Transportation Energy Management

Fuel Futures

February 1983

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FOREWORD

The rapid increase in the price of energy during the 1970's has significantly increased the importance of these expenditures in transit operator budgets. For 1981, the Section 15 report indicates that transit properties spent 10.2 percent of their operating budgets, or about $670 million on fuel and utilities. Expenditures of this magnitude imply a need for careful attention to their reduction through improved management.

In response to this problem, the Urban Mass Transportation Administration is developing a number of materials providing technical assistance. Reports are being produced in a series entitled Transportation Energy Management. Previous reports in this series have included the following:

- Current Transit Operator Activities, (DOT-I-83-01)
- Transit Operator Facilities, (DOT-I-83-10/11)

This report, Fuel Futures, is designed to provide guidance on the use of fuel futures trading to lock in the price of fuel against volatile changes. While this is a new and different measure for a transit operator to take, we believe that use of fuel futures represents a rational and potentially beneficial action for transit operators concerned with rapid changes in fuel price. In addition, these measures have applicability in contingency planning to reduce price problems or provide for obtaining necessary fuel supplies in an energy emergency. We believe that in the current rapidly changing fuel market, the measures described in this report will be of interest. We believe that this report should prove useful to operators in deciding whether or not to utilize fuel futures.

Additional copies of this report, or the others from this series, are available from our offices upon receipt of a self-addressed label, while supplies last. In addition, reports are available through the National Technical Information Service, Springfield, Virginia 22161. Please refer to UMTA DC-09-9044-83-1 when requesting this report.

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EXECUTIVE SUMMARY

Hedging transit fuel supplies in the commodity futures market offers transit officials predictability in budgeting for fuel costs and may serve as an additional source of fuel in a tight market situation.

Transit property officials face volatile diesel fuel prices. The deregulation of crude oil prices has resulted in an oil market in which consumers face frequent price fluctuations. The possibility of being hit with a sharp price increase is always present. As a result, budgeting for fuel costs has become an even more difficult task than it was before deregulation.

Transit property officials also face uncertainties in diesel supply availability. The termination of petroleum product allocation regulations ended the transit systems' "priority user" status. Diesel suppliers are no longer required by the federal government to provide transit properties with their full diesel requirements. Moreover, the suppliers themselves are no longer guaranteed deliveries by refiners and may be unable to continue deliveries to transit properties in a future petroleum supply emergency.

Volatile prices and uncertain supplies are two problems which must now be addressed by transit system planners if the hazards of increased prices and decreased supplies are to be mitigated. One option available to transit officials is hedging their fuel supply in the commodity futures market.

Hedging in the futures market can add predictability to the fuel budget by essentially locking in the net amount of money the transit system will have to pay out for fuel. Any additional costs incurred under the normal supply contract resulting from higher prices in the wet barrel market can be covered by profits realized in the futures market, given the proper hedging strategy.

Hedging can result in the acquisition of diesel fuel by transit operators. Most transactions in the futures market, however, do not end in a delivery because the market is primarily designed to serve as a financial instrument. The cost of taking or making delivery is often prohibitive, and it is simply easier to end a transaction by taking an offsetting position in the market. Putting cost aside, taking delivery of diesel fuel in the futures market is an option for some transit properties operating in states on the east coast, and in the south and midwest. The key variable in assessing the feasibility of taking delivery is proximity to a terminaling area situated along one of the major interstate petroleum product pipeline systems. For all practical purposes, transit operators in the Western Plain states,

the Rocky Mountain states, and the West Coast should not view delivery as a viable option because the petroleum product pipelines were not designed to transport supplies from the Gulf and East Coasts to the West.

Though all transit operators in the United States can not view the futures market as an additional source of fuel supply, all transit operators can view the futures market as a mechanism by which they can reduce their exposure to price shocks.

In considering how to use the futures market, transit officials have two options: (1) transit officials may enter the futures market themselves and hedge the fuel supplies they expect to receive; or (2) transit officials could accept only fixed price bids from fuel suppliers, thereby forcing the suppliers into the futures market to hedge the fuel they expect to deliver to the transit property.

Hedging in the energy futures market is not without risk. A hedger can sustain a net loss at any given time. However, the nature of the market is such that a net loss will likely be balanced out by a subsequent net gain. The proper hedging strategy is necessary to reduce the chance of sustaining a loss. Moreover, there are institutional safeguards within the futures market which protect hedgers against financial disasters.

Hedging in the energy futures market is not the definitive solution to volatile prices and supply uncertainties. However, it warrants serious consideration as a means for mitigating the effects of adverse price movements and supply problems on transit operations throughout the country.

I. BACKGROUND

A. Purpose

The purpose of this study is to assess the feasibility of mass transit operators trading in the fuel oil futures market as a means to reduce price risk associated with buying and storing fuel, and as a means to enhance fuel supply security. Trading in the fuel oil futures market is one option that has been identified as being of potential benefit to mass transit operators in their effort to minimize fuel costs both in normal and energy crisis situations, and as a means to insure fuel availability during petroleum supply interruptions.

Trading fuel oil in the futures market is a relatively new activity begun in the United States in 1978. Because trading fuel oil futures is a new practice, very few people within the petroleum industry, much less bulk users of petroleum products, understand the nature of the market--how it operates, and its potential costs and benefits.

This study was undertaken to advise and inform mass transit operators on the commodity futures market so that operators will be in a position to make a valid judgement on the merits of trading fuel oil futures for their own transit systems. This report will describe and explain how the futures market operates. It will identify and describe the potential costs and benefits, and present the specific questions that need to be answered before the feasibility of futures trading by any particular transit system can be determined. The study will reach some broad conclusions as to the feasibility of transit systems trading fuel oil futures. This study cannot provide the definitive statement on the merits of any particular transit property trading in the futures market. Such a determination can be made only by the individual operators who have an in-depth understanding of their transit system: specifically, the management perspective within the organization, the financial situation, the fuel supply situation, the regulations governing publicly owned transit systems, and the availability of other options.

B. Statement of the Problem

Operation of a mass transit system is heavily dependent on availability of diesel fuel. The financial well being of mass transit systems is significantly influenced by the cost of diesel fuel. Consequently, mass transit operators must continuously address the problems of diesel supply acquisition and budgeting for fuel acquisition.

Concerning the problem of price, the transit operator is not interested only in obtaining the lowest price at any given time, but also in predicting future fuel costs so that they can be

accurately factored into the budget for the upcoming year. In essence, the operator must ask: "How much does diesel cost me now, and how much will diesel cost me one month, six months, or a year from now?" Answering these questions has been made more difficult as a result of the decontrol of petroleum in January, 1981. Supply and demand now determine the price of diesel and not federal regulations.

Supply and demand for diesel fuel, and consequently diesel prices, are heavily influenced by factors not directly related to diesel fuel or the transportation sector. Such factors as weather, strikes, federal government policies and programs, domestic economic conditions, international tensions, and international economic and trade conditions all influence diesel fuel prices.

Price fluctuations of diesel fuel not only influence the amount of money an operator must pay for new supplies, but they also influence the value of diesel fuel already paid for and being held in storage. Thus, in the event of a price decrease, the transit property will incur a loss (on paper) equal to the decrease times the gallons being held. Though this is not an out-of-pocket loss, it still represents a loss in terms of an opportunity cost--money spent for diesel could have been spent on other things. On the other hand, if diesel prices rise, the value of the stored diesel increases, but more money is required to pay for future deliveries of fuel. Since there is no way to transfer the increased value of stored fuel to the purchase of new fuel, the transit operator will suffer a greater than expected out-of-pocket expense when it purchases additional fuel.

Because almost all fuel contracts include a price escalation clause, the transit operator is liable to all price jumps without any recourse.[1] Yet, it should be noted that if the wholesale price of diesel declines during the life of the contract, the dealer is often not required to pass on the decrease in full to the end user; that is, the transit operator.

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[1]Many supply contracts allow the buyer the right to refuse delivery of a portion of the fuel specified in the contract. The buyer can refuse delivery if he does not need the fuel due to lower than expected requirements. He can also refuse delivery if the market price has fallen below the contract price. He may substitute lower priced spot fuel for higher priced contract fuel. The degree of protection offered by the right of refusal clause depends on the portion of fuel which may be refused. The higher the portion, the greater the protection. Inclusion of a right of refusal clause mitigates, but does not eliminate, the potential price disadvantage stemming from the absence of a de-escalation clause.

In short, in a decontrolled fuel market, using the standard fuel acquisition process and contract, the transit operator stands a significant chance of sustaining higher fuel expenses than anticipated, or at the very least, of being unable to take maximum advantage of any drop in prices. In this instance, the only way to manage fuel costs is to monitor and act on expected price changes, and the only way to reduce fuel costs is to reduce consumption which can only be achieved by using more efficient engines and/or cutting back service.

This point leads back to the basic fact that bus service requires diesel fuel. As was stated in the report, Transit Fuel Supplies Under Decontrol,[1] transit operators can no longer depend on federal allocation controls for receipt of diesel fuel supplies. Each transit operator is on his own in acquiring adequate supplies of fuel in both normal and crisis situations.

Under normal conditions, acquisition of supplies through the standard bidding process may be satisfactory, particularly when the world oil market is experiencing a glut. However, the standard fuel acquisition procedures are likely to prove unsatisfactory in a market experiencing a sudden reduction in supplies or a sharp increase in demand. In the event of another crude petroleum supply interruption, the transit operator will face a drop in available supply. At the same time, people will switch from automobiles to mass transit systems, thereby requiring increased service by the systems. The transit system will be in the position of needing more diesel fuel when there is less available.

In a petroleum supply interruption the transit operator may find himself receiving less diesel than he contracted for, and, in the worst case, he may find his supplier unable to maintain deliveries at all. In this event, the transit operator will be forced into the open market to bid on any diesel fuel supplies available. The transit operator will be bidding against all other consumers of diesel fuel, the most significant of which are truckers and farmers. In a severe crisis situation, obtaining any fuel at any price will be a major accomplishment. In a free market, it is assumed that the buyer offering the highest price for the commodity will receive the commodity. In a severe supply crisis caused by a natural disaster or a politically motivated interruption, it is possible that there will be little or no fuel to be had at any price through the normal distribution channels.

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[1] Transportation Energy Contingency Planning: Transit Fuel Supplies Under Decontrol, U.S. Department of Transportation, No. DOT-I-82-20, May 1982.

C. One Option: Hedging in the Fuel Oil Futures Market

This study examines hedging in the fuel oil futures market as one option available to transit operators. Hedging will be assessed within the context of its cost and benefits in reducing price risk, and in the context of enhancing one's supply security.

Hedging fuel oil futures is being put forth as just one option to be considered by transit operators. There are other means that can be used to reduce price risk and enhance supply, but they will be examined in other studies. The intent of this study is to provide transit operators with enough information about this particular option to permit them to make their own judgement on the applicability and usefulness of trading diesel futures given their own situation.[1]

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[1]To date, very little material has been published which would assist the layman in understanding the principles and operations of the energy futures market. Fortunately, for transit operators, a book entitled, McGraw Hill's Quick and Easy Guide to Energy Futures by Jane Jachimczyk will be available by March, 1983. It is highly recommended as an additional source of information of the energy futures market.

II. DESCRIPTION OF FUTURES MARKET OPERATIONS

A. Moving From a Forward Market to a Futures Market

At first glance, the practice of trading commodities on the futures market appears to require an understanding of complex forces unfamiliar to the normal businessman. Even reading the market quotations on the financial page of newspapers can be somewhat intimidating. Yet, underneath the numbers and the jargon lies a market whose operation is actually a relatively simple affair.

In a futures market, people buy and sell a **futures contract** which obligates each party to make or take delivery of a commodity in a specific future month for a specific price. This activity is similar to the normal fuel acquisition process of most transit properties. Normally, contracts are negotiated between a purchaser and a supplier for delivery of a certain volume of diesel fuel over the next 12 months for a certain price, activation of the escalation clause notwithstanding. In this case, the parties are negotiating a **forward contract**, that is the contract calls for delivery of a commodity in the future and delivery will actually occur.

The primary difference between a forward contract and a futures contract is that the forward contract is arranged to fit the specific needs of the buyer in quantity and quality of the commodity and the time and place of delivery. A futures contract is standardized in these factors: the quantity is always the same; the quality must be within a given range; time of delivery is fixed; and place of delivery is at a given location. Another major difference between a forward contract and a futures contract is that a forward contract is negotiated with the intent to actually take delivery. There is rarely such an intent in the buying and selling of futures contracts.

The transition of a forward market into a futures market normally occurs when five elements exist. First, there must be a large number of buyers and sellers within the specific product market. Second, there must be some standardization in the quality or grade of the commodity. Third, there must be an element of risk stemming from frequent price fluctuations. Fourth, information pertaining to supply and demand of the commodity must be publicly available and readily accessible. Fifth, there must be a need to arrange for future delivery or receipt of the commodity. If these five elements exist, the forward market may mature into a futures market which, in essence, is more of a financial instrument to be used, not as a substitute for normal distribution channels, but as a means to reduce price risk. Its usefulness as a means for actually obtaining supplies of a commodity is

secondary to its usefulness as a means for protecting one's financial position. In a futures market, the contract itself becomes that which is readily marketable, whereas, in the forward market, the commodity is the marketable item.

In short, the futures market should not be perceived as being at odds with or opposite to the more familiar forward market, but as a progression from the forward market. The futures contract should also not be perceived as an alternative to the forward contract, but as a complimentary instrument to protect one's financial and supply position in the forward market.

B. The Futures Contract

A **futures contract** is a legally binding commitment to make or take delivery at a specified location in a designated month of a standardized quantity and quality of a commodity at an agreed to price. Thus, a futures contract embodies:

- location where delivery is to be made
- month in which delivery is due
- volume to be delivered or received
- physical properties of the commodity
- price

Of the five elements constituting the futures contract, only one--price--is negotiated by the buyer and seller. The other factors are determined and fixed by the commodities exchange. Because of the high level of standardization, the contract itself takes on the trappings of a marketable commodity. It is the contract that is bought and sold. Its value is guaranteed by the exchange in which the contract is traded.

The factor that makes the futures contract unique is that, in the vast majority of transactions, neither party expects to make or take delivery of the commodity, in this case, fuel oil. Each party expects to **liquidate** its position; that is, to get out of its obligation to make or take delivery before the contract comes due by taking an opposite, offsetting position.

In the petroleum futures market, a contract represents 1,000 barrels or 42,000 gallons. Consequently, trading is undertaken in increments of 42,000 gallons.

As stated above, the price is the only feature of the futures contract negotiated by the buyer and seller. This is done through their respective agents or brokers. The brokers reach an agreed upon price through open bidding on the floor of the exchange.

C. Hedging

1. Who Enters the Futures Market and Why

Everyone who enters the futures market does so for at least one of three reasons: (1) to reduce financial risk inherent in price changes; (2) to enhance supply; or (3) to make money through speculation. The individual who enters the futures market for either the first or second reason or both is referred to as a **hedger**. The individual who enters the futures market for the third reason is called a **speculator**.

Before a detailed examination of hedging is begun, it is first useful to understand the basic difference between **hedgers** and **speculators**. A hedger enters the market in order to **reduce** financial risk, whereas, a speculator enters the market to **assume** financial risk.

A hedger is an individual involved in the manufacture, marketing, or consumption of the commodity being traded. That is, a hedger deals with the commodity in the normal course of his business. For example, hedgers in the fuel oil futures market are by and large petroleum refiners, refined product wholesalers (i.e., jobbers), and bulk consumers of petroleum products. Their business requires that they deal with fuel oil on a day-to-day basis. Hedgers are often referred to as **commercials**.

Because commercials are involved in the buying and selling of fuel oil as a normal part of business, they are constantly susceptible to financial losses as a result of adverse price movements. To reduce this financial risk, commercials hedge their positions in the futures market. To hedge one's position means to take a position in one market to protect the position already held in another market.

A speculator is an individual who enters the market to trade a commodity which has no bearing whatsoever on his normal day-to-day business. He does not enter the futures market to protect a position already held against financial risk. In fact, by entering the futures market he is exposing himself to financial risk in the hope of obtaining substantial profits. Profits are obtained by successfully anticipating price movements. His goal is to buy low and sell high or sell high and buy low.

For example, a doctor may trade fuel oil contracts. The doctor does not have any position in the wet barrel[1] market to protect. Moreover, the doctor has no means by which he may make delivery or take delivery of fuel oil; therefore, he knows he must terminate his position with an opposite, offsetting transaction. The doctor is speculating that the price will move in one particular direction. When and if it does, he will close out his position and earn a profit. If the price does not move in the expected direction, he will still have to take an offsetting position by the close of the contract period in which case he may sustain a loss. The attractiveness of speculating in the futures market lies in the possibility of making large profits with little capital. At the same time, it is just as possible to suffer a severe loss just as quickly, and with as little capital.

It is the speculative nature of the futures market which has received the widest attention by the general public, thereby creating the image that the futures market is little more than a craps shoot for "industry insiders". This image neither accurately reflects the operation of the futures market nor is a fair representation of the parties involved in the futures market. First, speculators are usually not "industry insiders", but exactly the opposite--outsiders whose only interest in the particular industry is the price at which a particular commodity is being traded. Second, speculators do not corrupt the futures market, but rather support its existence by providing liquidity to the market. It is the speculator that allows the futures market to function by his willingness to accept the risk that the hedger is attempting to cast off.

The focus of this study is not on the speculator, but on the hedger. The transit property which enters the futures market will do so for the purposes of hedging its financial and supply position; that is, to reduce the risk inherent in buying, storing, and consuming a large volume of diesel fuel over time.

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[1]Throughout this report, reference will be made to the "physical" market or "wet barrel" market. These are synonymous terms which refer to the market in which the actual commodity--in this case diesel fuel--is bought and sold. The physical or wet barrel market includes both spot and contract transactions. In essence, the physical or wet barrel market is the opposite of the futures market in which the futures contract itself is bought and sold.

2. Hedging Defined

In its simplest form, **hedging** is the act of assuming a position in one market which offsets the risks inherent in holding a position in another market. The most common hedge in the fuel oil market is undertaken by jobbers (i.e., wholesalers) who buy the fuel oil from refiners and resell the product to retailers and/or end-use customers. By holding the product for any length of time, the jobber makes himself vulnerable to a price decrease. In a market characterized by falling prices, a jobber holding inventory may see his expected profit margin shrink or disappear altogether. To protect himself against such an eventuality, the jobber may assume a position in the futures market opposite to that held in the physical market (i.e., wet barrel market). That is, at the time the jobber buys the fuel from the refiner, he will sell a futures contract obligating himself to deliver fuel at a fixed price at some specified point in the future. Assuming that the price at which he bought the fuel in the physical market is exactly the same as the price at which he sold the futures contract, and assuming that the volumes traded in both markets are exactly the same, the jobber has achieved what is technically known as a **perfect hedge**--the opposite positions in the two markets offset each other perfectly. No matter what prices do, the hedger is protected. If prices fall, he loses in the wet barrel market but gains in the futures market. If prices climb, he gains in the wet barrel market but loses in the futures market. In short, his profit margin is locked in; it will not widen, but it will also not narrow.

A hedge does not have to be the taking of opposite positions in two markets. Under certain circumstances, a hedge may involve buying in both markets, or selling in both markets. For example, let us assume that a transit operator expects to purchase and take possession of 42,000 gallons of diesel fuel in the physical market from his normal supplier for $1.00 a gallon over the next six month period. In order to protect himself against price escalation during the course of the six month period, the transit operator buys a fuel oil futures contract (i.e., takes a long hedge) for 42,000 gallons at $1.00 per gallon. If the price of diesel should increase by, say $.10 a gallon, the transit operator would have to pay an additional $4,200 to his supplier. In order to offset this additional expenditure of $4,200 in the physical market, the transit operator may draw from the futures market the added value (i.e., the profit) on his long hedge which would be $4,200. (Originally, the futures contract had a value of $42,000. The 10¢ per gallon increase meant that the contract was now worth $46,200). The $4,200 profit could be withdrawn from the futures transaction and applied to the contract in the wet barrel market. Therefore, no net increase in expenditures would be incurred by the transit operator

because the loss sustained in the physical market would be balanced out by the profit made in the futures market. The transit operator's fuel budget would remain intact.

This example represents a perfect hedge. That is, the position in the physical market was completely covered by the position in the futures market. In actuality, perfect hedges are not common. Factors at play in the physical market result in imperfect hedges. These factors will be examined in a subsequent section of this report.

As discussed on the previous page, hedging may result in preventing the hedger from sustaining a loss. However, it must be understood that hedging may also result in preventing the hedger from realizing a windfall profit. If a hedger assumes opposite positions in the physical and futures market, no matter what direction prices take, he will not expand his profit margin or realize a savings because the loss in one market will negate the profit or savings in the other market. Thus, hedging can be a useful tool to reduce the risk of financial loss, but it can also reduce the opportunity to realize unexpected savings or profits. The essential question then becomes: "Is the prime motivation to reduce the risk of financial loss, or is it to realize maximum profit or savings? The assumption in this study is that transit operators are more interested in reducing their exposure to diesel price increases than they are in taking advantage of an unexpected price decrease.

Though hedging is aimed at reducing financial risk, transit authorities must recognize that risk is not entirely eliminated. Hedging itself may result in a net financial loss. Circumstances under which a loss may result are presented in a later section.

3. Long Hedge

One of two basic hedging strategies is referred to as a **long hedge** or buyer's hedge. The long hedge is adopted by parties who will be acquiring fuel over time and who want to protect themselves against rising prices. The objective of a long hedge is simple: buy low and eventually sell high. The buyer is also seeking predictability in fuel costs. He wants to lock in the price of future fuel deliveries at a fixed level. This motivation, and hence, the long hedge, is most applicable to the situation of the transit system. The goal for the transit system is protection against rising diesel fuel prices. Any price increase could eat into funds designated for other operating and capital expenses and, in the case of privately owned properties, reduce the profit margin.

In all but a few cases, transit operators negotiate a diesel fuel contract with a supplier in which the price is tied to some published price posting (often Platt's Oilgram listings)

to which the supplier adds his margin. The escalation clause in the contract permits the supplier to pass through to the transit system 100 percent of any price increase which occurs during the course of the contract. (Most contracts run for twelve months.) To protect a transit system against price increases, a long hedge can be placed in the futures market. This long hedge would involve buying diesel fuel contracts in the futures market.

For purposes of illustration, let us assume that a transit system takes a long hedge fearing rising prices. As expected, prices increase steadily during the course of a supply contract. The additional cost is passed through by the supplier to the transit system. The transit system has to pay out more than it had budgeted, and thus incurs a financial loss in the physical market. This loss in the physical market, however, is offset by a profit realized in the futures market. Because of the price increase, the futures contracts held by the transit system have a greater monetary value in each subsequent month. Consequently, liquidating the long position, that is, selling the contract at a price higher than the purchase price, results in a profit. This profit can then be applied to covering the increased cost of the diesel fuel in the physical market. The end result is that the transit system has sustained no net loss (i.e., the fuel budget has not been exceeded). The additional costs in the physical market are offset by the profits in the futures market.

By taking a long position in the futures market; that is, by obligating itself to buy diesel fuel in a certain future month at a certain price, the transit property reduces its vulnerability to price increases. However, it also relinquishes the opportunity to benefit from a decrease in prices in the physical market, which, given certain contract conditions, could result in savings to the transit system.

Exhibit I presents an example of a long hedge.

EXHIBIT I

EXAMPLE OF A TRANSIT PROPERTY'S LONG HEDGE

PROBLEM: Transit property wants to protect its fuel budget against rising diesel prices expected in next three months.

	Transactions	
	Physical Market	**Futures Market**
April 15	Budgeted diesel costs: May @ 92¢ per gallon June @ 94¢ per gallon July @ 96¢ per gallon	Buy futures contract: June @ 92¢ per gallon July @ 94¢ per gallon August @ 96¢ per gallon (Note: Trade in month following month being hedged.)
May 15	Buy diesel @ 93¢ per per gallon	Sell June futures @ 93¢ per gallon
	Therefore: 1¢ per gallon over budget	Therefore: 1¢ per gallon profit
	NET RESULT: No Change In Budget	
June 15	Buy diesel @ 95.5¢ per gallon	Sell July futures @ 96¢ per gallon
	Therefore: 1.5¢ per gallon over budget	Therefore: 2¢ per gallon profit
	NET RESULT: 0.5¢ per gallon profit	
July 15	Buy diesel @ 96.5¢ per gallon	Sell August futures @ 97¢ per gallon
	Therefore: .5¢ per gallon over budget	Therefore: 1¢ per gallon profit
	Net Result: .5¢ per gallon profit	

This example shows that by taking a long hedge, the transit property is able to negate the impact of rising prices on its budget. In fact, the long hedge results in the transit property paying less than had been budgeted in June and July even though prices went up. Recognizing that this example is presented only for the purpose of illustrating a long hedge, it should be understood that such results are possible. However, transit operators should not expect a long hedge to result in lower than expected costs. It is more realistic to expect a long hedge to yield a smaller increase in costs than would have been incurred if no hedge had been taken. In short, though a net profit may result from a long hedge, it is safer, particularly in the area of public service planning, to view hedging as a means to reduce net increases in costs.

Referring to the example in Exhibit I, it should be understood that if the price had gone down while the long hedge was held, the transit property would have still been obligated to buy in the futures market at the fixed price, and thus, would have sustained a loss when it liquidated its position (i.e., when it sold at a price lower than the purchase price). This loss in the futures market, however, would have been negated by the reduced cost in the physical market, thereby, resulting in the transit property paying the same amount it would have paid had there been no decrease. In short, the transit property would have realized neither a savings from the price decrease, nor increased costs.

Unfortunately for transit properties, there is one factor in the standard procurement contract that may result in the transit property suffering a net loss as a result of hedging long in the futures market. In the preceding explanation of the impact of a price decrease on a long hedge, an assumption was made that the supplier in the physical market would pass through to the transit operator the full reduction in price. The money already budgeted, but not paid to the supplier would be used to cover the loss in the futures market. The problem with this example is that price reductions are not always passed through in full to the transit property by the supplier. Almost all supply contracts include an escalation clause to protect the supplier's margin; however, many supply contracts do not include a de-escalation clause which requires the supplier to pass through a price reduction in full to the consumer. If the supplier does not pass on the reduction in full to the operator, there is no unspent money in the budget to cover the loss in the futures market. Funds would have to be taken from accounts other then the fuel account.

The question then becomes: "Does the fact that a fuel contract does not include a price de-escalation clause diminish the attractiveness of going long in the futures market?" The answer is "yes", to the extent that it adds an additional element of risk to hedging long. However, this risk need not exist. Moreover, the problem does not rest in the futures market **per se**, but in the supply contract. Therefore, in order to reduce the risk of sustaining a net loss in hedging long in the event of a price decrease, the transit operator should stipulate that a price de-escalation clause be included in the supply contract. This clause should require the supplier to pass on to the transit property any price reduction in full.

Many transit properties do have the right to refuse delivery on some portion of the contracted volume. If prices fall, but the property is still required to pay the higher contract price, refusing delivery on fuel up to the ceiling specified in the contract, and buying less expensive fuel in the local spot market

will help to realize savings. These savings can be used to partially offset the loss incurred in the futures market resulting from a long hedge.

In summary, a long hedge can provide protection against sudden sharp price increases which may result from normal market forces or extraneous events affecting the availability of diesel fuel. On the other hand, there is a trade-off inherent in this protection. The transit operator that goes long in the futures market gives up his opportunity to realize savings in the event of a price decrease--price is locked in. The long hedger is more interested in avoiding unexpected expenditures due to increasing prices than in realizing unexpected savings stemming from falling prices. In order to maximize the protection offered by a long hedge, the transit operator must stipulate the inclusion of a price de-escalation clause in its supply contract.

4. Short Hedge

The second basic hedging strategy is referred to as the **"short"** or **seller's** hedge. The short hedge is commonly adopted by one who expects to be holding the commodity in inventory prior to reselling it at a later date. The primary motivation behind the short hedge is avoidance of losses resulting from declining prices. That is, the short hedger is attempting to reduce his vulnerability to buying high and having to sell low, thereby incurring a financial loss or, at the very least, a reduced margin.

The typical short hedger in the diesel fuel market is the jobber (i.e., wholesaler) who receives his diesel fuel from the refiner and places it in storage pending subsequent delivery to retailers or end-users. While holding the fuel in inventory, he is vulnerable to a drop in price, which would reduce the market value of his fuel. To protect the value of his inventory, in essence, his margin, the jobber will enter the futures market and sell a futures contract. That is, he obligates himself to make delivery of a certain volume of diesel fuel at a certain time for a certain price. By selling in the futures market, the jobber has assumed opposite positions in the physical market (where he bought) and in the futures market (where he sold). By establishing these opposite positions, the jobber has locked in his margin--any drop in prices resulting in a financial loss in the physical market will be balanced out by a profit in the futures market.

By taking a short position in the futures market, however, the jobber relinquishes the opportunity to realize windfall profits as a result of rising prices. If prices rise in the physical market, the jobber will be holding fuel with a greater market value. Assuming he can move the product at its higher price, he will realize greater profits than he anticipated. Yet, these unexpected profits in the physical market must be used to offset

the loss incurred in the futures market, for short hedgers always lose when prices rise. This is because the short hedger sold low and must buy high to liquidate his position. Thus, hedging short should be perceived as a defensive act protecting one's margin at the cost of maximizing profits. The short hedger is protecting himself against falling prices, while the long hedger is protecting himself against rising prices.

Short hedges are not limited to fuel oil jobbers. A short hedge might also be taken by a transit property given the right conditions. An example of a short hedge by a transit system is presented in Exhibit II.

EXHIBIT II

EXAMPLE OF A SHORT HEDGE

PROBLEM: A transit property has a fixed price contract. Diesel prices have unexpectedly begun to decline. The operator notifies the supplier that the system will not take delivery on the amount of diesel specified in the "right of refusal" clause when the market price drops below the contract price. The operator immediately places an order to sell futures; i.e., takes a short hedge, knowing that a short hedge benefits from falling prices.

April 15	Fixed diesel prices: May @ 96¢ per gallon June @ 97¢ per gallon July @ 98¢ per gallon	Sell futures contract: June @ 96¢ per gallon July @ 97¢ per gallon August @ 98¢ per gallon
May 15	Buy diesel @ 96¢ per gallon when market price is 95¢ per gallon	Buy May futures @ 95¢ per gallon
	Therefore: 1¢ per gallon loss (i.e, Operator pays 1¢ per gallon over market price)	Therefore: 1¢ per gallon profit
	NET RESULT: ZERO BALANCE	
June 15	Buy diesel @ 97¢ per gallon when market price is 94¢	Buy June futures @ 94¢ per per gallon
	Therefore: 3¢ per gallon loss (i.e., Operator pays 3¢ per gallon over market price)	Therefore: 3¢ per gallon profit
	NET RESULT: ZERO BALANCE	
July 15	Buy diesel @ 98¢ per gallon when market price is 94¢	Buy July Futures @ 94¢ per gallon
	Therefore: 4¢ per gallon loss (i.e., Operator pays 4¢ per gallon over market price)	Therefore: 4¢ per gallon profit
	NET RESULT: ZERO BALANCE	

By taking a short hedge, the operator is able to balance the loss he incurs in the physical market by having to pay above market prices with profits from the futures market. The short hedge allows the operator to take advantage of the falling prices to the extent that his net expenses are not higher than they would have been had he had no fixed price contract.

A short hedge would be the proper strategy for transit operators who enhance their supply security by maintaining diesel fuel in bulk storage facilities. A basic risk in storing diesel is that prices will go down after the diesel has been purchased and stored. Funds spent on fuel might have been spent on other items. In short, falling prices increase the opportunity costs associated with storing the fuel. Though these costs may be accepted as the price for supply security, a short hedge minimizes the possibility of being caught with high price oil. Bulk storage of diesel and a short hedge are not only compatible strategies, but yield the best of both worlds--supply security and price protection.

To further clarify which strategy (long or short) should be considered by any particular transit operator, Exhibits III and IV present in a simplified format, the conditions under which a long hedge or short hedge would be favorable or unfavorable.

Exhibit III-A presents the impact of rising and falling prices on a buyer (e.g., the transit property) and a seller (e.g., the diesel oil supplier) who have a long-term contract containing an escalation clause but no de-escalation clause in the physical market.

Exhibit III-B presents the impact of rising and falling prices on a buyer and seller in the physical market who have a long-term contract that includes a de-escalation clause.

Exhibit III-C presents the impact of rising and falling prices in the futures market on a long hedge (i.e., buying a contract) and a short hedge (i.e., selling a contract).

EXHIBIT III-A

PHYSICAL MARKET

$1.00/GALLON LONG-TERM CONTRACT WITH AN ESCALATION CLAUSE BUT NO DE-ESCALATION CLAUSE

	Rising Prices					Falling Prices				
Market Prices	1.00	1.10	1.20	1.30	1.40	1.00	.90	.80	.70	.60
Prices Paid By Transit Property	1.00	1.10	1.20	1.30	1.40	1.00	1.00	1.00	1.00	1.00
Variance From Contract Price Favorable [Unfavorable]	0	[.10]	[.20]	[.30]	[.40]	0	[.10]	[.20]	[.30]	[.40]
Market Prices	1.00	1.10	1.20	1.30	1.40	1.00	.90	.80	.70	.60
Prices Charged By Supplier	1.00	1.10	1.20	1.30	1.40	1.00	1.00	1.00	1.00	1.00
Variance From Margin Favorable [Unfavorable]	0	0	0	0	0	0	.10	.20	.30	.40

	Rising Prices	Falling Prices
When Buying (End-User: Transit Property)	Lose (Increased Expenditures)	Lose (Pay Above Market Prices)
When Selling (Diesel Supplier)	Neutral (Maintain Profit Margin Assuming Dealer's Costs Increase)	Win (Expand Profit Margin Assuming Dealer's Costs Decrease)

PHYSICAL MARKET

$1.00/GALLON LONG-TERM CONTRACT WITH AN ESCALATION AND DE-ESCALATION CLAUSE

	Rising Prices					Falling Prices				
Market Prices	1.00	1.10	1.20	1.30	1.40	1.00	.90	.80	.70	.60
Prices Paid By Transit Property	1.00	1.10	1.20	1.30	1.40	1.00	.90	.80	.70	.60
Variance From Contract Price Favorable [Unfavorable]	0	[.10]	[.20]	[.30]	[.40]	0	.10	.20	.30	.40
Market Prices	1.00	1.10	1.20	1.30	1.40	1.00	.90	.80	.70	.60
Prices Charged By Supplier	1.00	1.10	1.20	1.30	1.40	1.00	.90	.80	.70	.60
Variance From Margin Favorable [Unfavorable]	0	0	0	0	0	0	0	0	0	0

	Rising Prices	Falling Prices
When Buying (End-User: Transit Property)	Lose (Increased Expenditures)	Win (Pay Less Than Expected)
When Selling (Diesel Supplier)	Neutral (Maintain Profit Margin Assuming Dealer's Costs Increase)	Neutral (Maintain Profit Margin Assuming Dealer's Costs Decrease)

COMMODITY FUTURES MARKET

	Long Hedge: Buying $1.00/Gallon Contract									
Futures Prices	1.00	1.10	1.20	1.30	1.40	1.00	.90	.80	.70	.60
Variance From Contract Value	0	.10	.20	.30	.40	0	[.10]	[.20]	[.30]	[.40]
	Short Hedge: Selling $1.00/Gallon Contract									
Futures Prices	1.00	1.10	1.20	1.30	1.40	1.00	.90	.80	.70	.60
Variance From Contract Value	0	[.10]	[.20]	[.30]	[.40]	0	.10	.20	.30	.40

	Rising Prices	Falling Prices
When Buying a Contract	Win (Value of Contract Increases)	Lose (Value of Contract Decreases)
When Selling a Contract	Lose (Value of Contract Decreases)	Win (Value of Contract Increases)

Examination of Exhibits III-A and III-C reveals that a long hedge is desirable for the buyer if prices rise: the loss in the physical market is offset by the profit in the futures market. However, if prices fall, a long hedge would prove disastrous because the hedger would be paying above-market prices in the physical market and sustaining a loss in the value of his contract in the futures market. Exhibit III-C does indicate, however, that a short hedge would be desirable for a buyer expecting prices to fall. Profits from the futures market could be used to balance out payment for above-market priced fuel in the physical market.

Examination of Exhibits III-B and III-C reveals that a long hedge in the futures market is desirable for a buyer expecting or experiencing rising prices in the physical market. The increased expenditures in the physical market would be offset by profits in the futures market. If a long hedge is held and prices fall, the buyer is also protected against a net loss because the loss sustained in the futures market is offset by the savings accrued in the physical market. In essence, inclusion of a de-escalation clause permits a long hedge in which there is no downside (i.e., there is little chance of sustaining a net loss no matter what direction prices move). The lesson to be learned is that in order to maximize the benefits of a long hedge, the transit property must pay only the market price for fuel in the physical market.

Further examination of Exhibits III-B and III-C reveals that a short hedge would be undesirable for a buyer in the physical market if prices rise. A loss in the physical market in the form of increased expenditures would be accompanied by a loss in the futures market resulting from a drop in the value of the contract. If prices fall, however, the hedger gains in both markets. This is an enviable position in which to be, yet the possibility of falling prices and the consequences makes this a high risk position.

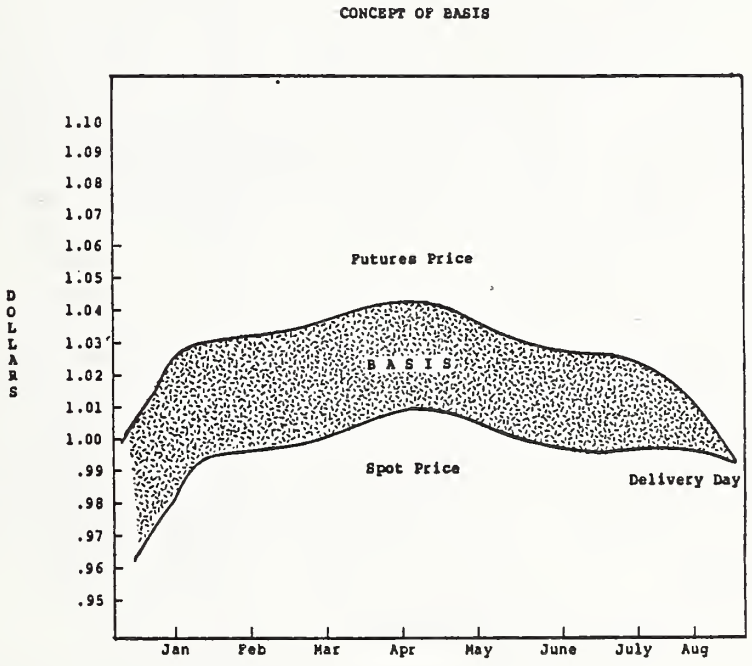
5. The Concept of Basis and The Imperfect Hedge

The earlier examples of hedges were all perfect hedges where the risk was entirely eliminated. As stated above, perfect hedges require that future prices and spot prices track one another perfectly; that is, they must move in exact tandem. Thus, if the spot price increases by one cent, the futures price will increase one cent.

Under normal market conditions, the futures price will be higher than the spot price in the delivery area. So, for example, one would expect to see a No. 2 fuel oil futures price of 95 cents when the spot price is at 90 cents. The difference between the futures price and the spot price is called the **basis**. In

theory, the basis remains constant until delivery day (specified in the futures contract) when the futures and spot prices converge. This concept is illustrated in Exhibit IV.

EXHIBIT IV



Basis consists of two elements: **storage basis** and **location basis.** Storage basis is the difference between the spot price and the futures price in the delivery area. It is called storage basis because the difference, in part, represents the holding cost built into the futures price which is not found in the spot price.

Location basis is the difference between the spot price in the delivery area and the spot price in the buyer's local market. The location basis primarily represents the transportation cost involved in moving the commodity from the delivery area specified by the exchange to the local market. Although at any time there is only one futures price for a given commodity, there may be many spot prices depending upon market factors characterizing each local market. One factor influencing a local spot price is the cost of transporting the commodity to the local market.

Basis would present no problem to the hedger if it remained constant. The difference could be allowed for in calculating the price at which the hedger would take or make delivery in

the futures market. There would be no risk. However, the basis does vary over time and because of this, most hedges are called imperfect hedges.

Basis varies, in part, as a result of changes in the cost of storing fuel. There are two key elements in storage costs: physical maintenance and the cost of holding the fuel (which is tied to the cost of money). Thus, as interest rates rise, the cost of holding fuel rises; as interest rates fall, so does the cost of holding fuel. Changes in the basis also result from changes in the costs of transporting fuel. Transportation costs vary depending on mode of transportation and cost per unit per time. Common carrier interstate pipelines transport the majority of petroleum products within the United States. Each pipeline has its own tariff (i.e., charge to users). Tariffs are not static, and may be changed with the approval of the Federal Energy Regulatory Commission. Other factors such as the demand/ supply balance also influence the size of the basis.

Because the basis varies, and because it is not possible to predict with certainty the direction or degree of variation, the hedger must face what is called **basis risk.** Basis risk stems from the fact that a hedger may suffer a loss as a result of a widening or narrowing of the basis depending upon what type of hedge is held. For a short hedge, a narrowing basis means a net loss, and a widening basis means a net profit. For a long hedge, a narrowing basis means a net profit, and a widening basis means a net loss.

By hedging in the futures market, the hedger is substituting basis risk for price risk. This tradeoff is attractive because experience has shown that jobbers and consumers run a greater risk of being more severely affected by adverse price movements than by adverse basis variation.

Basis risk is rarely eliminated. It can be reduced by picking the most opportune month to liquidate a futures position and by selecting the right futures market (i.e., point of delivery).

D. Institutions

1. The Commodity Exchange

The **commodity exchange** is an organized market whose sole business is the trading of futures contracts. Exchanges are located throughout the country, generally at points where there are substantial transportation and storage facilities, and in cities through which a large volume of the traded commodity passes. Consequently, the leading exchange in cattle and pork bellies is in Chicago. The leading grain exchanges are in Chicago, Kansas City, and Minneapolis. The leading cotton exchange is in New York City. No. 2 heating oil futures are currently being

traded in New York City at the New York Mercantile Exchange, and will soon be traded at the Chicago Board of Trade and the Chicago Mercantile Exchange.

Commodity exchanges are membership organizations whose members are involved in the production, processing, and marketing of one or more of the commodities being traded, or are brokers whose business it is to place orders for others. Individuals or businesses who wish to trade in the exchange do so through brokers whose firms are members of the exchange. Almost any broker can place an order in a particular exchange, for even if his firm is not a member, the chances are it has a relationship with another firm that is a member. These relationships among brokerage firms preclude the need on the part of the potential hedger to seek out a broker whose firm is a member of a specific exchange.

A commodity exchange is operated according to rules established by its own governing board. The governing board exists to insure that all transactions are undertaken fairly and as efficiently as possible. The governing board in no way influences prices of commodities traded in the exchange. The governing board and other exchange officials scrutinize all operations and enforce all rules recognizing that the success of the exchange is entirely dependent upon its being perceived as an equitable market where all parties are accorded the same rights and responsibilities.

2. Role of the Broker In Placing An Order

Commodity brokers perform the same basic function as do stock brokers. They execute orders at the direction of the client. To open an account with a broker one needs only to deposit the required margin with the broker and give him an order to buy or sell a futures contract. For purposes of illustration, let us assume that a transit operator wants to protect against a rise in diesel prices in the upcoming months so he decides to take a long hedge and buy a diesel futures contract.

The first step is for the transit operator to contact a broker and find out what the margin is on a diesel futures contract (margins are fully discussed in Part II, Section F, Subsection 2). That sum of money is deposited with the broker, and he is asked to place an order buying one diesel fuel contract (e.g., one No. 2 heating oil contract). From this point on, the entire transaction is out of the hands of the transit operator, and in the hands of the broker.

The brokerage firm contacts its office in New York City (assuming the trade is to be done on the New York Mercantile Exchange) by its own private wire. The order is received by an operator who records the order and gives it a number. The order then passes through a time stamp machine and is given to a phone

operator. This phone operator is in constant direct communication with another phone operator within a few feet of the "pit" on the floor of the exchange where the trades are carried out. The order is communicated to the pit operator who, in turn, passes the order immediately to the firm's broker in the pit. The pit broker signals that he is a buyer by raising his hand and turning his palm in (towards himself), and shouts his buying prices, the number of contracts for sale, and contract month(s). Another broker spots the buying broker, identifies himself as a seller by raising his hand and turning his palm away from himself and shouts his selling price, the number of contracts he wants to sell, and contract month(s). The two brokers nod to one another to signal agreement, and the trade is complete. The broker signals back to the phone clerk that the deal is done, and marks "done" on his "pit card" the time the order was placed, the price, the broker who sold the contract, and the delivery month.

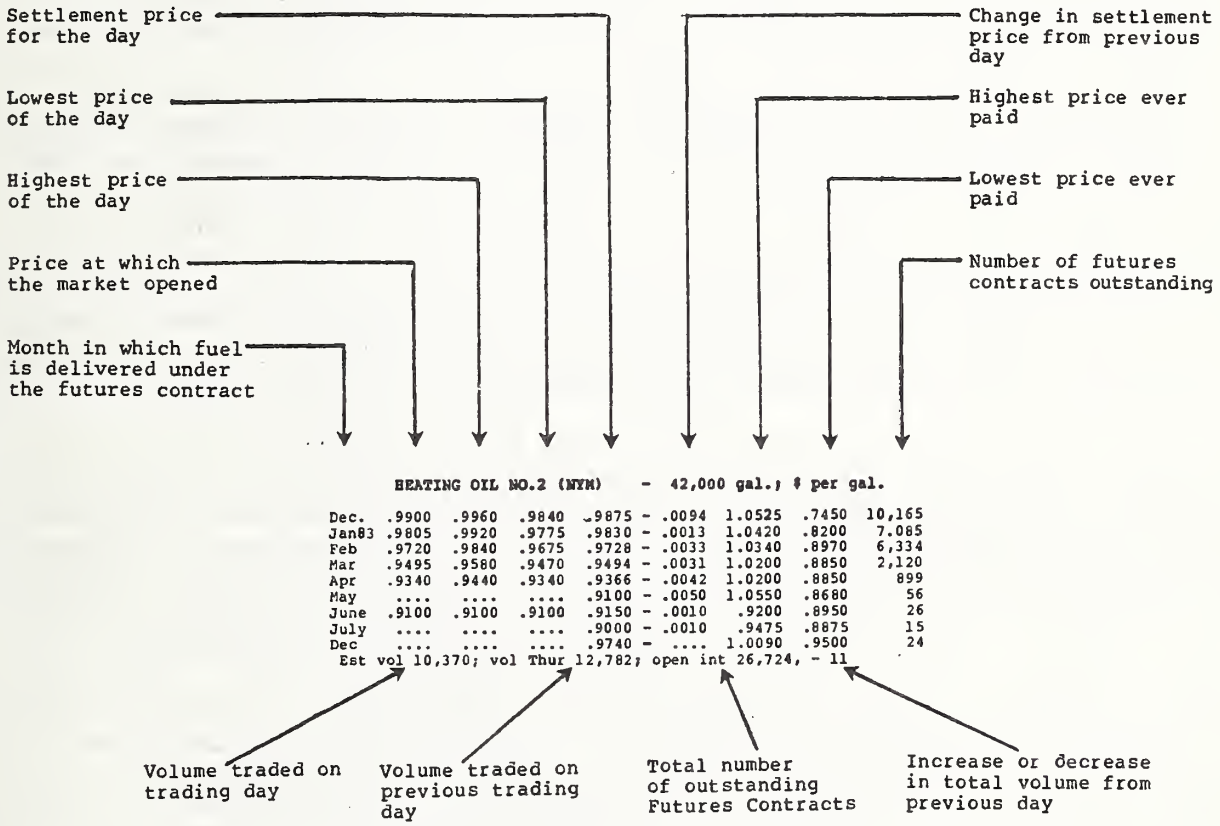
The phone clerk calls the phone operator who in turn calls back the wire room. The message is then sent from the wire room back to the broker's originating office at which time the transit property is notified that the contract was bought and the price at which it was bought.

This entire transaction usually takes less than five minutes. While the brokers in the pit are involved in their trading, officials of the Board of Trade, called pit reporters, are watching over the action. Their job is to record all price changes of a quarter of a cent above or below the last recorded price. Any such change is immediately recorded electronically and a central operator feeds the new prices into the ticker. The new price is known by interested parties around the world within minutes of the trade. Key prices for every commodity traded in an exchange are published daily in major newspapers and the Journal of Commerce (see Exhibit V).

From the transit operator's point of view, the system could not be simpler. There is practically no time spent on the actual trade by system employees. There is no involvement or contact of any kind with the opposite party in the transaction. All technicalities of the trade are handled by the broker. The broker's fee for these services are addressed in a following section on the costs of trading futures.

When closing out a position in the futures market, the broker plays the same role, and the same process is used.

AN EXPLANATION OF COMMODITIES FUTURES DATA
FROM THE WALL STREET JOURNAL



SOURCE: Wall Street Journal, November 8, 1982.

3. Role of the Clearinghouse

The U.S. dollar is currency accepted at banks throughout the world. As long as people perceive the United States government as being a sound institution, the dollar will be perceived as a sound asset. An analogous situation exists in the futures market. A futures contract is perceived as a sound asset marketable in its own right for one basic reason. The futures contract is backed by the exchange--actually by the clearinghouse associated with the exchange. As long as the clearinghouse is perceived as being a sound institution, the futures contract traded in the exchange will be perceived as a sound asset.

Each exchange has its own clearing association or house. The clearinghouse is composed entirely of exchange members, but not all members of the exchange are members of the clearinghouse.

The clearinghouse exists primarily to insure the integrity of the exchange. This is done by holding assets against which a claim can be made on a defaulted contract. The financial soundness of the clearinghouse itself is insured by: (1) the funds deposited by each clearinghouse member upon joining the association; (2) the margins deposited by every buyer and seller at the start of every trade; (3) the surplus reserve held by the clearinghouse; and (4) by the total membership of the exchange which is liable based on its proportion of the total volume of business done through the exchange over a certain period.

The clearinghouse is also responsible for documenting all transactions in the exchange, and for keeping financial and legal records. As soon as the brokers in the pit have arranged a trade, the clearinghouse steps into the transaction to assume the opposite position to each party. That is, to the hedger who is selling, the clearinghouse assumes the role of the buyer; to the hedger who is buying, the clearinghouse assumes the role of the seller. At the close of trading each day, the clearinghouse should have a net position of zero; that is, it should have assumed the position of buyer in as many contracts as it assumed the position of seller. In days when "buys" do not equal "sells", an error has been made. The outstanding trades examined by the exchange and corrections are made as soon as possible--usually in the next day of trading.

The clearinghouse is the arm of the exchange which monitors each position to insure that each trader maintains the required margin. This role is more fully examined in the section on costs which addresses the role of margins in the futures market.

Last, the clearinghouse is responsible for facilitating the delivery process by matching the parties who want to take delivery with those parties who want to make delivery. The clearinghouse

monitors the delivery process to insure that the contract specifications are met and that payment upon delivery of the commodity is made promptly.

From the point of view of the futures trader, the clearinghouse is the most important institution in the futures market. Not only does it insure the integrity of each contract, but it also minimizes the risk, the administrative burden, and the normal hassles often associated with a business transaction. The trader does not have to worry about the solvency of the other party. The trader does not have to negotiate over fine points of finance terms, product quality or delivery terms. The trader does not have to be concerned about renegotiations of established contracts. Personalities do not come into play. Default on a futures contract is extremely unlikely.

In turn for providing these services, the clearinghouse receives a commission on each contract. More specifically, a member of the clearinghouse is assigned to each trade and that specific clearinghouse member receives a small commission on each trade.

4. Types of Orders

The vast majority of orders placed in the futures market are called **"market orders"**. A market order is an order which is to be executed at the best price possible at the time the order reaches the pit. Unless otherwise specified by the hedger, all orders are market orders.

Other types of orders exist which carry certain restrictions on when they can be executed by the broker. A **limit order** restricts the broker to executing a trade only if a specified price is reached. Thus, if a broker is selling a contract under a limit order he can execute the order only if prices on the floor reach the specific price set by the customer.

If the broker is buying a contract under a limit order, he can execute the trade only at or below the predesignated price. In a limit order, the hedger needs to specify the exact price down to a fraction of the penny at which the broker is either to buy or sell. If the price of the limit order is not met, no order will be executed.

In theory, a limit order is advantageous to the hedger because it insures that a position will only be taken on his terms--that is, at his price. This enhances the probability that expected profits will be realized. However, limit orders have a major drawback. There is no guarantee that a limit order will be executed even if the predesignated price is reached on the floor. Prices fluctuate while trading is going on, and there is no guarantee that your broker will either be in the pit at the time your price is reached, or, if he is, there is no guarantee that your broker will be able to negotiate a trade at your price before the price changes.

There is a high possibility that the limit order will not be executed because the exact price was not reached on the floor. The broker has no flexibility; if the trading price gets to within half of a cent of the hedger's predesignated price, but does not reach it, no trade is executed. In short, a limit order may serve the hedger's best interest if the target price is reached and if a trade is made at that price, but it may also act as a hindrance to entering the market.

There is another type of order which may be placed that offers greater protection than a simple market order, but does not involve the restrictions of a limit order. This type of order is called a **stop order** or **stop-loss order.** A stop order directs a broker to initiate a trade only if a specified price is reached in the pit (similar to a limit order). When this certain price is reached, the stop order is treated as a market order allowing the broker to execute the trade at the best possible price. There is no guarantee that the trade will be made at the specified price called the **stop price.** However, there is a guarantee that a trade will be executed.

The stop order is often used by hedgers when they are interested in closing out a position already held in the market. Their objective is either to protect a profit or minimize a loss. For instance, let us assume that in October a transit operator buys a February diesel fuel contract at 98¢ per gallon expecting the price to rise. At the same time, the transit property wants to limit the potential loss to 2¢ per gallon if prices should decline so it places a stop order to sell at 96¢ per gallon. By early December, diesel prices have declined unexpectedly to 97¢. They continue to fall until mid-December when the price reaches 96¢. At this time, the broker executes the stop order to sell at the best possible price. Thus, the stop order has resulted in the transit system limiting its loss to approximately 2¢ per gallon.

The hedger may use the stop order to protect a profit. For example, let us assume that in March a transit system sells a September fuel oil contract at 98¢ expecting prices to decline. By June, the price has fallen to 93¢, thereby yielding the transit property a 5¢ profit. However, by early July, the price has started to climb and stands at 95¢. To protect a portion of the profit, the transit operator places a stop order to buy at 96¢, thereby insuring a profit of approximately 2¢ per gallon.

There is no guarantee that a stop order will be executed at the stop price. However, the hedger is assured that the order will be executed at the best possible price at that time.

E. Delivery

1. Rarity of Deliveries

A unique feature of the futures market is that one buys or sells a contract obligating oneself to take or make delivery of a

commodity when there is no such intention. This apparent anomaly primarily stems from two factors. First, the primary usefulness of the futures market lies in its ability to provide financial protection and not as an alternative means of acquiring a commodity. Second, there is rarely a **need** to make or take delivery. As a result of these two factors, delivery of commodities in the futures market is a rare occurrence. Less than seven percent of all No. 2 fuel oil futures transactions terminate in delivery.

Though actual delivery of the commodity is rare, the ability to deliver is crucial to the viability of the futures market. In fact, operation of the futures market is premised on the ability of sellers to deliver the specified commodity to the buyer, and on the ability of the buyer to take delivery. If delivery were impossible, there would be nothing to guarantee the convergence of futures prices and spot prices as the delivery date approached. The futures and spot market would be totally distinct markets with little or no relationship between price movements in either market. The fact that delivery can be made or taken is the element in the futures market which allows the futures contract to be treated as one treats the actual commodity in the physical market.

Yet, it is a fact that in the commodities that have been traded for many years, actual delivery is a rare occurrence. The same has been found to be true in the few years heating oil has been traded in the futures market.

Deliveries are rare, in part, because a large portion of traders in the futures market are speculators and are not hedgers. That is, they are not commercials, therefore, have no facilities for making or taking delivery. Speculators must terminate their market position with an offsetting market position.

Another reason deliveries are rare is that the futures contract specifies a particular port or pipeline (i.e., **delivery area**), where delivery is to be made. It is often the case that commercials do not operate or have business relationships in the delivery area. It is, therefore, easier to terminate the market position with an opposite, offsetting position.

The primary reason most hedgers do not terminate their position by making or taking delivery is cost. Let us assume that a hedger does not operate in the delivery area but is predisposed to receiving the fuel oil. Arrangements for the transportation of the fuel oil from the delivery area to the local market will have to be made. The cost of transporting the fuel may make taking delivery uneconomical. In instances where a buyer's futures price is lower than the local spot price, the transportation cost may negate, or be more than, the difference. In this case, it is wiser simply to offset the futures position and use the cash to buy on the local spot market and receive the product through normal channels.

Another reason for the rarity of deliveries is the high degree of specificity in the futures contract covering quality, quantity, and lifting.[1] As mentioned earlier, the strict quality, quantity, and lifting requirements are crucial to the viability of the fuel oil futures contract in that they add predictability to the transaction. Ironically, the degree of specificity in the definition of these features may become a hindrance in delivery of the commodity. The transit operator and even the fuel oil jobber may find that his facilities and schedules are not sufficiently flexible to accommodate the specifications of the contract. Modifying facilities or rearranging schedules may result in a dollar and manhour cost not economically justifiable.[2]

In short, it may be said that, under normal market conditions, there is **no need** to take delivery. It is easier and makes better economic sense to take an opposite offsetting position and apply any profit against a long term contract, or to immediately purchasing fuel in the local spot market.

2. Taking Delivery

The question then becomes when, if ever, is it useful for a transit operator to accept delivery on a fuel oil futures contract. The answer may be when normal market conditions do not prevail. In the event of a tight supply situation due to unexpectedly high demand, or in the event of a shortage situation stemming from a petroleum supply disruption, a transit property that has a long futures market position may decide it wants to take delivery. In this event, exchanges permit the hedger to take delivery by using one of two methods. The first method involves taking possession of the actual fuel oil at a time and place specified by the clearinghouse. The second method involves acceptance of a warehouse receipt which entitles the holder to draw from inventory the specified quantity of fuel oil at whatever time is convenient for the buyer. The first method is referred to as the **wet barrel** delivery mechanism, and the second method is referred to as the **depositary receipt** delivery mechanism.

a. "Wet Barrel" Delivery

The New York Mercantile Exchange uses the "wet barrel" delivery mechanism for all refined petroleum products, including No. 2 fuel oil. The "wet barrel" delivery mechanism is also found in the proposed crude oil futures contract in both the New York

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[1] "Lifting" is the process of removing the diesel from the storage tank.

[2] The fuel oil contracts do permit the delivery procedures to be modified if both parties agree to the changes. For more information see pages 36 and 37.

Mercantile Exchange and the Chicago Board of Trade, as well as in the gasoline futures contract proposed by the Chicago Mercantile Exchange.

Trading of petroleum futures contracts subject to the wet barrel delivery mechanism is stopped in the month immediately preceding the delivery month. The exact day trading is to cease is specified by the exchange. The month in which trading ceases is usually called the **position month** but may also be called the **spot month.** On the day trading ceases, the clearinghouse matches up all open long positions with open short positions. All parties holding open short positions are obligated to deliver the product to a terminal or pipeline facility in the delivery area. The seller has some flexibility in deciding at which approved terminal or pipeline facility he will be depositing the fuel. The buyer is obligated to lift the product from the designated holding point. The buyer has some flexibility in deciding when to lift the product, though lifting must occur during the delivery month.

The buyer pays for the fuel by making a payment in full to his broker. The broker, in turn, transfers the payment to the clearinghouse, which passes it to the seller's broker, who passes payment to the seller. The exact timing of the payment process is governed by the rules of the exchange. Generally, payment is to be received by the seller within 24 hours after the product has been lifted from at the terminal.

As mentioned earlier, the clearinghouse is responsible for insuring that both parties fulfill their obligations. Default by either party will result in a fine, and in the event that the seller is unable to deliver the required quantity and quality of fuel, the clearinghouse is responsible for finding a substitute seller.

It is important for transit operators to recognize that the trading of fuel oil futures is a relatively recent development. Consequently, there has not been a substantial amount of institutional experience in the area of wet barrel deliveries. Exchanges are currently reviewing existing delivery procedures, and may, at any time, modify existing rules or adopt new rules with the approval of the Commodity Futures Trading Commission, an agency of the federal government. It is important that any transit operator entering the futures market carefully examine the rules of the exchange governing delivery.

b. Depositary Receipt Mechanism

The Chicago Board of Trade is planning to use the second method of delivery referred to as the depositary receipt mechanism. This method of delivery does **not** involve the immediate transfer of fuel from the possession of the seller to the possession of the buyer. Instead, the buyer receives from the seller (through the clearinghouse) a depositary receipt or **DR.** Payment is made in full at the time the DR is received by the buyer. The DR entitles the buyer to lift the contracted volume of product from the seller's storage facility at any time. The buyer may

lift it immediately or wait. However, if the buyer chooses to postpone lifting the product, he obligates himself to paying a 1¢ per barrel per day storage premium. The buyer holding the DR also has the option of selling the DR; the DR is a negotiable item which can be sold and resold indefinitely. Once the buyer has received the DR, he has technically taken delivery on his contract and the position is closed. The clearinghouse has no interest or involvement in when and by whom the product is subsequently lifted from the storage tank.

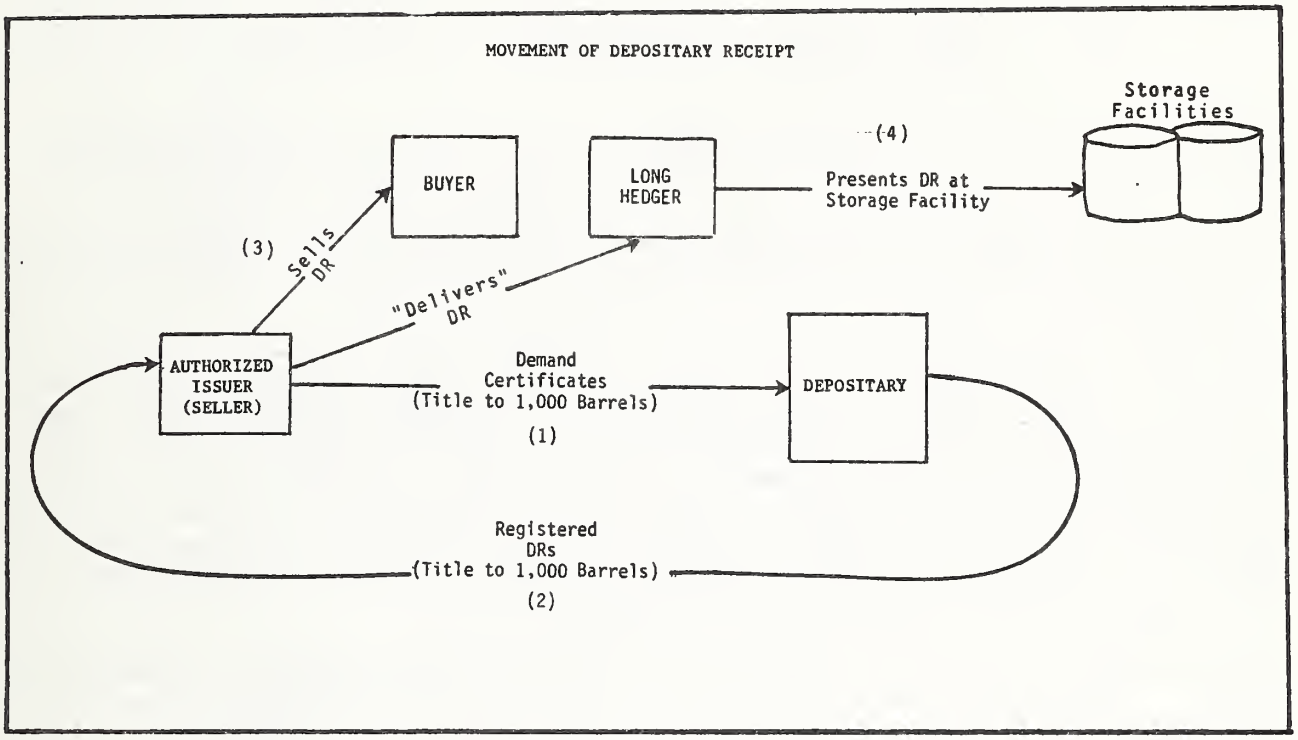
Planned use of the depositary receipt mechanism by the Chicago Board of Trade is an attempt to reduce potential logistical problems inherent in the wet barrel delivery mechanism. It also works to reduce the potential for pressure on spot prices resulting from wet barrel deliveries. This pressure on spot prices results from the possibility that several buyers could designate the same delivery site and the same time within a given delivery month. This sudden surge in demand can tax the available supply and cause a temporary but sharp jump in the local spot prices. Spot prices may also be influenced by a number of sellers going to the spot market to buy product to satisfy their delivery obligation stemming from their short positions. Use of the depositary receipt mechanism permits the lifting of the product to be carried out over a longer period of time--not just in the delivery month. By spreading out the liftings, the pressure on prices is diffused.

Only companies authorized by the Commodities Board of Trade may issue DRs. Such companies are generally refiners, wholesalers, or other firms in the petroleum industry which have sufficient storage capacity to hold fuel prior to lifting by the buyer and have access to pipelines. If a seller in the futures market is not authorized to issue a DR, it must buy one from a company that is authorized. The buyer of the DR must pay the full face value of the contract at the time the DR changes hands.

From the transit operator's (i.e., buyer of the DR), point of view, the DR is as good as having oil in the bank. To understand why this is the case, it is useful to understand what lies behind the DR. Exhibit VI illustrates the creation and movement of DRs.

The first step in the DR delivery process is the creation of a DR. This is initiated when an authorized issuer (i.e., refiner, wholesaler, etc.) gives "demand certificates" representing title to 1,000 barrels of oil, and a letter of credit to the depositary. The depositary is a subsidiary of the clearinghouse and is responsible for accepting and holding the demand certificates and letters of credit. In return for the demand certificates, the depositary registers and issues DR's to the authorized issuer.

EXHIBIT VI



Each DR is title to 1,000 barrels of oil. Upon receipt of the DRs by the authorized issuer, it is free either to use the DRs to satisfy delivery requirements resulting from a short hedge, or to sell the DRs on the open market.[1]

The buyer who takes delivery by way of accepting a DR has three options. First, he can hold the DR indefinitely. However, this would soon become an expensive option because he is paying 1¢ per barrel per day for storage, and he is paying interest on the money he used to pay for the DR upon its delivery. Second, he can give the DR to the depositary in exchange for which he receives a demand certificate. The wet barrel delivery location is identified on the certificate. The buyer has one day to submit to the company storing the fuel instructions as to when and where the fuel is to be lifted. Third, he can sell the DR. The price at which the DR may be sold will be determined

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[1]Guide to Energy Futures, Jane Jachimczyk (McGraw-Hill, February 1983).

by existing market conditions. It can be expected that the depositary receipt will run somewhat below the current spot price to allow for the storage premium the buyer would have to pay.

c. Other Delivery Procedures

Though each exchange has its own set of rules governing making and taking delivery, exceptions to the established procedures are possible. These exceptions take place only when **both** the buyer and seller believe it is more convenient to work out an alternative method and agree to an alternative arrangement. Exceptions to normal delivery procedures usually take one of two forms.

The first is referred to as an **exchange for physicals (EFP).** In an EFP, the buyer and seller match themselves on their own without the assistance of the clearinghouse. This must be done before trading of the contract ceases. The parties notify the clearinghouse of their desire to be matched, and are automatically matched by the clearinghouse. The two parties may renegotiate any or all parts of the contract including delivery procedures, delivery location, and quality specifications.

The second procedure is known as an **alternative delivery procedure (ADP).** Under an ADP, the buyer and seller who have already been matched by the clearinghouse may agree to make and take delivery at a location outside the prescribed delivery area of the exchange. The parties may also renegotiate the quality and price of the fuel (a premium for higher quality; a discount for lesser quality). The price may also be altered as a result of a change in location of delivery.

The EFP and the ADP may offer the buyers and sellers who want to take and make delivery respectively a degree of flexibility not found in the standard procedures of the exchange. Traders may make the delivery process more compatible with their normal business operations. The EFP permits two parties who have a steady business relationship to undertake a delivery with one another.

However, there are disadvantages to these delivery procedures. First, they veer away from a central benefit offered by the standard delivery procedures--predictability. Once two parties decide to go on their own and work out alternative delivery methods, they assume the responsibility for coming to a mutually agreeable plan. The details of the delivery plan may or may not be known when the clearinghouse is notified of their intention to adopt an EFP and an ADP. Second, by choosing either the EFP or ADP, another benefit derived by operating in the futures market is surrendered, and that is the buffer provided by the clearinghouse between buyer and seller. By opting for one of

the alternative methods, the parties place themselves in the position where they must work with one another. This effort requires the allocation of manhours to work out a deal and also introduces the element of personalities. In short, the protection inherent in the standard arms-length relationship with the other party is eliminated.

F. Costs

1. Highly Leveraged Market

What are the costs involved in hedging in the futures market? This question is usually the second one to be asked by people considering the futures market. It is preceded only by the question, what are my risks? Before identifying the specific costs involved in hedging, it is first important to understand that the futures market is a highly leveraged market. That is, a relatively small amount of money needs to be tied up to maintain a long or short hedge. Thus, trading in the futures market does not necessitate the allocation of a sizable portion of an organization's cash. On the other hand, the fact that the market is highly leveraged may lead to problems of over extension if the hedger focuses only on margin requirements (examined below) and loses sight of the potential impact of adverse price movements.

2. Margins

A **margin** in commodity trading is a good-faith money deposit made by the hedger or speculator to his broker, who in turn places it with the clearinghouse. The margin is a means by which the brokerage house reduces its own risk. In every transaction, the brokerage house guarantees the credit worthiness of its client to the exchange. In the event of default by the broker's client, the brokerage house is held liable by the clearinghouse. By requiring a margin from the trader, the broker is reducing his exposure to financial loss as a result of adverse price movements and defaults.

Each exchange establishes its own minimum margin requirement. The minimum margin is generally around 10 percent of the contract value, but it may be as low as 5 percent or as high as 20 percent. A broker may require a higher margin than the minimum set by the exchange.

Unlike the margin in the stock market, the margin in the commodity market is **not** partial payment for the contract. Neither is the margin a fee paid to either the broker or the clearinghouse. The margin is used to cover adverse price movements between the time a position is established and the time it is liquidated.

The value of the margin can vary hour to hour or day to day depending on price movements in the market. If prices move against the hedger, the value of the contract will decrease. As a result, the hedger may be notified by his broker that he must deposit additional funds to maintain his margin. This notification is referred to as a **margin call**. For example, let us assume that on March 1 a transit property buys one July fuel oil contract at $1.00 per gallon. The contract value is thus $42,000. Assuming the exchange requires a 10 percent margin, the transit property deposits $4,200 with the broker, so the margin value is $4,200. The very next day, a July fuel oil contract is being traded at 98¢ a gallon. A drop in price constitutes an adverse price movement for a long hedge (a long hedger buys in anticipation of higher prices). The contract value has decreased to $41,160. If the transit property chooses to liquidate its position by selling its contract, it would sustain a loss of $840. But the transit property does not choose to liquidate. Consequently, its margin is **marked to the market** (i.e., adjusted to reflect the loss or gain in the value of the contract) and the value of its margin is reduced by $840, leaving it with a value of $3,360. At this point, the transit property may receive a "margin call," and could be asked by the broker to deposit $840 into the margin to return the value of the margin to the original $4,200. This additional $840 constitutes an expenditure or a loss to the transit property. Small adverse price movements rarely result in a margin call. However, the hedger must be prepared for one at any time.

If prices move in favor of the hedger, the value of the contract will increase. The incremental value of the contract will be registered at a profit and added to the value of the hedger's margin. The hedger has immediate access to this profit. For example, assuming the same set of circumstances as above (i.e., buying a contract at $1.00 per gallon, thus having a contract value of $42,000, and a margin value of $4,200), if the price increases to $1.02, then the value of the contract would be $42,840, representing a gain of $840. Assuming the transit operator chooses not to liquidate, the additional value of the contract would be added to the margin account bringing the margin value up to $5,040 (4,200 + 840). At this point, the transit operator has the choice of either leaving the $840 in the margin account to cover possible adverse price movements or withdrawing the $840.[1]

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[1] A hedger may deposit cash or U.S. Treasury bills to satisfy his initial margin requirements, however, interest can be earned only on Treasury bills.

The process of "marking to market" results in the hedger realizing profits or sustaining losses little by little over the life of the contract. Consequently, there is no large profit or loss when a position is liquidated.

3. Commissions and Fees

Each trader pays a commission to his broker when a position is liquidated. The size of the commission ranges from $50 to $100 per trade depending on the volume of trading undertaken by the hedger. Though each exchange has its own minimum commission for its members, hedgers must discover the exact size of the commission from the particular brokerage house with whom they are dealing. The commission pays for the broker's services in opening and closing a position, as well as for maintaining margin.

Another cost the hedger may incur is a fee paid to outside consultants who are hired to first assess the feasibility of entering the futures market, and second, to develop a hedging strategy if the decision is made to enter the market. The CTA's fees are negotiable.

4. Maximum and Minimum Price Moves

The fact that the margin requirements, commissions, and fees are relatively small compared to the value of the contracts being traded means that the transaction costs will not be of major concern to a transit property hedging in the futures market. What will be of major concern is the potential for sudden losses as a result of an unforeseen event affecting the supply and demand and, consequently, the price of fuel oil. A sudden unexpected adverse price movement might place the transit property in the position of having to make an instant decision as to whether it should invest more money to maintain margin or liquidate before the loss becomes larger.

Fortunately for the hedger, there are rules which protect the hedger against a sudden crash. These rules stipulate minimum and maximum price moves allowed by the governing board of the exchange in a given day. For example, the New York Mercantile Exchange has a normal limit of 2¢ per gallon above or below the previous day's closing trade on all refined petroleum products. If the 2¢ limit is reached by the closing trade, the limit is raised to 3¢ in the next trading day. If the 3¢ limit is reached, the limit is raised to 4¢ in the next trading day. This 4¢ limit is the maximum change from the previous day allowed by the exchange. The only exception to this maximum change is found in the position month (i.e., month immediately preceding delivery month) during which there is no maximum price move.

The maximum price move affords the hedger time to decide what course of action he wishes to take, and reduces the risk of a substantial loss as a result of quirks in the market. It also allows the clearinghouse time to carry out its record keeping responsibilities, and to match buyers with sellers.

The exchanges also have rules covering minimum price moves. The minimum price move in fuel oil and gasoline is .01¢ per gallon which is called a "point". A point is the smallest amount by which a trade may be more or less than the previous trade. Thus, if a transit operator owns a single contract representing 42,000 gallons and the market moves one point, $4.20 is either gained or lost depending on the position held. This also means that for every one cent charge per gallon, the hedger either gains or loses $420 on each future contract.

III. ADDRESSING THE FEASIBILITY OF FUTURES MARKET TRADING

A. Introduction

1. Purpose

The purpose of Part III is to establish a framework within which each transit operator can assess for himself the feasibility and merits of trading in energy futures. There is no blanket conclusion that can be offered. The costs and benefits of this option can best be established by those people familiar with the financial and diesel supply situations and the management perspective of a particular transit property. To assist the planning staff of each property, the questions which need to be addressed are identified and examined. That is, the variables upon which a decision can be made are delineated, and their significance is explained.

By addressing these questions, the transit property will be forcing itself to look at the kinds of problems often put off due to the pressures of day-to-day operations. Even for systems that have devoted time and effort to preparing for fuel emergencies of one type or another in the past, addressing these questions again may be useful because the environment in which transit properties acquire diesel fuel has changed with the advent of decontrol.

2. Impact of Decontrol

Decontrol in the oil industry has brought about a major shake-up at all levels of the petroleum product marketing chain. Distribution of refined products through a vertically integrated company is no longer the industry standard. Diesel suppliers are less and less the marketing arm of a refiner. An increasing number of suppliers, wholesalers, and retailers are becoming independent marketers. This includes branded suppliers. Because diesel suppliers are independent businesses, they too will suffer the vagaries of the free market with no refiner there to soften the hardships of a tight market. Because diesel suppliers can not count on preferential treatment by any given refiner, it would be unwise for transit operators to count on preferential treatment by any given diesel supplier.

Uncertainties over prices and supply availability have led an increasing number of petroleum refiners and marketers to look to the commodity futures market as one means of reducing risk. Petroleum companies view the commodity futures market not as a panacea for the uncertainties inherent in a deregulated petroleum market, but as one possible mechanism for reestablishing some degree of predictability particularly in the area of price. Though transit operators as bulk end-users do not resell diesel fuel and are not interested in protecting margins or market

share, transit properties are like the petroleum companies in that their operations may be adversely affected by sharp price changes and supply interruptions. Consequently, transit properties may also look to the commodity futures market as one of several ways to reduce risks.

Scepticism is only natural when examining a new concept, and in fact, should be encouraged. Scepticism will result in probing questions which need to be asked before a transit operator can make a final assessment of the feasibility and utility of trading in the energy futures market.

3. Identify Major Concerns

In order to determine the feasibility of trading fuel oil futures, a transit property first has to identify its major energy concerns and the potential adverse impact of these concerns on the operation of the system. Are the concerns related to fuel price? Is there concern that diesel prices will rise sharply within the contract year? If prices do rise, are there adequate funds to cover the additional cost? Conversely, is there a chance that prices will decline below the negotiated contract price? If so, will the transit property benefit from the lower price?

In addition to price, there may be concern over the availability of supply. On how many sources of supply does the transit property rely? How vulnerable are these dealers to supply interruptions upstream (i.e., in the crude oil market)? Are there alternative sources of diesel fuel readily accessible if the dealer(s) with whom the property has a contract defaults? If so, what are these alternatives and how would they be utilized in a crisis? How would a diesel fuel shortage specifically affect operations of the transit system?

There may also be concerns relating to management of the transit system in times of crisis. Will the implementation of one emergency response action as opposed to another affect the responsibilities and operation of employees? Are supervisory personnel trained and prepared to administer emergency plans? How many hours a day does the property want its management staff overseeing any one particular emergency response activity? Will outside help be necessary to effectively and efficiently respond to a supply emergency?

When answering these and other related questions, the property's planners should prioritize their concerns and determine what problem is both most likely and would have the most adverse impact on the transit property. By prioritizing the concerns, the planners will be in a better position to determine if trading energy futures offers benefits that match the high priority problems. Identifying potential problems is the first step.

The second step involves examination of issues related specifically to trading in the energy futures market.

B. Specific Questions to be Addressed

Questions listed below are divided into two categories: (1) price questions and (2) supply questions. The relative importance of the various questions within each group needs to be established by the transit organization itself.

1. Price Questions

a. What do I expect diesel prices to do in the next 12 months?

Unfortunately, the first question that needs to be examined is also the most difficult one to answer with any degree of certainty. Consequently, rather than attempting to look into the future on one's own, it is recommended that specific sources be referenced.

Price projections on refined petroleum productions may be obtained free of charge from the Department of Energy's short term energy forecast. Prices are projected for the upcoming months. Price projections may also be obtained for a fee from several private sources such as Data Resources, Inc. (DRI) and Chase Enconometrics. These three sources make projections in dollars. Other sources offer assessments of trends though specific dollar figures may or may not be given. For instance, Petroleum Intelligence Weekly, and the Oil and Gas Journal often contain articles in which demand, supply, and price trends are given. Another source of information on future prices would be the transit property's supplier(s). The supplier will quote a price which covers his present and future cost and allow for a profit margin. To determine this price, he will have made an assessment on his own as to projected supply/demand/price trends, possibly using information obtained from his refiner. Yet, another source of information for diesel price projections would be national and local weather services. Since No. 2 fuel oil can be used as either diesel fuel or heating oil, the prices of the two products are generally very close. Consequently, as the price of heating oil is influenced by the severity of winter, so is the price of diesel fuel.

Projecting exact prices is not necessary. What is necessary is to get a sense for the trend and the degree of fluctuation that can be expected. This will assist in determining whether there is cause to be concerned about rising prices, and if the property is exposed to a depletion in funds as a result. If prices are expected to remain relatively constant, or go down, the need to trade diesel futures diminishes. If prices are expected to rise or fluctuate sharply, the usefulness of the futures market increases.

b. What is my exposure to price escalation under my current contract(s)?

The standard contract with a petroleum jobber includes an escalation clause. This clause usually permits the supplier to pass on to the customer on a cent-for-cent basis any operating cost increase incurred by the seller during the course of the contract. This clause permits the supplier to protect his profit margin. At the same time, it adds an element of uncertainty in the process of budgeting for diesel expenditures by the transit property. It is standard practice to put a ceiling on the escalation clause. This ceiling is usually in the 15 to 20 percent range, but it is a negotiated point and may be higher.

In order to assess the merits of hedging in diesel futures, the transit system needs to estimate its financial risk; that is, its exposure to escalating prices. This is all the more important if one expects diesel prices to experience a rise or sharp fluctuations. The transit operator can calculate his expenditures for best case and worse case scenarios to establish the outside parameters. Estimating the possible increased costs will assist in determining vulnerability to price jumps, and it will establish the amount to be hedged if the decision is made to trade diesel futures.

c. Is there a correlation between local diesel prices and No. 2 fuel oil prices in any one of the futures exchanges?

Any transit operator considering hedging in the futures market must ascertain if there is a consistent correlation between spot prices in the local market, and No. 2 fuel oil prices in one of the two exchanges--the New York Mercantile Exchange and the Chicago Board of Trade. A consistent correlation is necessary for hedging to work. Prices do not have to be the same, and in fact, this would be highly unusual unless the local market is in close proximity to the delivery area of the exchange. What is important is that the local spot prices for No. 2 fuel oil follow the same trend as the futures prices with the spread (i.e., the difference between the local spot prices and the futures price) remaining more or less constant.

The best way to determine if a direct correlation exists is to examine historical prices of the local market (this data may be available from the Department of Energy or from local suppliers) and futures prices (this data may be obtained from past issues of the Journal of Commerce and the Wall Street Journal).

In addition to examining historical data, the transit operator may track current price movements over a period of several months. However, it should be noted that because the demand for heating

oil (the major use of No. 2 fuel oil) is cyclical, it is preferable to have a year of data to examine. It can then be determined if local diesel prices follow the ups and downs of heating oil prices throughout the year.

If a direct correlation is found to exist, hedging in the futures market becomes a more viable option. Conversely, if for any reason a consistent correlation is found to be lacking, hedging may be ruled out.

d. In which futures market should I trade?

This question is related to the preceding question in that, all else being equal, a transit operator should trade in the futures market in which the prices exhibit the strongest correlation with local diesel spot prices. Having said this, it must then be said that all else is rarely equal. Thus, other factors have to be taken into consideration. This is particularly true if the hedger is interested in the possibility of taking delivery. In this case, the hedger needs to examine the various ways he could physically move the product from the several delivery areas to identify the least costly route. Generally speaking, pipeline transportation is less costly than barges, and barges are less costly than railroad tank cars, which are less costly than tank trucks. Consequently, if a transit property can receive a product via pipeline from one delivery area as opposed to any of the other means from another delivery area, it would probably be better to trade in the market where pipeline delivery is possible.

If delivery of wet barrels is not contemplated, the decision would center around the question of basis (refer back to Part I, Section B for an explanation of basis). Since hedging is, in essence, substituting basis risk for price risk, the transit operator should select the exchange in which the basis is the most constant. This is just another way of saying that one should hedge in the market where the correlation between spot prices and futures prices is strongest.

e. Could the transit system absorb any financial loss as a result of hedging in the futures market?

Though it is the speculator and not the hedger that assumes risk, the hedger is not totally immune from risk. An adverse change in the basis could result in a hedger not having a loss in one market completely offset by a profit in the other market. Moreover, marking to market may require the transit operator to make a payment to the broker so that the margin is maintained. The question then becomes, does the transit system have available on a day-to-day basis the necessary funds to cover this requirement? Exactly how much will be needed depends on the value of the contracts, the number of contracts, and the margin requirement

of the broker. The net amount paid out will be determined by the ratio of favorable to unfavorable price movements. Though most medium to large transit systems would likely find this draw on available cash acceptable, it is still a factor not to be overlooked in ascertaining the merits of hedging.

One saving grace in sustaining a loss in the futures market is that the loss is paid out over time, and not all at once. Moreover, though hedging is not devoid of risk, neither is a supply contract which permits the supplier to pass on to the customer increased costs. The question must be asked, can the transit system afford to pay to the supplier 15 to 20 percent or more than anticipated? This may also strain the cash position of a transit property. In short, hedging does involve some financial risk, but so too does the normal fuel contract.

f. Can I use the futures market to negotiate a fixed price contract with a supplier?

Hedging in the futures market is being examined as a means by which transit operators can reduce their vulnerability to price increases. Much of the discussion has been based on the assumption that the transit property itself would buy and/or sell futures contracts, and by so doing become the hedger. Profits made in the futures market would be used to offset increased cost incurred in the wet barrel market. Yet, it must be recognized that hedging by the transit property would not be necessary if a fixed price contract were negotiated with the supplier. With a fixed price contract, the transit property would not be exposed to any risk of price shock. Funds could be budgeted for fuel acquisition knowing that at least this one operating expense would remain stable for the life of the fuel contract.

Historically, the problem has been that no diesel supplier would quote a fixed price. By so doing, he would run the risk of having his margin squeezed to the point of incurring losses as a result of rising costs. Thus, the escalation clause became a fixed item in any supply contract.

This is no longer the case. The existence of a sound futures market in No. 2 fuel oil has made the escalation clause in diesel supply contracts obsolete. This obsolescence stems from the fact that the supplier can hedge in the futures market. The supplier can protect the margin he factors into a supply contract with a transit property or any other bulk end-user. Since the supplier can protect his margin by hedging, he can offer a fixed price contract to the end-user at little risk to himself.

The fact that the supplier can hedge means that the transit operator can benefit from the futures market without taking an active role in the market itself. The supplier enters the futures market, hedges his wet barrel position, and offers a fixed price contract to the transit property.

This scenario assumes that the supplier is willing to enter the futures market. Is this a realistic assumption? The answer is probably no. From the supplier's perspective, it is easier and safer to continue doing business in the usual manner, and to cover his risk with an escalation clause. The typical diesel fuel supplier has no more experience and no more understanding of the futures market than do transit properties. Consequently, he can be expected to be as apprehensive at the prospect of trying this new mechanism as are transit system managers.

Yet, the fact remains that the supplier is competing for business in an open market. Moreover, any transit property of some size will represent a large potential customer. These two factors provide transit operators with leverage. This is particularly true in a soft market, i.e., a buyers market, the likes of which we are currently experiencing. Officials of the transit properties will simply have to make it clear that only fixed price bids will be considered.[1]

2. Supply Questions

Several questions must be addressed which involve supply.

a. What is my current supply situation?

The transit property must assess its current supply situation. This involves calculating current and expected diesel requirements, reviewing the contents of the existing contract(s) for volume, delivery schedule, and particularly, conditions under which the supplier may abrogate the contract. Is the transit operator to receive any preferential treatment in the event of a petroleum supply interruption? How many suppliers is the transit operator dependent on for diesel fuel? Upon what refiner or refiners is the supplier dependent? Does the supplier have any contingency plans for maintaining deliveries in an energy emergency? Answering these questions will allow the transit operator to ascertain its supply position and determine its vulnerability to a supply cut-off. The greater the vulnerability, the more necessary are contingency options such as hedging energy futures.

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[1]This tactic has been successfully used by the Washington Metropolitan Transit Authority in Washington, D.C. Details on the experience are presented in Part III, Section A of this study.

b. What do I expect to see in the diesel market in terms of supply availability over the next year?

Few transit properties or other bulk end users would be likely to invest time and money in contingency planning for supply emergencies if there is little likelihood of any shortage. Thus, a basic question to be addressed is, what do I expect to see in the diesel market in terms of supply availability in the next 6 to 12 months? The question of supply is related to the question of demand. Is demand for diesel expected to rise, fall, or remain the same? In short, expectations as to the future supply and demand for diesel fuel need to be explicitly made in order to determine the need for emergency contingency plans.

Currently, the petroleum market in general can be described as "soft"--demand is down relative to supply. Because supplies are plentiful, the petroleum market can also be described as a "buyer's" market. If one expects a buyer's market to continue, then it may be argued that time and money can be better used in things other than hedging. On the other hand, if one concludes that a buyer's market is not a permanent fixture, then activities such as hedging may be deemed worthwhile. In fact, if one believes the current soft market is temporary, then now is the time to take actions that are necessary to protect one's supply position when the market tightens up.

One benefit to hedging is that there is little preparatory work involved in entering the futures market. Consequently, the potential hedger who is more interested in insuring available supply than in protecting against adverse price movements may wait until signs are pointing to a possible supply problem. The only disadvantage in putting off hedging until the last moment is that by the time a potential supply problem is apparent, the prices in both the spot market and the futures market will have already reacted and gone up. If a hedger buys a diesel futures contract at the new high price and the supply problem does not materialize or is less severe then expected, prices will drop leaving the hedger in the position of having to sell at a lower price, thereby sustaining a financial loss.

The lesson to be learned is simple. If a transit operator decides to trade futures as a hedge against supply interruptions, the time to enter the market in a long position is when the market is soft. In this way, the hedger has locked in as additional source of supply and at a low price.

It is not necessary to hedge a property's entire fuel requirement. In fact, it is more common for a trader to hedge only a portion of its requirements. For example, the Southern California Rapid Transit District hedges about 70 percent of it's diesel requirements in No. 2 fuel oil futures.

c. What happened to my diesel supplier(s) in the last petroleum supply interruption?

It may be of value to look at the past to see how the supplier with whom a transit property has a contract was affected in the last supply interruption, and to identify the actions he took in response. When doing this, however, it must be recognized that in 1979, when petroleum from Iran was stopped, crude oil price controls and product allocation regulations were still in effect. Therefore, caution should be used when drawing conclusions about the future based on the past.

Having said this, it may still be useful to examine how the supplier allocated his shortfall among his "nonpriority" customers. That is, upon what basis did the supplier cut back customers who were not guaranteed 100 percent of requirements under allocation regulations? The Uniform Commercial Code, which covered how a seller should have cut back nonpriority users in 1979, is still in effect today. The code requires a seller to fulfill his contractual obligation as best he can. However, if conditions arise that prevent the seller from meeting his full obligation, he must allocate available supply among his customers in a "fair and reasonable" way (i.e., on a pro rata basis). Thus, a diesel supplier cannot cut off a transit system entirely while maintaining deliveries, even at reduced amounts, to other customers. Yet, transit operators should not put too much reliance on the seller's requirement to reduce deliveries on a pro rata basis.

One should note that a direction to allocate pro rata is far from an explicit and rigid set of allocation rules. The seller may choose to prorate based upon historic deliveries, historic contract amounts, current needs, current contract amounts, and, possibly, other grounds. By choosing one or another scheme to establish his proration, the seller may be able to favor one set of customers over another to a considerable extent.

The seller's flexibility in determining his pro rata scheme may work in favor of or against the interest of mass transit systems.[1]

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[1]J. White and R. Summers, Uniform Commercial Code, p. 135, 136 (1980).

Regarding the 1979 and 1974 oil shortages, the supplier should be questioned as to his experience in the past supply disruptions. At the very least, the supplier can be made aware of the transit operator's concern over a future supply disruption, and he can be questioned on his planning for such an eventuality.

As a result of this probe, the transit operator will have additional information which may be applied to the overall assessment of vulnerability to supply disruption.

d. Is delivery of wet barrels feasible?

If one is considering hedging for the purpose of insuring supply availability, the feasibility of wet barrel delivery must be determined. In theory, there are four ways transit systems may take delivery of wet barrels.

Option 1: Liquidation - Offset the long position, take the cash and buy fuel in the local spot market. (Technically this is not a "delivery" option.)

Option 2: Exchange - Take delivery of the fuel in the delivery area. Arrange an exchange whereby a jobber operating in both the delivery area and in the local market accepts the fuel from the transit property in the delivery area in exchange for delivering diesel to the transit property in the local market area.

Option 3: Transport the Product - Take delivery of the diesel in the delivery area and have it transported via pipeline, barge, railroad tank car, or tank truck to the transit property's local market.

Option 4: Alternative Delivery Plan or Exchange For Physical Negotiate an alternative delivery plan with a seller where the seller agrees to make delivery in the transit operator's local area, or at a mutually agreeable point along a major transportation route from which point the fuel would be transported to the transit property's area.

Option 1, liquidation, is technically not a method of taking delivery and, in fact, is the alternative to taking delivery. At the same time, liquidation results in the freeing up of the original margin plus any profit that had been allowed to stay in the margin account. This money may be used to purchase diesel fuel on the local spot market. This option negates the need to arrange and pay for the transportation of diesel from the delivery area to the local market and thus may result in the lowest price per gallon delivery of the four options.

Option 2, exchange, is a common arrangement found within the petroleum industry. The objective of the exchange is to avoid transporting the product which would add to its cost. An exchange involves the transit operator taking title to the diesel in the delivery area. This title is turned over to a jobber who holds title to another volume of diesel already in the transit operator's local area. In exchange for title to the product in the delivery area, the jobber gives the transit operator title to the diesel already in the local area. Thus, the transit operator has access to additional supply without having to bear the cost of transportation.

Option 3, transporting the product, involves taking delivery of the diesel at the delivery area and arranging and paying for its transportation to the local area. The feasibility of this option depends on the location of the transit property's operating area relative to petroleum product transportation routes. In other words, the usefulness of this option largely depends on how close the transit property is to a petroleum product, terminaling area situated along a pipeline, or a navigable river or railroad. Because pipeline transportation is substantially cheaper than all other modes of transportation, proximity to a pipeline is preferable.

Hedgers trading in the New York Mercantile Exchange with a New York harbor delivery must recognize that delivery by pipeline from New York harbor is limited to a small geographic area shown as the enclosed region in Exhibit VII-A. This region includes areas west of New York City serviced primarily by the Buckeye pipeline. This area also includes New Jersey, the southern half of Pennsylvania, and Western Ohio, including Cleveland. Areas northwest of New York are serviced by the Buckeye/Mobil pipeline which runs into western New York state. No pipelines run due north or south from New York harbor.

An alternative to pipeline is barge transportation. Product movement by barge is very heavy along the New England coast. Mass transit operators in Connecticut, Massachusetts, or southern Maine in close proximity to New Haven, Boston, and Portland, respectively, may have the product barged up to the water terminals located in those cities. From these terminaling areas, the diesel would have to be moved inland by tank truck.

These few pipelines and barge routes are the only means by which transit operators could physically move diesel from New York harbor. Thus, transporting diesel from New York harbor is only physically feasible for a relatively few transit properties.

A large number of transit operators will find it feasible (though still expensive) to take delivery on the Chicago Board of Trade/ Gulf Delivery contract and the New York Mercantile Exchange/Gulf

Delivery contract.[1] The Chicago Board of Trade contract defines "Gulf Coast" as consisting of Harris, Galveston, or Jefferson counties in Texas. This would permit delivery to be taken by three common carrier pipelines: Colonial, which transports products up the Eastern seaboard to New York City; Texas Eastern, which transports products north through Little Rock and Indianapolis to Chicago and Cincinati, and Explorer, which transports products north through Dallas-Fort Worth, Tulsa and St. Louis up to Chicago. See Exhibits VII-A, VII-B, VII-C and VII-D.

The New York Mercantile Exchange defines "Gulf Coast" as extending from Pasadena, Texas to Collins, Mississippi. This area also permits delivery into the Colonial, Texas Eastern, and Explorer pipelines.

In short, the east coast and central states are serviced by pipelines originating in the Gulf Coast area. Consequently, depending upon the location of the specific terminaling area at which the buyer takes delivery of the fuel, it may be possible to physically transport the fuel to a wide number of cities.

Operators considering taking delivery must not only select the terminaling area at which they will take delivery in the Gulf Coast but must also identify the terminaling area at which they can take the fuel from the pipeline. (Terminaling areas along pipelines are depicted as **T** in Exhibit VII.) Taking delivery from a pipeline terminaling area will likely involve the use of tank trucks and this is the most expensive mode of petroleum product transportation.

An alternative to the pipelines originating in the Gulf Coast is barging the product up the Mississippi River. Of course, this alternative would be feasible only for those transit properties in close proximity to terminals along the river.

For all practical purposes, there are no major pipelines which move petroleum product from the Gulf Coast area to the Rocky Mountain states or to the Southwest and West Coast states. These two areas operate as distinct production and marketing areas with only small capacity pipelines linking them with each other and the Gulf Coast area. Therefore, transporting fuel by any means from the Gulf Coast to the Rocky Mountain, Southwest, and West Coast states should be considered unfeasible.

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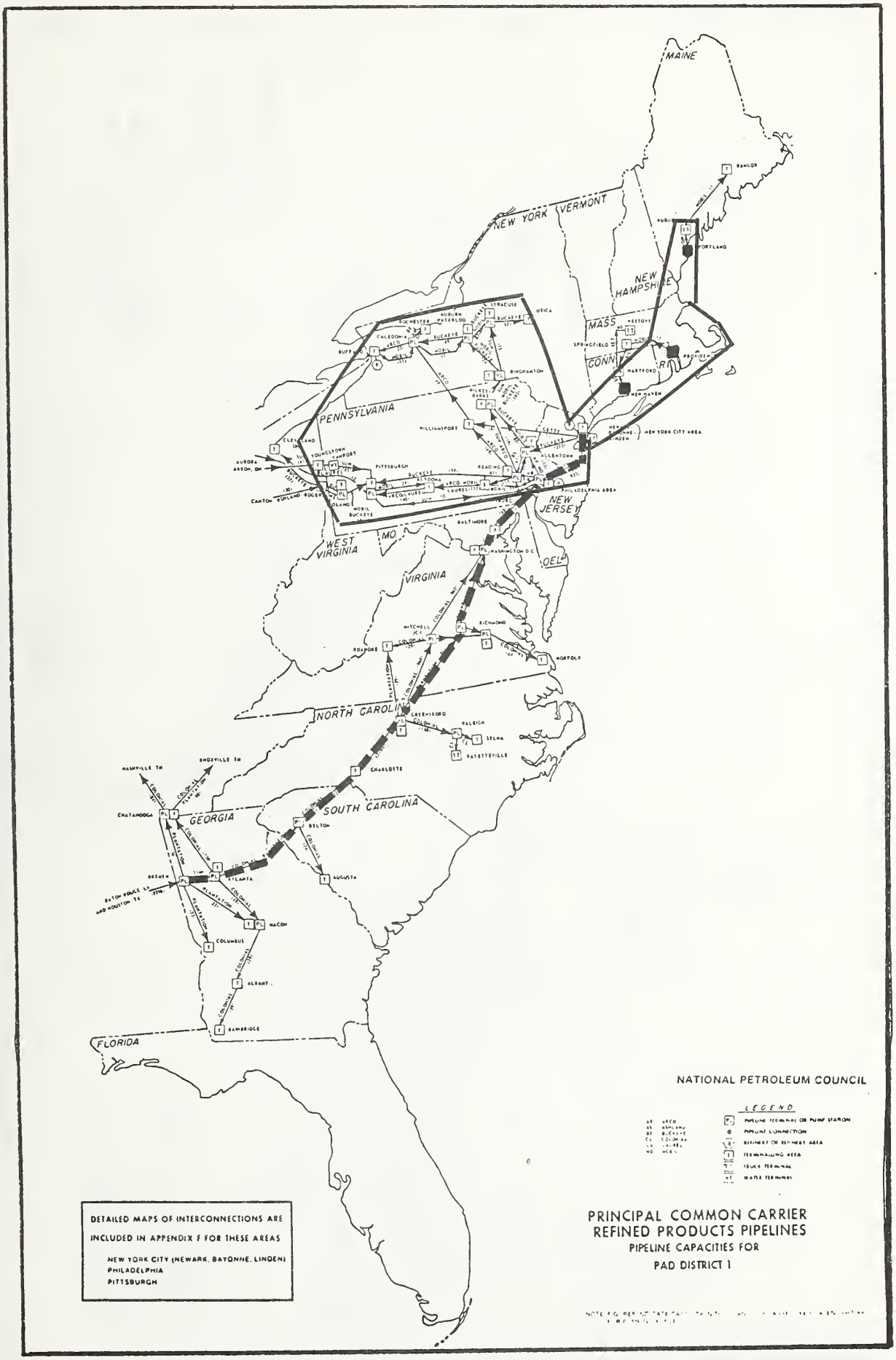
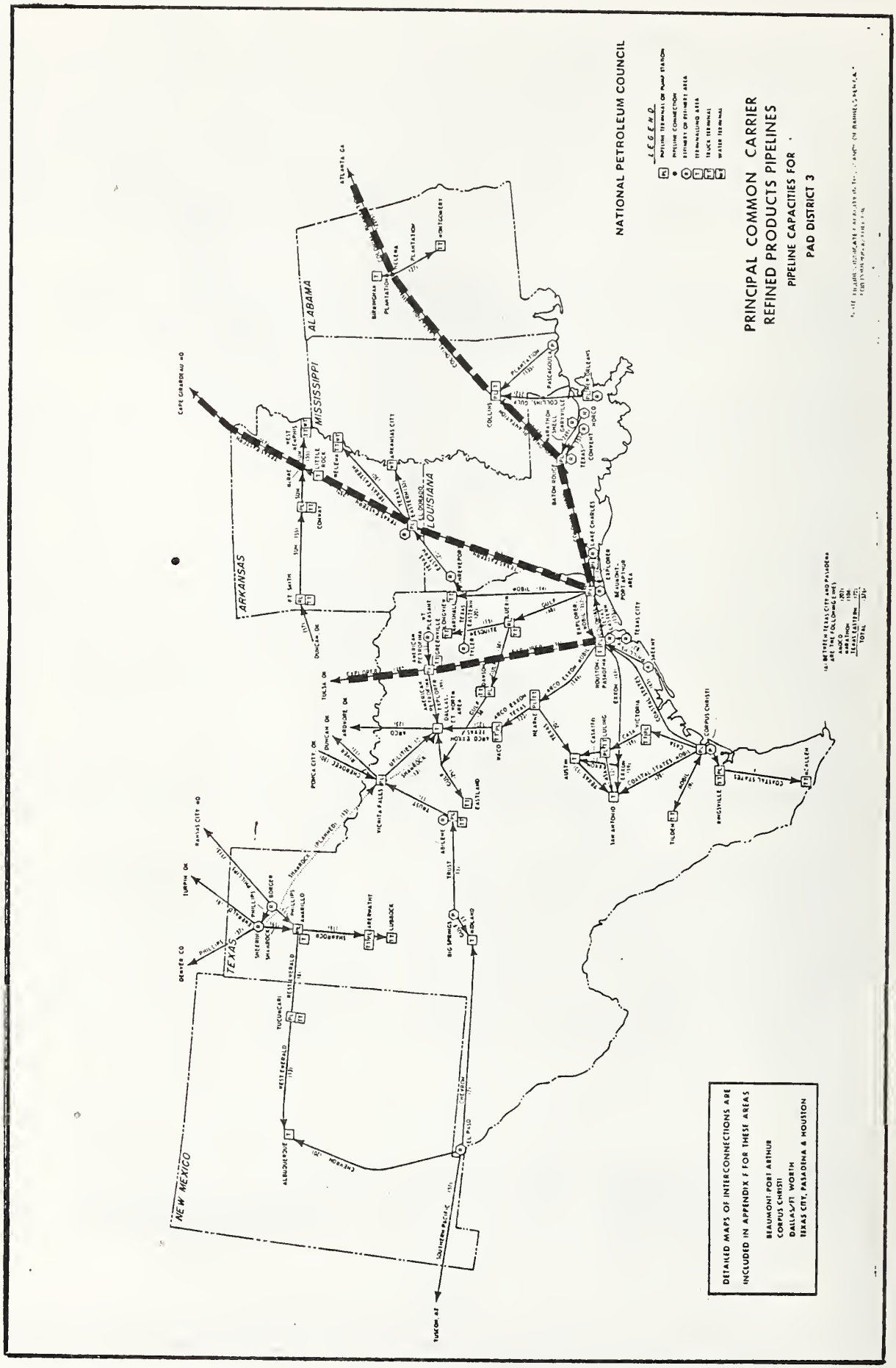
[1] These contracts have been approved by the Commodity Futures Trading Commission and trading of these contracts is expected to begin in the first half of 1983.

EXHIBIT VII-A



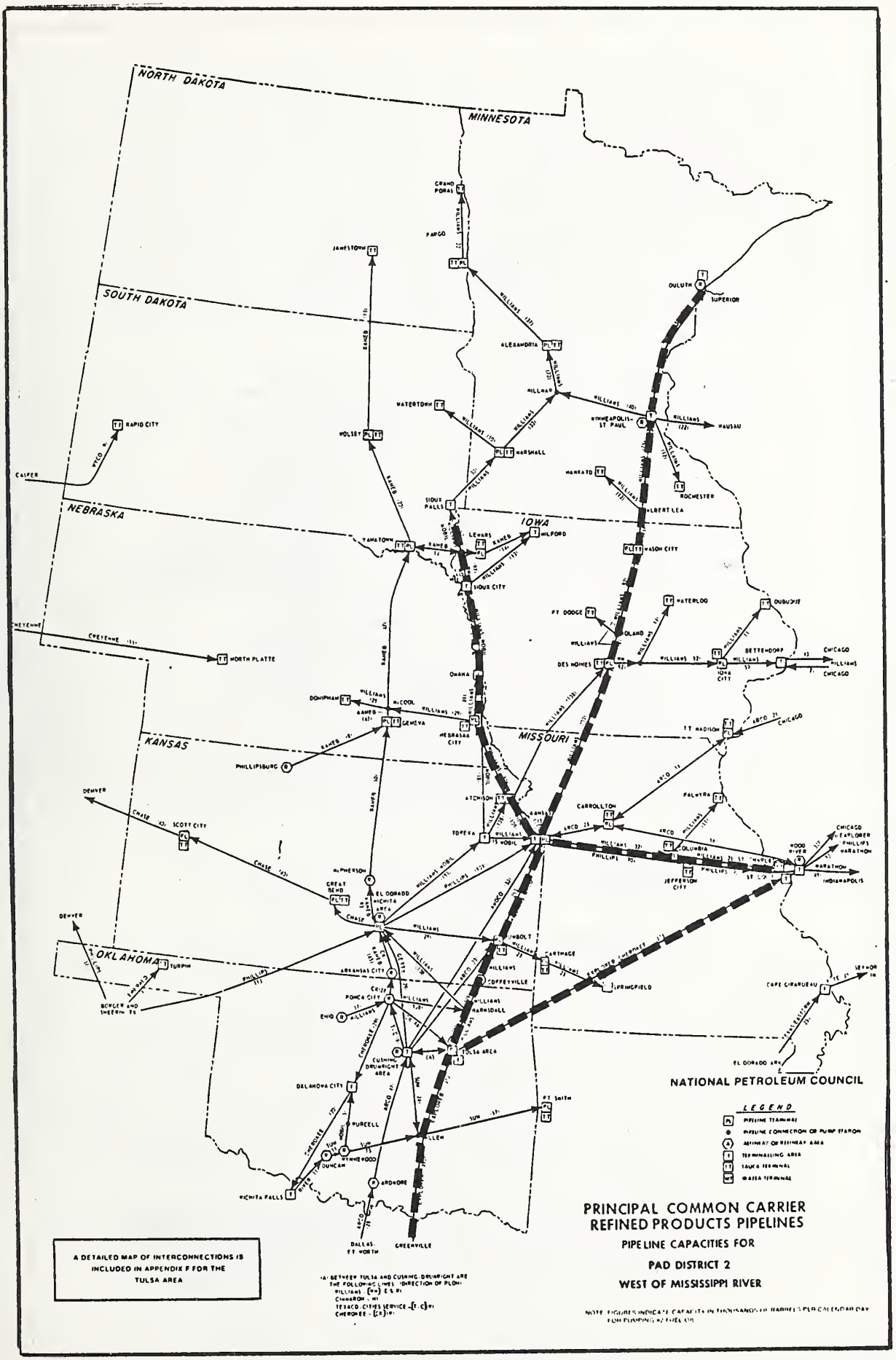
SOURCE: National Petroleum Council, Petroleum Storage and Transportation Capacities, 1979

EXHIBIT VII-B



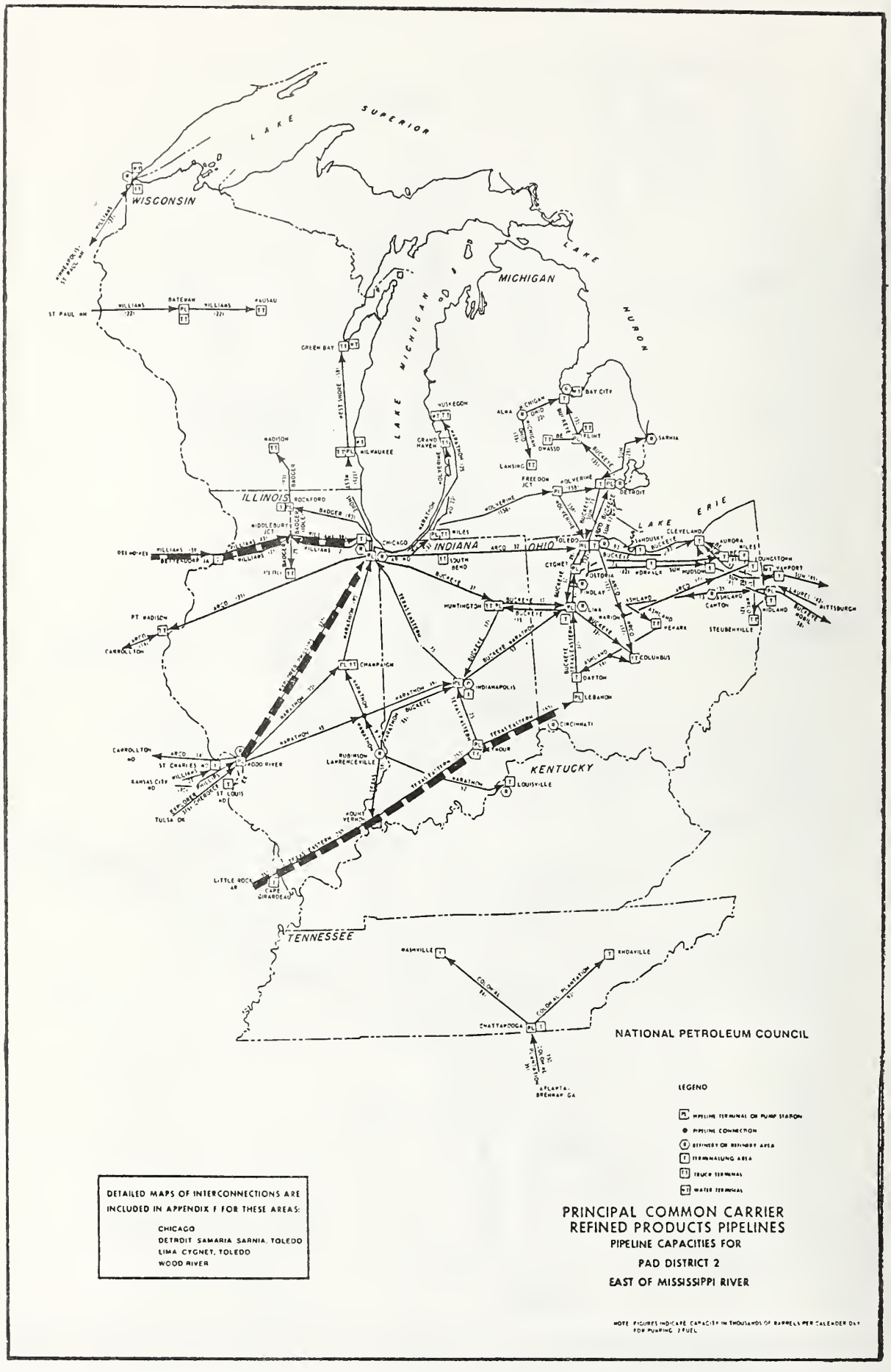
SOURCE: National Petroleum Council, Petroleum Storage and Transportation Capacities, 1979

EXHIBIT VII-C



SOURCE: National Petroleum Council, Petroleum Storage and Transportation Capacities, 1979

EXHIBIT VII-D



SOURCE: National Petroleum Council, Petroleum Storage and Transportation Capacities, 1979

The pipeline systems are presented to indicate what regions of the country could physically receive products from one of the two delivery areas--New York harbor and the Gulf. However, it must be understood that the cost in shipping products via these pipelines, particularly a relatively small volume on a one-time ad hoc basis, is an expensive proposition. This is one reason that less than seven percent of all energy futures transactions end in an actual delivery. On the other hand, if the hedger's primary concern is protecting his fuel supply situation in times of an oil emergency, the cost of transporting the fuel may be irrelevant. At this point, the question becomes: "Can I move the fuel from there to here no matter what the cost?"

Option 4, alternative delivery plan or exchange for physical may permit the buyer to take delivery of the product at a more convenient location, that is, closer to the transit property's home area. This option could save the buyer money if the seller already has in place the required volume of fuel at or near the agreed upon place of delivery. If the seller agrees to deliver the product at a location outside the exchange's delivery area, the buyer should expect to cover the cost of transportation and whatever storage fees are incurred. The benefit of the alternative delivery plan is convenience, not necessarily lower costs.

In the final analysis, the feasibility of taking delivery and the merits of each option has to be determined on an individual organization basis. Knowledge of the petroleum distribution system is critical and is usually obtained from an outside consultant. Over time, this knowledge can become institutionalized in the transit property and, in fact, understanding of the product distribution system should exist in-house considering the dependence of the property's operation on diesel fuel.

e. Are there alternatives to the futures market which would provide equal or better protection of my diesel supply?

In an oil crisis under free market conditions, transit systems can look to only three conventional sources of diesel fuel. First, they can see if their supplier under contract will be able to maintain deliveries, and if not, the size of the cutback will have to be determined. Second, they can investigate diesel fuel available on the domestic spot market (the largest transit systems could even look to the international spot market at Rotterdam). Competition for the diesel not already spoken for will most likely be fierce. Third, transit systems can rely on whatever fuel has been stored for emergency use.

Contract suppliers, spot market, and storage are the only conventional places from which diesel fuel might be acquired. Each of these sources has its own benefits but the point to recognize

is that the range of alternatives is narrow. The Federal government will not guarantee deliveries. The state government may or may not attempt to insure deliveries of fuel to transit operators. State allocation programs which do exist may or may not provide the necessary volume when and where it is needed.

It is because of the narrowness of conventional supply options in an emergency that the futures market option is considered to be a worthwhile alternative.

IV. PRELIMINARY ASSESSMENT

A. Recent Experience

Trading energy futures is a recently developed activity within the petroleum industry. It has been met with many questions and some apprehension. For the transit industry, trading energy futures is an even newer and more foreign activity. Consequently, many questions and even more apprehension can be expected.

The reasons for considering trading energy futures are a transit operator's vulnerability to diesel price increases and supply disruptions. If a transit operator feels secure and does not feel threatened by either contingency, then no time need be spent examining the benefits and costs of futures trading. On the other hand, if either one or both are of real concern, then examination of the futures option is justified.

To date, many transit systems have examined their positions in light of price fluctuations and supply vulnerability and have concluded that their situation warranted some form of remedial action. A few transit systems have examined the futures market option and have decided to hedge their diesel supply with No. 2 fuel oil futures. The largest transit system currently hedging is the Southern California Rapid Transit District (SCRTD).

In September, 1981, the state of California enacted legislation permitting the SCRTD and the San Diego Transit Corporation to trade No. 2 fuel oil futures on the New York Mercantile Exchange. Prior to enactment of this legislation, officials of these transit systems had spent a period of time tracking No. 2 fuel oil prices in the New York Mercantile Exchange against their local spot prices and had concluded that a strong correlation existed. Based on this correlation, they concluded that trading energy futures was a feasible mechanism for reducing their exposure to the volatility inherent in the the wet barrel market.

It should be noted that the California transit officials were interested in trading energy futures for the purpose of reducing price risk, and not as a source of emergency supply. The California Legislature decided to allow the two transit systems to trade in the futures market exclusively in No. 2 fuel oil futures. The systems could buy and sell contracts with the investment decisions resting with the systems' board of directors. The SCRTD intends to hedge about 70 percent of its total diesel fuel supply. The SCRTD is the largest all-bus transit district in the country consuming about 35 million gallons of diesel a year. A 70 percent hedge equates to 583 futures contracts (35,000,000 x .70 = 24,500 000 ÷ 42,000 [1 contract] = 583.3).

The budget planning requirements of the system necessitated more predictable fuel costs than had previously been offered by the diesel suppliers. Consequently, the decision in favor of hedging was made.

As earlier discussed, some transit operators may be interested in hedging but are unwilling or unable to trade in the futures market directly. In this situation, the transit operator may hedge through his supplier; that is, have his diesel fuel supplier trade in the futures market.

This option has been successfully undertaken by the Washington Metropolitan Area Transit Authority (WMATA) in Washington, D.C. In June, 1981, the Transit Authority awarded a one year contract to American Refining Company of Villanova, Pennsylvania. American Refining offered a contract in which the prices to be paid by the WMATA were fixed at the time the contract was signed. The prices were pegged to the No. 2 fuel oil futures prices for the upcoming twelve months on the date the contract was signed. Thus, the WMATA knew exactly what it was going to be paying for diesel fuel in each month over the following year. In addition, the contact at $17.5 million was $1.5 million less than had originally been budgeted. American Refining Company was able to offer this fixed price contract because it was willing to hedge its position in the futures market. Gulf Oil Company, Washington's traditional supplier, was apparently unwilling to follow suit.

Though these systems have been hedging for a relatively short time, system officials have stated that they are pleased with the results and will continue to hedge.

Several properties have considered trading in the futures market, but for one reason or another have decided not to do so. For example, in early 1982, Tri-County MTD of Portland, Oregon, undertook extensive analysis of the costs and benefits involved in trading in the New York Mercantile Exchange's futures fuel oil market. Their objective was to determine first if hedging in the futures market would yield financial savings and lower risk, and second, if the futures market could be used as an additional source of fuel supply. As a result of this analysis, Tri-County MTD decided not to enter the market.

There were three reasons behind the decision not to enter the futures market, yet the second and third reasons were related to the first.

The first and most important reason for not trading diesel futures was that there was little or no incentive to trade futures, given the current market conditions in petroleum products. It was felt that the world-wide petroleum supply glut and steady or falling petroleum prices negated the need to take steps to

reduce costs and supply risks. It made more sense to invest funds allocated to diesel costs in interest-earning accounts, and withdraw the funds as needed to either pay for fuel delivered under contract, or to buy diesel on the local spot market. Moreover, when the costs of taking delivery were analyzed (e.g., transportation, storage, and fees), it was concluded that the costs outweighed the benefits.

A second reason given for not hedging was unfamiliarity with the petroleum product transportation system. It was felt, and rightly so, that if one were to enter the futures market with the idea of possibly taking delivery, some understanding of petroleum product transportation was necessary. System officials recognized that they could obtain advice from the petroleum common-carrier serving their area, and that an outside consultant could be hired to provide the property with the needed expertise. Yet, it was felt that these steps were not justified given the existing market conditions.

A third problem was the absence of sufficient storage capacity in close proximity to Portland. In the event that delivery was taken on a 42,000 gallon contract, officials faced the problem of having to store the fuel until needed. The property itself did not have adequate storage facilities for this volume. One remedy considered was entering into a joint venture with another property which would receive and store a portion of the fuel. Again, this action was not deemed necessary given the soft market conditions.

In short, Tri-County MTD identified the costs and benefits involved in trading fuel oil futures, and concluded that the costs outweighed the benefits given the current market conditions.

Another transit property that has examined the futures option and decided to adopt an alternative approach to price and supply security is Seattle Metro in Seattle, Washington. Property officials assessed the costs and benefits of hedging in the futures market relative to the costs and benefits of buying a tank farm for bulk storage of diesel.[1] The final decision was to opt for the bulk storage option. The reasons for not selecting the futures option were: (1) soft prices and abundant supplies diminished the incentive to enter into a venture of an unfamiliar nature; (2) hedging offers price protection more than price savings; (3) enabling legislation would have been required, and system officials wanted to avoid the need for

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[1]Bulk storage of diesel fuel is another option that merits consideration by transit properties. This option will be examined in a subsequent study by the Urban Mass Transit Administration and the resulting report will be published in late 1983.

legislative action; and, (4) whereas hedging in the futures market is somewhat of an intangible action, owning and controlling a bulk storage facility is concrete, and thus is more readily accepted and understood by state and local officials, as well as the public.

The Seattle metro official responsible for diesel fuel planning and acquisition was quick to point out, however, that hedging was only "put on the back burner" for the time being. Hedging was not ruled out entirely, and would be reassessed if market conditions changed radically.

The experience of Tri-County MTD and Seattle Metro highlights a significant point. These transit properties examined the merits of hedging energy futures during a period of normalcy, and not at the outset of an emergency. By examining the options under normal conditions, they allowed themselves the time to undertake comprehensive examinations. They were not under pressure to come to quick decisions. Thus, the right questions were asked, and there was adequate time to determine answers. Though the decision in each case was not to enter the market at that time, these properties will benefit from their experience when the market tightens up. The property officials will be able to reaccess their decision based on the new market realities and take whatever action they deem appropriate with a minimum of delay.

B. The Final Decision on Hedging

Whether or not a transit system hedges in the futures market will ultimately be determined by the senior managers of a system. In the case of a publicly owned system, the decision may also involve local and/or state legislators. At this time, the single largest factor against hedging is the lack of understanding by these parties as to how the futures market operates and what benefits it has to offer. This report has attempted to shed some light on these two questions recognizing that all questions can not and should not be addressed in an introductory paper. It is to be expected that transit officials and public officials will at first view hedging with scepticism. In the long run, this scepticism may have a positive affect if it breeds questions. Questions concerning the operation, benefits, and risks need to be addressed in detail. Only then can an informed decision be made as to the merits of hedging in the futures market. In this study, hedging by transit systems has been put forth as one response, but certainly not the only response, to price and supply volatility in an energy market governed by free market principles. Other options exist and will be the focus of future studies.

GLOSSARY

ALTERNATIVE DELIVERY PROCEDURE:

Methods used to make and take delivery arranged by the buyer and seller after having been matched by the clearinghouse. These procedures differ from those specified in the futures contract.

BASIS:

The difference between the price of the commodity in the spot market and a specific futures price.

BASIS RISK:

The probability that physical market prices and futures prices will not move in perfect parallel, and may result in a diminished profit or greater loss. On the other hand, increased profits may result from the two prices not moving in perfect tandem.

CLEARINGHOUSE:

The institution associated with a particular exchange which maintains all records, collects and distributes payments, and matches hedgers on delivery day.

COMMERCIAL:

An institution or individual whose normal day-to-day business involves the commodity being hedged in the futures market. Generally, commercials have the facilities to physically make or take delivery. Synonymous with "hedger".

CROSS HEDGE:

The trading of one commodity in the futures market to hedge a different commodity in the physical market. The two commodities must have a strong price correlation.

DELIVERY AREA:

The geographical location specified by the exchange in which delivery of the commodity must be made or taken. The New York Mercantile Exchange is currently trading a No. 2 fuel oil contract which specifies the New York harbor as the delivery area. In addition, the New York Mercantile Exchange and the Chicago Board of Trade have each had a No. 2 fuel oil contract approved by the Commodities Futures Trading Commission which designates the "Gulf Coast" as the delivery area. Trading of these contracts is expected to begin in early 1983.

DEPOSITARY RECEIPT:

A document which guarantees that a certain volume of a commodity having certain qualities is being stored. This document may be surrendered against a futures contract in exchange for the commodity, held indefinitely, or sold. In energy futures trading, use of the depositary receipt is peculiar to the Chicago Board of Trade.

EXCHANGE (FUTURES):

A membership institution existing solely for the purpose of organizing and conducting the trading of futures contracts. It is ultimately responsible for guaranteeing the integrity of the futures contract.

EXCHANGE FOR PHYSICAL:

The delivery procedures which differ from those specified by the exchange, arranged by a buyer and a seller who match up with each other on their own before being matched by the clearing-house.

FORWARD CONTRACT:

An agreement by which the parties agree to make and take delivery of a commodity in the future. Differs from a futures contract in that the parties privately negotiate with one another from the start; the commodity will definitely be delivered and accepted; and parties agree on the specific quantity and quality of the commodity.

FUTURES CONTRACT:

An obligation to make or take delivery of a certain volume of a commodity with certain qualities in a specified month. The price of a futures contract is set publicly by outcry on the floor of an exchange. There is rarely an intent to take or make delivery against a futures contract.

HEDGER:

One who establishes a position in the futures market, (usually) opposite to a position held on the physical market as a protection against the possibility of adverse price movements in the physical market.

IMPERFECT HEDGE:

A hedge in which the hedger's position in the physical market is not completely covered. This condition primarily arises as a result of a change in the basis (see above); that is, the prices in the futures and physical markets do not move in perfect tandem. An imperfect hedge may also result from different volumes being traded in the physical and futures markets.

LIMIT ORDER:

An order in which the customer determines a specific limit on either the price or time of execution.

LIQUIDATION:

The closing out or termination of a futures position by taking an opposite, offsetting position, instead of making or taking delivery.

LOCATION BASIS:

The difference between the spot price of a commodity in the delivery area, and the spot price of the same commodity in the customer's local market.

LONG HEDGE:

The act of buying futures contracts. A long hedge is taken in expectation of rising prices. Because transit operators are concerned with reducing the impact of rising prices, they will usually take a long hedge. The operator buys the contract at a low price and subsequently sells it at a higher price, thereby netting a profit.

MARGIN:

A good faith deposit made by the customer to his broker. It does not constitute partial payment on the contract or a commission. The margin is to be maintained at or above its original value until the position is closed out.

MARGIN CALL:

A request by the broker for additional funds from a customer to bring the value of the margin up to its minimum level (which is usually its original level).

MARKED TO THE MARKET:

The process of adjusting the value of the margin so it reflects profits or losses resulting from price movements in the futures market.

MARKET ORDER:

An order from the customer to the broker to buy or sell futures contracts as quickly as possible at the best price available at the time the order reaches the trading floor.

PERFECT HEDGE:

A hedge in which prices in both the futures market and the physical market move in exact parallel, and the same volumes are being dealt with in each of the two markets.

PHYSICAL MARKET:

The market in which the actual petroleum commodity is traded, that is, real barrels of No. 2 fuel oil are traded in the physical market whereas contracts or "paper" barrels are traded in the futures market. Synonymous with the "cash" or "wet barrel" market.

POSITION MONTH:

The month immediately preceding the month in which delivery is to be made or accepted. For example, if February contracts are being traded, January is the position month. Synonymous with "spot month".

SHORT HEDGE:

The act of selling futures contract. A short hedge is usually undertaken by a party who is buying the commodity in the physical market. A short hedge is taken in expectation of falling prices. Operators will take a short hedge only to protect themselves against having to pay a fixed contract price that is higher than the current market price.

SPECULATOR:

A trader who is not a hedger by virtue of the fact that the commodity which is traded has no bearing on his day-to-day business. He is betting that the futures price will move in a particular direction. The speculator must liquidate his position with an offsetting position.

STORAGE BASIS:

The difference between a commodity's spot price and its futures price in the delivery area. Normally the futures price will be higher than the spot price, in part, because it includes the cost of storing the fuel until delivery.

STOP ORDER OR STOP-LOSS ORDER:

An order to get the best possible price only if the futures price increases to a designated level. A sell stop is an order to sell if futures prices fall to a designated level. The purpose of a stop order is to minimize a loss or protect a profit.

STOP PRICE:

The designated price in a stop order which, if reached, triggers a move by the broker.

SPOT MONTH:

The month immediately preceding the delivery month. Synonymous with "position month".

WET BARREL MARKET:

The market in which the actual petroleum commodity, in this case No. 2 fuel oil, is traded. The term "wet barrel" is used to distinguish this market from the futures market in which futures contracts are traded and only rarely is the fuel oil itself traded. It is synonymous with "cash market" or "physical market".

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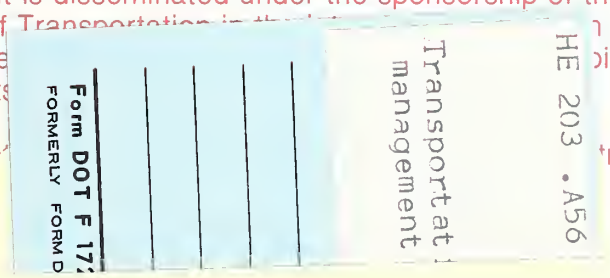

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TECHNOLOGY SHARING

SPECIAL STUDIES IN TRANSPORTATION PLANNING (SSTP)

PROGRAM OF THE U.S. DEPARTMENT OF TRANSPORTATION