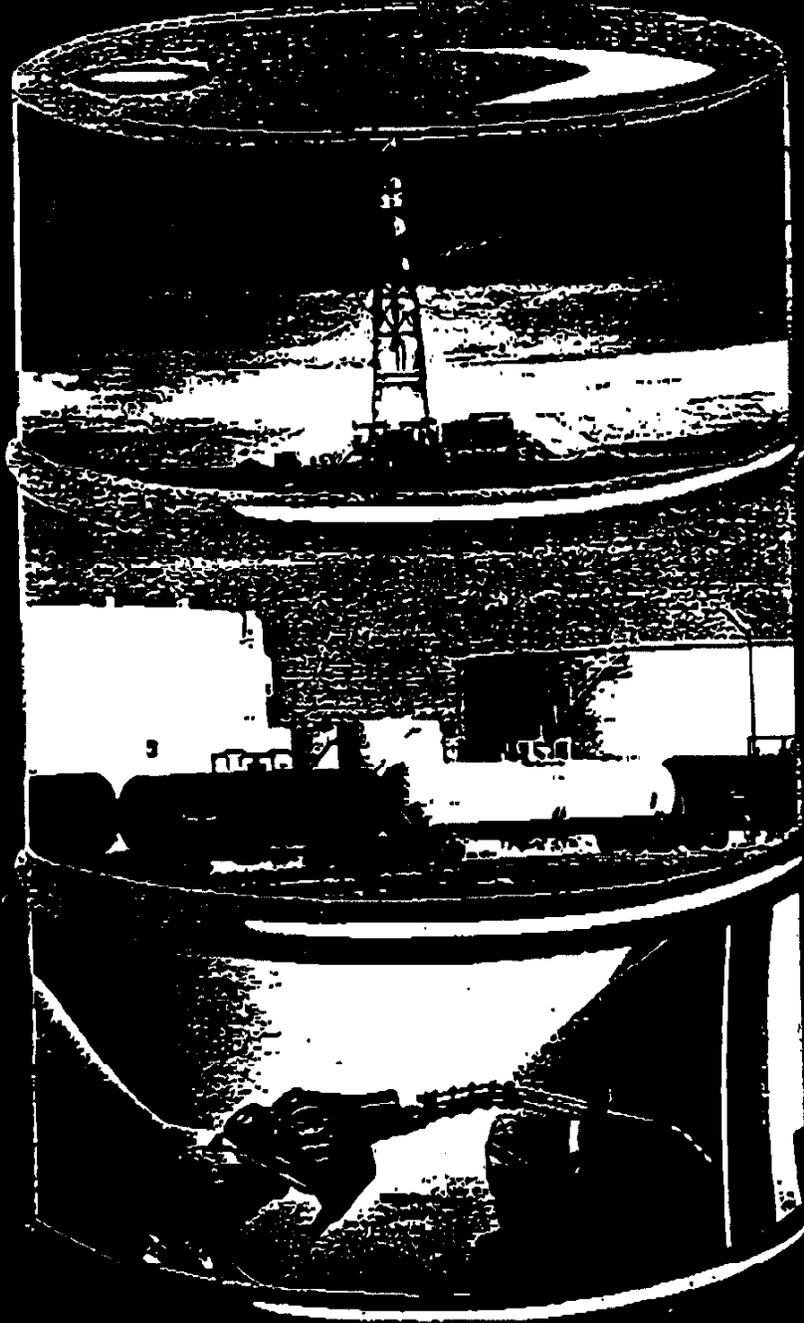
Mr. Thomas received the "Award for Excellence in Written Journalism" from the International Association for Energy Economics (IAEE) in October 1992. He received the Independent Petroleum Association of America's Lloyd N. Unsell Award for "Excellence in Journalism" on behalf of The Oil Daily in October 1991. Mr. Thomas has given lectures under the auspices of Japan Cooperation Center For Petroleum Industry Development (Tokyo), Asia Pacific Petroleum Conference (Singapore), Oil & Money Conferences (London & Singapore), Institute of Petroleum (London), Association of Energy Professionals (New York), New York Mercantile Exchange, and Mobil Oil (at a management seminar). He has also appeared on U.S. and international television: Cable News Network's (CNN's) Business Morning program, C-Span's "Newsmaker" program, and local network affiliates of CBS. Mr. Thomas was educated at Trenton State College in New Jersey.

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EXHIBIT B



*Hedging
Every
Aspect
of the
Barrel*

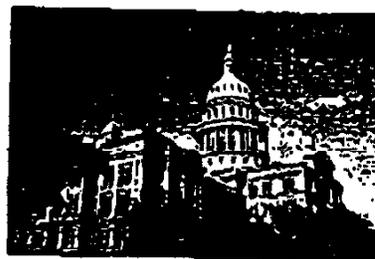
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Crude oil producers largely depend upon a system of formulas for their pricing in which the NYMEX Division light, sweet crude oil futures play a vital role.

One Way or Another, Crude Oil Pricing Comes Around to Futures

BY MARSHALL THOMAS
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The present crude oil formula pricing system is a vast improvement over the previous rigid methods. Formula-pricing systems are critical because they are used to price virtually all of the OPEC and non-OPEC supplies moving in global trade, and millions of dollars are potentially at stake.

The system is not perfect, some of the flaws have been implicit for decades, yet there is a reluctance to

change the status quo and, at any rate, present pricing methods are much more responsive to market conditions than to the former system of official prices, ongoing price negotiations, product-based netbacks and other inflexible methods.

Crude oil futures, which have traded since the introduction of the NYMEX Division light, sweet crude contract in 1983, have become an integral part of the pricing mechanism. The published cash market quotes almost universally used in crude oil contract formulas are essentially a proxy for the baseline level of global oil prices that are determined by the futures markets.

Middle Eastern OPEC crude (also known as Saudi Arabian Light f.o.b. Ras Tanura and/or Iranian Light f.o.b. Kharg Island) was the international benchmark grade through much of the 1970s and 1980s. The yardstick crude price was typically defined as an "official" price, and it served as the framework of a producer-managed pricing system that never really worked very well. The attempt by OPEC collectively, and its members individually, to legislate a price and establish differentials for quality, location, and even currency changes proved an unenforceable administrative nightmare.

The light, sweet crude oil futures

contract achieved widespread acceptance by 1987; it is no coincidence that a big leap of growth in volume occurred that year, when OPEC abandoned official prices. In the years since, the NYMEX Division contract has gained growing acceptance, with trading volume now on a scale of 150,000 contracts (equivalent to 150 million barrels) changing hands on a good trading day. In terms of liquidity and scope of participation, the NYMEX Division contract is the primary de facto global benchmark. The market for West Texas Intermediate sweet crude is defined by the cash market and its participants in turn make widespread use of the NYMEX Division light, sweet contract. The degree of activity is such that the NYMEX Division quote sets a base line yardstick for U.S. domestic crude prices, and represents the primary price line for the oil industry in many parts of the world.

The launch of the International Petroleum Exchange's Brent contract in 1988 came after the big spurt in NYMEX Division trading activity and the demise of official OPEC pricing. IPE volume on a good day is now in excess of 50,000 contracts (the equivalent of 50 million b/d). Unlike the NYMEX Division crude contract, the IPE does not provide for physical delivery, but utilizes a cash settlement mechanism calculated against an index published by the exchange each day. The contract is designed and intended to track the underlying cash forward market in Brent (15-day Brent), so the settlement index is compiled daily on the basis of weighted averages of paper deals reported by six pricing services, *Platts Oilgram*, *Petroleum Argus*, *ICIS-LOR*, *Reuters Pipeline*, *Telerate*, and *RIM Intelligence*.

In some respects, the oil futures exchanges and the oil trade (pricing) press are in the same business: price discovery. Both the New York Mercantile Exchange and the IPE see

crude oil futures as part of a "whole" market, and are inter-dependent on the other aspects for success. NYMEX Division futures price are seen as a "reflection" of the cash markets, with the floor of the exchange providing a venue for trade and a mechanism for making prices known, or transparent. IPE Brent futures are a component of a three-pronged trading complex that extends beyond the exchange floor. It also embraces the "dated" spot or physical market for crude loading in Sullom Voe, and the Brent 15-day "forward" or "paper/cash" market which is concentrated on supplies one to three months ahead.

The NYMEX Division light, sweet crude oil futures contract provides a pricing baseline for many markets, even to a certain extent for the IPE Brent futures market, which often takes a cue from the activity on the NYMEX Division. Liquidity, for example, is greatest on the IPE when the NYMEX Division contract is also open. The two crudes are traded against one another rather frequently, and, as a result, the Brent/WTI spread is a viable trading and price market for the industry.

Both the New York and London crude futures markets are utilized, singularly and in unison, by the cash markets, depending on the needs of each transaction. While some purists would argue that only one futures market is necessary for a given commodity, the oil trade thus far finds it useful to work with multiple instruments.

Traditionally, the benchmarks are referred to by grade type, such as WTI, or Brent, which implies a direct connection between the price and a physical supply of that oil. With the commoditization of oil, the connection is less well defined. The crude that the U.S. industry refers to as WTI is largely synonymous with the NYMEX Division light, sweet futures contract, but the two are not the same.

Numerous grades other than WTI are deliverable against the futures contract, and the Exchange very pointedly discourages references to its contract as WTI, preferring to see it called NYMEX Division light, sweet. In contrast, the IPE specifically refers to its contract as Brent, but daily settlement is in cash, not in oil, and the Brent that is generally used as a contract reference is the dated physical and forward paper markets.

The bulk of open-market market transactions are centered around the primary four benchmark crudes: WTI, Brent, Dubai, and Malaysian Tapis. The other 40-plus satellite crudes monitored by the cash pricing services are substantially less liquid and the vast majority of quoted prices are derived from "assessments" in an absence of spot deals. Outside the array of so-called commercial crudes monitored by the trade press, there are scores of other secondary grades priced by producers in a variety of fashions. The largest category of such non-spot grades is in the U.S. where a system of buyer "postings" has been used for pricing purposes for decades.

The prices "posted" typically reflect a location and timing difference between the Cushing, Oklahoma, basis of the NYMEX Division futures front month futures quote. Posted prices usually are changed in 25¢ per barrel increments in response to the New York futures moves. The "posting-plus" domestic crude business enables buyers and sellers to agree to an open market premium or discount to the posted price established by a specific oil company posting or perhaps an average of several company postings. This multi-tiered pricing technique allows for prices of a given crude, in say Kansas or West Texas, to track both the NYMEX Division crude futures (more or less) and the posted market for the locale where it is produced.

WTI is the undeniable benchmark crude in the U.S. market, a position that is enhanced by the futures contract, which the oil trade considers to be WTI for all practical purposes. Brent is the benchmark for North Sea and African sweet crude oils. At the beginning of 1994, Saudi Arabia changed the price indexing of its crude bound for the huge United States market from Alaska North Slope crude to the end-of-day WTI quotes reported by *Platt's Price Service*, which is generally a reflection of the day's trading on the futures markets.

Ultimately, after the 1986 netback price debacle, Middle Eastern producers gave up trying to administer prices and opted to become market followers. Saudi Arabia eschewed the benchmark role, and took steps to forbid resale of its crudes by its primary off-takers, and the large scale marketplace for Mideast oil simply dried up. Geographically nearby Dubai crude—reasonably comparable to Arabian Light—assumed a benchmark formula price role by default. The volume available is small at roughly 300,000 barrels per day. The Dubai yardstick is usually part of a formula basket for Far East-oriented grades along with Oman crude—which suffers from even less liquidity than Dubai.

Local Asian crudes fall into two broad categories: light low-sulfur distillate-rich crudes led by Malaysian Tapis, and electric utility crudes led by waxy Indonesian grades. The regional benchmark—such as it is—is presently Tapis crude. Market values for Tapis generally reflect local, Far East market conditions, though values also must be assessed in the context of spread relationships with distant crudes like Brent and WTI. The physical underpinnings, as with Dubai, are on the slim side in terms of liquidity and availability, but a forward paper market is growing. Malaysian state oil firm Petronas has not encouraged use of the crude for a benchmark, and the

addition of new local refining facilities is tightening physical availabilities. Indonesian Minas crude is the region's traditional benchmark, but the changing production profile has reduced its importance.

To a certain degree, both Dubai and Tapis do track the "world" futures price. For example, the typical process for a Singapore oil trader to set daily price parameters before the opening of the local trading day is to look at the overnight quoted for the NYMEX Division light, sweet futures on NYMEX ACCESS™, the Exchange's after-hours electronic trading system, then look at the New York closing of the Brent/WTI spread, and derive an "adjusted" Brent value. Then the last known Brent/Dubai spread would be added on to derive an adjusted Dubai value. A Tapis value would be "bridged" in a similar fashion.

The "price" of crude—whether it is \$15 or \$16 or \$20 a barrel is obviously vital to many. The producing nations care, since the national oil income reflects the sum of oil price times oil volume. The consuming nations care, because the cost of energy, operating an economy, the balance of trade, etc., all depend on the world oil price. The oil exploration and producing companies care, since their profits all depend to a great degree on the simple outright price. For some of the largest futures market participants, however, who by virtue of the depth of their aggregate participation play a key role in determining day-to-day prices, the outright price is not as important as the difference between the purchase price, or cost, of crude oil and the sales price of refined products. Refiners, for example, live and die by this difference. As long as they can obtain crude oil at the cheapest possible price versus the market, and sell products at a decent profit, the actual price of purchase and sale is not significant to them.

The oil trading community (both on and off Wall Street), the marketers, and even the trading desks at primary oil companies all work on the margin nowadays. They are geared to earn a profit on a transaction, hedging risks, and generating a return on each deal, whether they go long or short, forward or prompt. Given these economic imperatives, the oil trade is active in numerous "spread" or price relationship transactions in which the full outright or flat price is of lesser importance.

A substantial portion of today's oil trade consists of taking a position on the "time spread" either buying a spread (going long) or selling a spread (going short). While cash market spreads are bought and sold as such, these transactions are ultimately achieved by laying off a position on the futures market. Thus these timing positions ultimately effect the outright price line on the screen, but only indirectly.

Timing Differences

The commodity-driven crude oil markets are subject to fluctuation throughout the day with each tick of the futures screen. The assessments of the cash market reporting services are made at various times. Most contract linkages are tied to the close or settlement price, and it is these numbers which are typically incorporated in the historical pricing series databases. Given the 24-hour nature of the oil markets, however, there are now multiple regional closing assessments in Asia, Europe, and the United States that are tracked by pricing services. In addition, some are doing mid-day assessments, and the screen services are updating more frequently. For purposes of our tracking, we have included multiple regional closing numbers where the pricing services made them available. In reviewing the cash market quotes, we find that some of the largest differences in quotations for individual

each other quite simply and, given the smaller size of the finite price, the variations are more obvious and clear-cut.

For example, an \$18 per-barrel total crude oil price for an individual grade reported by a pricing service may in reality consist of a \$17.50 a barrel benchmark futures quote, and a plus 50¢ spread differential evident on the cash market. The pricing service is thus really defining whether the spread is 45¢, or 52¢, or 56¢. The underlying market is defined by exchange-traded transactions, which accounts for 97% of the total price. The futures quote may drop 30¢ between Monday and Tuesday, whereas the spread may still be in the area of 50¢ or so. As the \$18 total price drops to \$17.70 on Tuesday, it is only reflective of a futures market drop, with the cash market price assessment of the spread unchanged.

This means that the formula contract price which is linked to the cash market on the surface is in reality tracking the futures market more than anything else. The amount of these spread differentials vary over time according to market conditions, location, and numerous other factors already discussed, and may be considerable. Nonetheless, they are still a relatively small component of the aggregate price of oil.

Atlantic Basin Benchmarks

Outright pricing simply does not exist in the bulk of Atlantic Basin oil market transactions without reference to the futures markets. The NYMEX Division and IPE screen quotes represent a very real price starting point that has direct regional relevance in the U.S. and Europe. A whole series of satellite price references have evolved in the US and Europe for various secondary crude grades.

Both WTI and Brent (and thus the NYMEX Division & IPE) prices can be subject to parochial and

regional events that may put them out-of-sync with the overall market situation for brief periods of time. NYMEX Division light, sweet (and thus Cushing, Oklahoma) values can be influenced by events in the interior U.S. mid-continent market that don't necessarily affect other markets. Similarly, Brent is subject to weather disruptions, seasonal maintenance, and other dislocations that can radically alter prices, while the baseline world market is unchanged.

Bridges To Liquid Markets

Despite the underlying disconnection of the Far East from the Atlantic Basin arena much of the time, a growing number of local Asian market participants are becoming active in trade that is linked to the other distant benchmarks (WTI, Brent, and Dubai). Singapore and other Asian market centers trade Dubai and Tapis instruments between the time the trading floor in New York closes and London opens, although with a liquid, transparent WTI-based market trading via NYMEX ACCESSSM, including the small but growing direct business from Sydney, and the coming trading gateway in Hong Kong, a growing benchmark role of the NYMEX Division light, sweet crude contract has been seen in the region.

At the start of each trading day, the East of Suez markets in fact now define the "opening" prices based on Atlantic Basin values. In assessing values, eastern participants look at the after-hours NYMEX ACCESSSM quote for WTI. They use the last known WTI/Brent spread to peg a Brent value, and the last known Brent/Dubai spread to set an "updated" Dubai value. The forward values for Dubai are then pegged using last known time spreads. The previous day's values for paper Tapis are then also revised off of the updated Brent/WTI/Dubai numbers to provide a starting point for the new day.

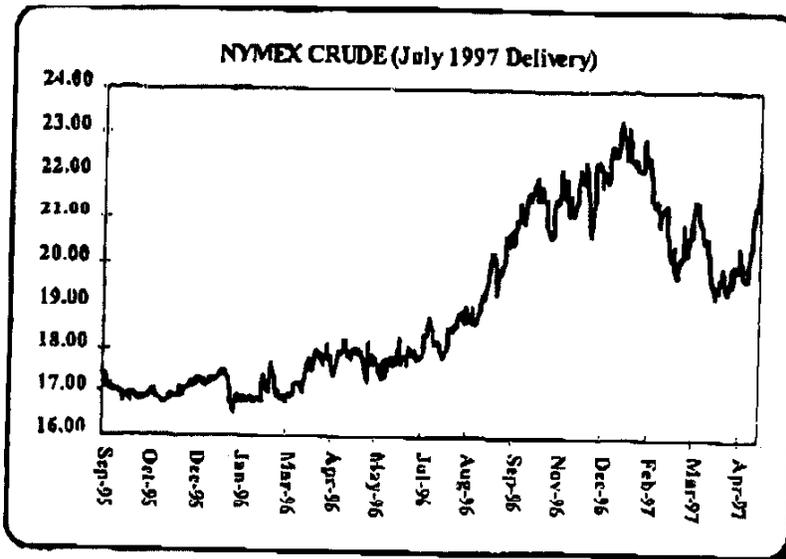
Thus the Asia-Pacific market takes its pricing cues from WTI and Brent. During the window between the close of the extremely liquid open outcry trading session in New York, and the London open, the global commodity crude prices — such as they are — are set in the Far East, with traders keeping a careful eye on the overnight NYMEX Division crude oil activity on NYMEX ACCESSSM. The liquidity of overnight trading in the NYMEX Division light, sweet crude contract has grown consistently since its inception three-and-a-half years ago, and it is not unreasonable to expect this to continue, especially with the opening of direct trading links to Asian market centers that have strong entrepreneurial traditions. Price discovery on the Exchange is open and straightforward, purely a matter of buyers and sellers looking for the best quotations. Liquidity and transparency are what benchmarks are made of: the most successful typically feature an active cash and futures market operating side-by-side, with the price discovery process involving both the exchange, as well as the industry trade press and/or pricing panels. ■

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Among its many activities, PVM maintains a huge database of U.S. domestic and international cash crude oil transactions, and long and short cash positions, dating back to the early 1980s. The firm also monitors the volume of waterborne crude oil movements in global trade each week.

EXHIBIT C
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GRAPH 1 - NYMEX Crude (July 1997 Delivery)



GRAPH 2 - WTI Cushing (Cash) vs. WTI Midland

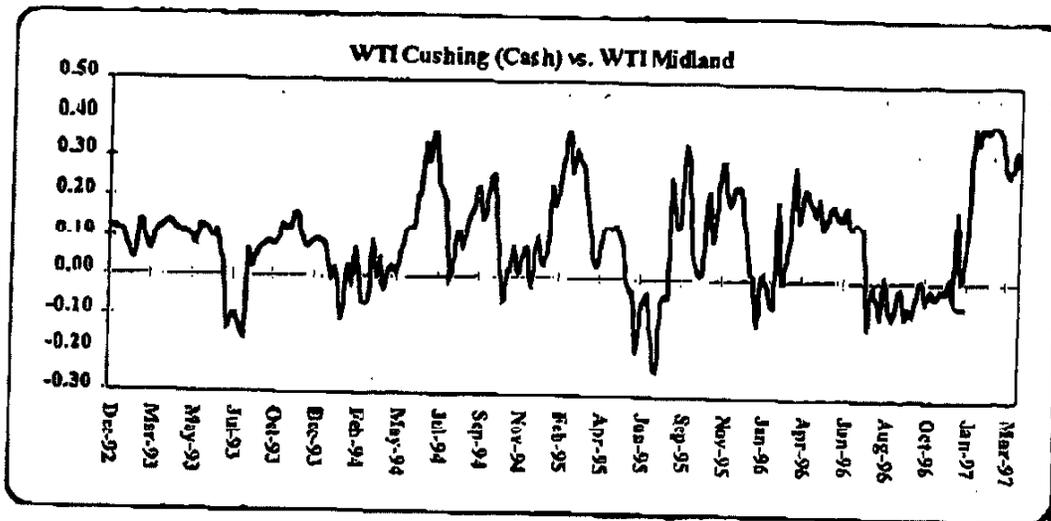
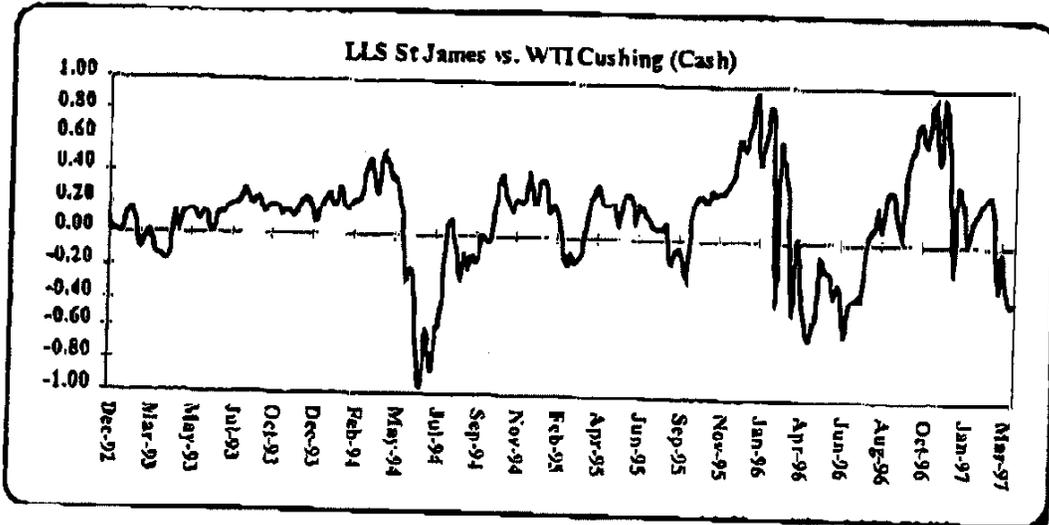


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GRAPH 3 - LLS St. James vs. WTI Cushing (Cash)



GRAPH 4 - WTI Cushing (Cash) vs. WTS Midland

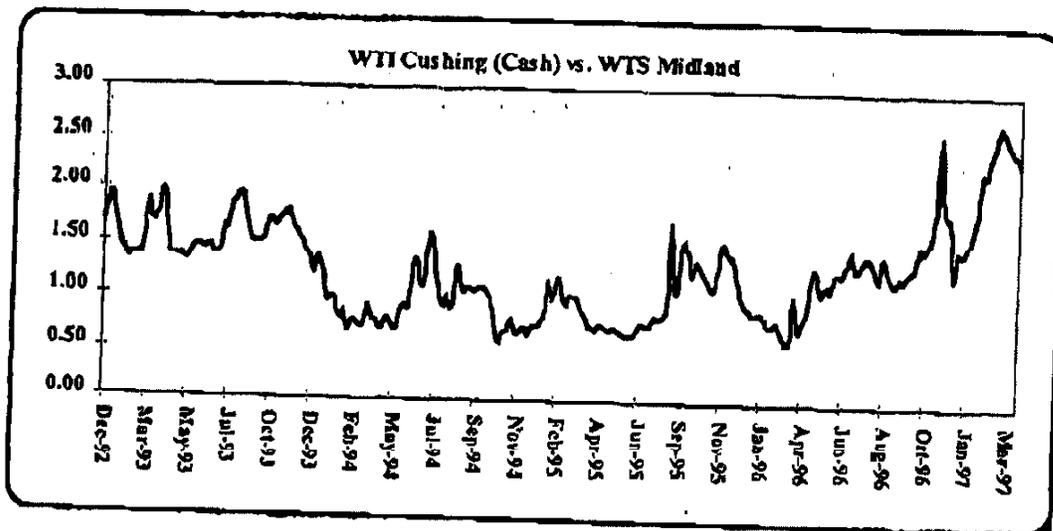
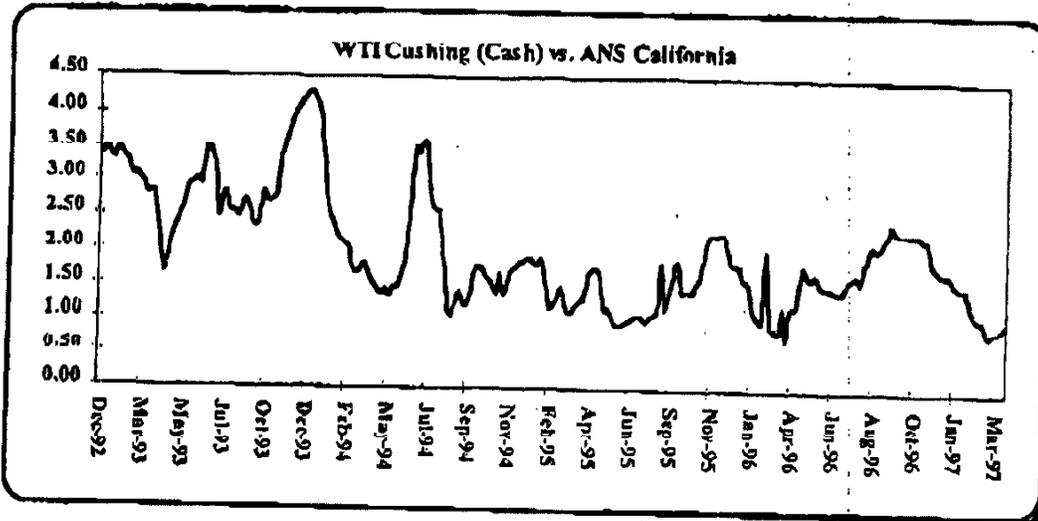


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GRAPH 5 - WTI Cushing (Cash) vs. ANS California



GRAPH 6 -- WTI Cushing (Cash) vs. Wyoming Sour

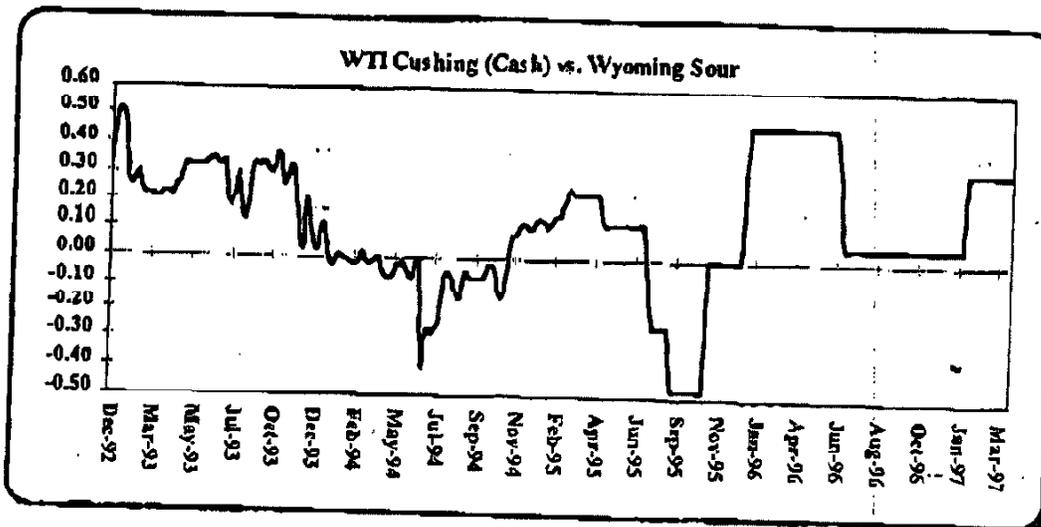


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GRAPH 7 - NYMEX Crude Futures
(1st Month vs. 2nd Month)

