

Hedging Against Bunker Price Volatility:
Considerations, Strategies and Implementation
for a Shipping Company

by

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Submitted to the Department of Ocean Engineering
in Partial Fullfillment of the Requirements
for the Degree of

Master of Science
in Ocean Systems Management

February 1996

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ABSTRACT

Shipping executives interested in ways of controlling their costs should regard bunker price risk management as an attractive financial policy. Implementing such a policy necessitates some knowledge of the dynamics of the fuel oil market. Bunker prices in the future will be affected by the price of crude oil as well as developments occurring in the three major fuel oil markets of Europe, the Americas and the Far East. The growth of the oil trade in the exchanges of these regions has led to the creation of numerous financial tools which could support a hedging program. The very basic, over-the-counter instruments, swaps and options, are also the most appropriate for use. Considerations on the nature of the risk to be hedged, and how it affects profitability, should be part of the decision making process leading to a competitive hedging strategy. The structure of a hedging program should also be consistent with a company's overall perception of risk. The example of a shipping company is used to examine implementation issues.

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Chapter 1: Introduction

Public perception has it that shipping is a profitable industry where the earning potential of a vessel is not necessarily related to the quality of transportation it provides. In reality however, certain segments of the shipping industry, especially the segment relating to oil transportation, have suffered from chronically depressed freight rates regardless of the quality of the ship itself or that of its owner's management. Against a background of low profitabilities, one finds shipping executives looking for ways to control if not cut their costs.

The proportions of energy expenses in the cost structure of a vessel's operation are significant. Generally speaking, the costs of a vessel can be classified as operating and running. The former include crew wages, maintenance and repair costs. The latter are variable depending on the voyage the ship performs and include port disbursements and the cost of its fuel consumption. In the tanker segment of the shipping industry, the cost of a large vessel's daily fuel consumption might be greater than its fixed operating cost. Clearly then, a shipowner's ability to control this cost becomes a critical factor affecting his vessel's profitability.

The disruptions in the oil trade caused by the 1990 Gulf War resulted in a significant but temporary increase in the price of crude oil and its by-products. At that time the price of fuel oil

used to run ships' engines-bunker fuel-increased by more than 100% in a matter of days. Since then, bunker prices have never reached the same levels of volatility. Even so, managing bunker price volatility, even in periods when it is less pronounced, is a financial policy with merits.

The purpose of this thesis is to examine a number of issues that a shipping company should consider before putting together a risk management strategy for its bunker purchases. It consists of three parts, each one presented in a different chapter. The content of these chapters and how they relate to each other will be outlined below. The remainder of this introduction will be used to explain certain terms and concepts which will be utilized in the remainder of this paper.

The first chapter discusses the factors which are likely to influence the price of crude oil and that of bunkers in the product's major markets. Bunker fuel is one of the heavier by-products of crude oil. Therefore, its price is affected by the price of the commodity it is derived from. Bunker fuel price also fluctuates depending on the product's separate dynamics of supply and demand. A review of the fundamentals for crude and fuel oil prices will help develop a knowledge base indicating how bunker prices are likely to be affected in the future. Strictly speaking, protection from price volatility can be achieved regardless of the direction a commodity's value is likely to follow and therefore information regarding fundamentals could be immaterial. However, it will be argued in

this introduction that a price protection strategy should still have an underlying reason to justify it. This argument will be reinforced in the third chapter which will discuss the implementation of a long term price risk management strategy by a particular shipping company.

The second chapter presents the different tools available to a shipping company interested in putting together a price risk management strategy. The first financial instrument that will be presented is the futures contract. It will be argued that certain characteristics of this contract render it unsuitable for the purpose of price risk management. The growth of oil trading in the formal exchanges of New York, London and Singapore has facilitated the development of alternative financial instruments, like swaps and options, which cover the same bunker price risk in different ways. The particular characteristics of these over-the-counter instruments determine their suitability for a given strategy. Derivative products based on swaps and options, can be combined in numerous ways to fit exactly a company's requirements and cover its exposure. However, a complicated custom design would compromise their competitive price. Consequently, the basic, "plain vanilla", widely traded, over-the-counter instruments will prove to be the most advantageous in a price risk management scheme.

The purpose of the third chapter is to discuss the framework of a price risk management strategy that could be implemented by a shipping company,

Eletson Corporation. The first part of this chapter looks at this issue from a theoretical viewpoint debating for the usefulness of such a strategy if it is designed consistently with a company's corporate strategy and executed carefully. The rest of the chapter uses the example of Eletson Corporation and demonstrates the kind of issues that should be considered before the company decides on a bunker price risk management program. The strategy that each company chooses to follow should be carefully selected so as to fit well with its overall profile towards risk. Therefore, the degree of risk a shipping company is exposed to due to the volatility of bunker prices should not be looked at separately but in conjunction with how it affects the company's performance.

Finally, the conclusion will summarize the findings of this thesis. The rest of this introduction then, will clarify certain terms and concepts which will be used throughout the remainder of this paper, but especially in chapters two and three.

Bunker fuel is another name for the type of fuel that is used for power generation in ships' engines. It is one of the heavier and cheaper by-products of crude oil when compared to heating oil, jet fuel or gasoline. To distinguish among the different types of fuel oils, one of the most frequently referred characteristics is its sulphur content. Fuel oils retain 80% of the sulphur of the crude they are derived from. High sulphur fuels are usually derived from the heavier crude oils and are

used as marine fuel. Marine fuel oil is not the only source of energy on a vessel. Diesel or gas oils are also consumed in auxiliary systems but in much smaller quantities. Therefore, despite the higher prices of these products, it is fuel oil that constitutes the biggest energy generation cost variable for a shipowner.

The price of any particular oil product depends on two factors. The first, obvious one, is whether supply and demand for this product are in equilibrium. The second factor has to do with the price of the crude oil that the product is derived from. These two factors can exert pressure on a product's price but usually work independently of each other. Crude oils are priced differently to reflect unlike properties and their suitability to produce similar products in different proportions. Simple or sophisticated refining processes also affect the proportion or properties of products derived from crude.

If the price of a crude which produces relatively small quantities of fuel oil increases, the price of fuel oil will not be significantly affected; at least not as much as the other products produced in larger proportions. For example, North Sea crude is considered to be suitable for the production of lighter products in larger proportions. Refined product types from this crude can be produced by a hydroskimming refinery¹ in the following proportions: 38% fuel oils, 24% gas oils, 15% kerosenes and 23% gasolines

¹ Every crude is initially processed through primary atmospheric distillation. This procedure shows the most obvious difference between crudes, in the different yields

and Chemical feedstocks. Arabian Heavy crude produces a very different slate of product types at the same refinery: 53% fuel oils, 18% gas oils, 11% kerosenes and 18% gasolines and chemical feedstocks.

As a general guideline, dense crude oils produce less of the light, expensive material like gasolines and more of the heavy fuel oils. The proportions are reversed for the lighter crudes. In between the gasolines and the fuel oils, the proportions of the middle distillates like gas oils and kerosenes vary accordingly. Therefore, the price of a product is affected by, but not directly related to, the price of the crude it is produced from. Different crude prices affect product prices in different ways. However, it is safe to say that despite very complicated pricing structures, rising crude prices pull product prices with them. Conversely, strong demand for products means pressure on crude oil prices to rise. Weak demand for products will drive crude prices down.

The variety of crude oil characteristics is one reason that complicates the dynamics of the products market. Refining processes are the second. It was mentioned earlier that a hydroskimming refinery allows for the distillation of North Sea or Arabian Heavy crude oils in different proportions. These yields would be altered under a different refinery process. A gradual increase in the world demand for lighter products like diesel, jet fuel or gasoline has caused a restructuring of the refining industry

of products at prescribed boiling ranges. A hydroskimming operation is one where a resulting product, naphtha, is processed further and upgraded to increase the gasoline yield.

in order to "whiten the barrel," i.e. produce more of the lighter products. Another interesting aspect of the refining processes is that modern refineries have the flexibility of altering the proportions of the refined products they produce in response to seasonal changes in demand for these products. For example, refineries in the United States increase the production of gasoline early in the Spring before the driving season begins and limit the production of heating oil. The process is reversed in the Fall when stocks of heating oil need to be built up in expectation of cold weather.

Converting crude to produce more of the expensive light products to the detriment of the residual fuel oils is done with a variety of processes such as thermal cracking, catalytic cracking or hydrocracking. An explanation of these processes in any detail would be outside the scope of this project. However, it is important to remember that advanced refining procedures reduce the inexpensive fuel oil yield derived from crude oils. Therefore, plans for additional refinery capacity usually mean reduced production of the residual fuel oils. This development also impacts the quality of the refined fuels.

A bunker price risk management program need not be affected by the quality of the physical product supplied to a vessel. There are other ways to check this aspect of the bunkering operation. A risk management scheme is based on the fact that changes in physical bunker prices are somehow reflected in the commodity exchange prices where oil is traded.

This is why understanding how different types of crudes or refining processes might affect fuel oil volumes and prices, constitutes vital information for someone interested in the complex dynamics of the spot price of this commodity.

If fuel oil is going to be more expensive when bought in the future, then an offsetting gain in the commodity markets between now and the future can neutralize or limit the potential loss from the physical purchase. This activity is called hedging. The underlying difference between hedging and speculating then, is that the former is related to a commodity that needs to be bought or sold in the future at an unknown price and a price risk needs to be neutralized. Speculating, is taking the position that the price of a commodity in the future will be higher or lower than what the market thinks now it is going to be at that time.

Predicting fuel oil prices in the future is not an easy exercise; a shipowner who does it well should consider changing his profession. But managing the risk relating to bunker price volatility has little to do with a precise forecast of the commodity's price. A shipowner need not be a fuel trader or a speculator who tries to take advantage of the market's adjustment to the laws of supply and demand. Managing the risk of volatile bunker prices really means increasing the certainty that a volume of the commodity, bought in the future, will cost a price which can be determined today.

The basic instrument that offers protection against volatile bunker prices is the futures contract. It represents the commitment to buy or sell a quantity of oil of a defined quality at a specified place and date in the future at the price this oil will be worth at that time. The price of this contract at the time it is bought or sold depends on the market's perception about the future. It is important to remember that this contract need not be executed at the time of its expiry. A shipowner may enter the commitment to buy a quantity of oil in the distant future and sell this commitment the next day at a higher or lower price depending on the market. This is the essence of oil paper trading. Contracts are linked to physical quantities of oil so as to have a price dictated by market perception about the future and eventually a price consistent with the spot price at their expiry. However, they need not represent actual physical commodities at the time they are traded. In reality, a very small fraction of futures contracts become actual physical cargoes.

Suppose that the shipowner knows he will need to buy a certain quantity of bunker fuel when his ship arrives in port sometime in a future month. He is not sure what bunker prices will look like at that time but he would rather determine now how much he is going to pay later. If he buys a futures contract now and sells it at the time the ship takes the fuel, he can either make a profit on this paper transaction, if in the interim period fuel prices have appreciated (market perception has been revised upwards), or a loss if prices have declined.

However, if prices have indeed appreciated, he will have to pay more for the expensive fuel destined for his ship. In this case however, the shipowner need not worry. His profit from the paper transaction will offset the extra cost of his physical supply. The owner has successfully hedged himself against an adverse price movement. Obviously, if bunker prices actually decline, he would have been better off doing nothing. The benefit of this strategy is the certainty of a fixed cost rather than a monetary gain. A loss is possible too.

A successful hedging strategy then, is one where the probability of a loss is smaller than that of a potential gain. For this reason, it is critical for a shipowner who is considering hedging his exposure to volatile bunker prices to understand how bunker prices are affected and how they are likely to move in the future. The following chapter will present information which is relevant to this issue.

Chapter 2: Market Fundamentals

It was previously demonstrated that a pure hedging strategy does not necessitate specific knowledge of market fundamentals or the drivers that are expected to move bunker fuel prices one way or another. Nevertheless, a successful hedging strategy that limits the downside potential of a loss should somehow incorporate knowledge about the factors that are expected to likely affect the price of fuel oil, in the short, medium or long term future. A view as to what the market is likely to do and why can only add reason to the hedging position of a shipping company.

The purpose of this Chapter is to examine the factors and conditions affecting the prices of bunker fuels and reach a conclusion as to what they are likely to do in the next one to two years. It consists of two parts. The first one examines the prospects for the price of crude oil. Fluctuations in the price of crude affect the price of residual fuel oil, the latter being one of the heavier by-products of the former. The second part examines the outlook for the price of fuel oil in general but also with regards to the three biggest markets of the product, in Europe, the Americas and the Far East.

a. Crude Oil Fundamentals

An issue that needs to be examined in the first part of this Chapter is who or what will dictate the price of crude oil in the future. It seems that one of the most substantial developments since the mid-80s, i.e. the dominance of the paper markets in setting the price for the most precious of commodities, will continue in the future. The growth of non-Opec oil production has substantially reduced Opec's ability to control oil prices. Therefore, the price setting role of the world's oil trade has been transferred to the mercantile exchanges of London, New York and Singapore, and the traders and well-endowed funds of Wall Street who are into oil paper trading.

This is not to say that Opec will no longer be able to influence oil prices. If the organization manages to maintain its credibility, by following a stable oil policy where members abide by their quotas, then it should be able to affect the supply and demand equation in order to provide support for the price of crude. It should be made clear however, that the organization is unlikely to return to a policy of fixed pricing since that would involve the Saudis acting as the swing producer, a role they are not keen to play anymore.

Once it is established that the laws of supply and demand as evaluated by the oil markets will determine the price of crude oil in the

future, it becomes easier to take a position on a range where this price is likely to fluctuate. World oil demand is forecast to continue to grow over the next ten years from 68.2 million barrels per day in 1994 to at least 79 mb/d in 2005. Non-Opec supply is expected to increase from 39.7 mb/d in 1994 to 42.8 mb/d in 2005. Consequently, Opec's supply should increase from 28.5 mb/d to 36.8 mb/d. This expansion looks feasible given the magnitude of Opec's reserves. The Organization still holds 75% of the world's proven oil reserves and its current production capacity utilization rate is 85%. The price of Brent crude is likely to range between 15-20\$/bbl in nominal terms.¹

Crude oil prices have indeed fluctuated within this range for the last two years although this should not be interpreted as proof of an inherent stability in the oil markets. In fact, due to the Gulf War in 1990, crude oil prices shot up to more than 40\$/bbl. During the Fall of 1993 these same prices fell to as low as 13\$/bbl following a combination of political and economic events. Discussions of an imminent lifting of the UN embargo on Iraqi crude had combined with market perception that Opec members would not agree to production quotas that could provide the floor for oil prices. Consequent to these developments, many of the funds that had taken positions in oil decided to get rid of them in order to pursue more profitable investments. The recent history of oil prices then, makes it

¹ Mehdi, Varzi, "Low Oil Prices - Is Demand the Key?," paper presented in the 7th Annual Oil Seminar, London, April 1995.

evident how the possibility of further oil price shocks, or instability in the Middle East, or any other event with relevant repercussions, could easily upset a reasonable oil price forecast.

But hedging exists so that companies or investors whose returns are affected by crude oil prices are protected by adverse price movements. If markets were indeed stable and consistent with the most precise of forecasts, there would be no need to resort to any hedging activity of any kind. Therefore, it is against such uncontrollable price movements described earlier, as far as crude oil goes, that a shipping company would be looking to protect itself. Once such price movements occur, it is reasonable to expect that prices will sooner or later gravitate towards the range where supply and demand have historically met.

To be sure, it is not in the interest of the market or even Opec to see crude oil prices move and stay outside the range previously mentioned. For the oil companies or investors in oil, low oil prices would mean that exploration and development projects currently under way in the North Sea, the Far East or elsewhere would not be economically feasible. High oil prices, although welcome in the short term, would also be undesirable as they would inhibit growth of the world economy and probably renew interest in alternative energy sources.² Opec countries would also favor a climate of price stability.

² "Asian Crude Oil and Refined Products Pricing, Australian Research, McIntosh Baring," Melbourne, November 1994.

For them, weak oil prices would not help alleviate the domestic problems most of their economies are faced with. On the other hand, high oil prices would also be undesirable for the same reasons mentioned earlier. (See Appendix 1.)

Having said that, there is one event which is likely to cause a mini-shock and affect the oil markets in a significant way. The lifting of the UN embargo on Iraqi crude exports will have significant repercussions for the crude oil market in general and the fuel oil markets in particular. The difficulty is in predicting when, not whether, this event will occur. When it does occur, it will most likely create a mini-crisis in the oil markets and therefore interesting hedging opportunities to be taken advantage of. Oil prices will come down in anticipation of excess oil. Most likely, oil producers will gradually limit their exports to push prices up and increase their revenues to sustainable levels. Eventually the market will readjust and the window of opportunity of low oil prices will close. While it remains open, it might be interesting examining the advantages of a long term hedging strategy.

Until then, crude oil is likely to go through a period of relative price stability within the 15-20\$/bbl range. During this period of price stability, monitoring the market on a daily basis might help identify hedging opportunities based on the fluctuations of crude oil prices. However, this strategy is unlikely

to prove better than one where the fundamentals for the price of fuel oil are monitored instead.

b. Fuel Oil Fundamentals

Bunker fuels have recently entered into a period of tightness relative to the other oil products. High and low sulphur fuel oil that used to be sold for 50% or less of the value of the crude it was derived from, sold for 75% or more in 1994.³ This trend is likely to continue in the near future. The remainder of this Chapter, will examine the outlook for fuel oil in general and the market fundamentals which are pertinent to the three major fuel oil markets. The prices for fuel oil in Europe, the Americas and the Far East do not move in unison although they do have a high degree of correlation.

In the late eighties, the total fuel oil market was about 730 million tons per year, i.e. about 20% of the total world-wide oil demand. About 20% of this quantity was low sulphur fuel oil with a sulphur content of 1% or less. That left about 590 million tons of high sulphur fuel oil, of which 13% went into the bunker markets. According to the International Energy Agency, the world-wide demand for bunkers constituted 27% of the 9.86 mb/d in fuel oil demand in 1992.⁴ These figures may not be precise but should serve as an indication of the size and relative importance of the fuel oil market.

³ "Bunker's Rising Star Pulls Fuel Oil Out of Twilight," Petroleum Intelligence Weekly (New York: Edward L. Morse, [May 29, 1994]), p. 5.

⁴ *Ibid.*

Three basic fuel oil trends are already evident and will become even more pronounced in the future. First, is the "whitening of the barrel." The increase in the world-wide demand for clean petroleum products has resulted in a situation where the existing refineries have been upgrading their installations so as to maximize the production of clean products and the new refineries being planned will also be geared towards the production of more clean and less dirty, i.e. residual oil, products. Second, is a trend for the demand of low sulphur fuel oil to increase to the detriment of high sulphur fuel oil used for bunkers. Environmental regulations dictate this change in supply. The third trend is for the portion of bunker fuel to claim a larger proportion of the high sulphur product. Again, environmental regulations inland as well as the increasing attractiveness of natural gas, hydroelectric power or coal have contributed to this trend.

However, probably the most important factor, likely to influence the price of fuel oil in the near future has to do with changes in the crude oil slate that will hit the market in the future. The eventual resumption of Iraqi oil has the potential of taking pressure off the fuel oil market for two reasons. The first, most evident has already been presented. Difficulties in accommodating extra crude in a balanced market will bring world crude oil prices down; product prices will follow. The second is not as straight forward. The properties of Iraqi crude

favor the production of more of the dirty by-products of oil. Therefore, when the UN embargo is lifted the proportion of high sulphur fuel oil in the market will increase relative to the other products thus adding even more downward pressure to bunker fuel prices. It has been estimated that fuel oil prices could be brought down by 5 to 10%.⁵

Presently, the relative tightness of the fuel oil markets has much to do with the kind of crude oil that has replaced Iraqi oil after 1990. During 1994 and 1995, Saudi Arabia reduced its Arab Heavy output from 30 to 20% of total production and replaced it with Arab Light and Super Light instead of Arab Medium. The rationale behind this move was to gain market share in the Far East where simple refining capacity favors light, sweet crude and to increase their influence over the price of heavy, sour crude in a tighter market.⁶ Whatever the case may be, fuel oil prices are likely to remain strong if Iraqi crude stays off the market and Saudi Arabia keeps exporting more of its lighter crude.

The properties of the crude slate world-wide combined with a number of trends pertaining to the supply and demand for fuel oil presented earlier account for the expected tightness of the

⁵ Roger Diwan, The International Oil Market Medium and Long-Term Outlook, Stockwatch Quarterly Review (Washington, D.C.: Energy Security Analysis, Inc., [April 1995]), p. 30.

⁶ Sarah A. Emerson, The International Oil Market Medium and Long-Term Outlook, Stockwatch Quarterly Review (Washington, D.C.: Energy Security Analysis, Inc., [April 1995]), p. 9.

fuel oil markets in the immediate future. There are however other factors which influence fuel oil prices on regional levels. In 1994, the strength of the product was also a direct result of very cold weather conditions in North America during the first quarter of the year and a drought in Japan during the third quarter⁷. Obviously, these events are unpredictable but specific reference to the three biggest markets for fuel oil might indicate how fuel oil prices might react to a sudden change in demand.

According to International Energy Agency data, during 1992, 21% of bunkers sales took place in Europe, 21% in North America and 12% in the Pacific Rim. The prospects for these three markets are different. European sales should stay stable but are likely to be affected by the demand in the Former Soviet Union. Demand is expected to decline in the United States after an exceptional year of growth in 1994 due to bad weather and economic growth in Mexico. Finally, the Pacific Basin should remain the only growth region for fuel oil demand, for the next two years, probably outpacing the region's ability to produce it.⁸

i. Fuel Oil in Europe

In Europe, fuel oil prices depend to a large extent on developments in the Mediterranean

⁷ Therefore, the use of hydroelectric power was limited, increasing the fuel oil demand of power stations. Diwan, The International Oil Market Medium and Long-Term Outlook, Stockwatch Quarterly Review p. 29.

⁸ Ibid., p. 30.

basin. The Mediterranean market has become the fuel oil price maker for all regions and is the only region where demand is holding ground well into this year. A number of reasons explain this development. First, is the change in the world's crude oil slate mentioned earlier. Second are developments regarding fuel oil production in the region. Finally, fuel oil prices largely depend on the exports coming out of Russia. Erratic exports in large quantities have depressed fuel oil price levels in the past and to the extent that they continue, they are likely to determine the levels of the fuel oil market in the future.

The supply crunch in the Mediterranean should be attributed to a significant extent to the reduction in heavy crude oil coming in from the Middle East. It has already been mentioned how the Saudis have emphasized exports of their crudes to the Far East where prices are more favorable for refineries. At the same time, the surge in North Sea production has resulted in a reduction of fuel oil coming out of the North European refineries since refined North Sea oil favors the yield of lighter products. The resulting tightening of the Mediterranean market is expected to keep upward pressure on the world residual prices.⁹ This pressure however can be mitigated by the Iranian barrels displaced from the American and Far Eastern customers¹⁰. Therefore, prices this coming winter should not

⁹ Ibid., p. 31.

¹⁰ Petroleum Market Intelligence (New York: Edward L. Morse, [August 31, 1995]) p. 3.

reach the high levels attained in 1994 but should be close to historical high levels.

Production of fuel oil is expected to decline and exert upward pressure on fuel oil prices although this decline will not be as substantial as in previous years. Production of fuel oil has declined by about 160,000 bbls/day over the last two years. During 1995 and 1996, production is expected to decline by about 20 to 30,000 bbls/day. However, this trend is not likely to continue in the future. The pace of fuel oil production withdrawal has almost stopped in Europe. Even more important in the long term is the increasing use of natural gas. This cleaner source of energy has been making substantial inroads into the power generation market in recent years and is expected to continue to erode fuel oil's market share. Over the 1995 to 1998 period, the most significant substitution program is expected to take place in Italy which also has the largest fuel oil market in Europe. Greater use of Algerian gas is forecast to slash the country's fuel oil requirement from 410,000 bbls/day to a little over 270,000 bbls/day. Over the next ten years gas is also expected to make heavy inroads into the fuel oil market in Greece, Spain, Portugal and Turkey.¹¹ This is a long term trend however that one should keep in mind; it is not likely to significantly affect the fuel oil market over the next two years. In the longer term however, it

¹¹ Varzi, "Low Oil Prices - Is Demand the Key?"

seems that the tightness of the fuel oil market in Europe will probably ease.

A critical factor which is expected to dictate what fuel oil prices will do in Europe will be developments in Russia and the Former Soviet Union. Russia remains the wild card in the fuel oil market. This role is heightened by the fact that most of the exported volume surfaces in the key Mediterranean market via the Black Sea. There is a direct relationship between Russian fuel oil exports, Mediterranean residual fuel oil prices and world residual prices. However, Russian fuel oil exports are increasingly seasonal and fuel oil prices in the Mediterranean and beyond will increasingly reflect this seasonality as long as global fuel oil fundamentals remain tight.¹² (See Appendix 2.)

ii. Fuel Oil in the Americas

The biggest decline in fuel oil demand since the latter part of the 1980's has occurred in the United States which also happens to have the world's most competitive gas market. Since 1988, fuel oil demand has declined by nearly 25% and there is every prospect of further declines in the years to come. This year, fuel oil import demand in the US could decline to less than 1mb/d. This would be the lowest level in 50 years.¹³ Having said that, production is expected to decline by 90,000 bbls/day in the

¹² Diwan, The International Oil Market Medium and Long-Term Outlook, Stockwatch Quarterly Review p. 31.

¹³ Varzi, "Low Oil Prices - Is Demand the Key?"

Americas during 1995. Cracking capacity will be added in Brazil, Venezuela and Colombia in 1995 and this can mitigate the price effects of declining demand since there will be less fuel oil produced too.¹⁴

Therefore, fuel oil markets in the Americas are not expected to change significantly. The tightness in Europe can also affect prices in the Americas as extra barrels can be exported to Europe in arbitrage opportunities. More recently, fuel oil prices have gained ground reflecting a revival of incremental utility interest into the winter. The drop in domestic demand due to the switch-over to natural gas this year should keep prices in balance until cold weather arrives. As the winter approaches, rising natural gas prices could make fuel oil more competitive.¹⁵ (See Appendix 3.)

iii. Fuel Oil in the Far East

Historically, the Far East has been a net importer of heavy products such as fuel oil. During 1990, the regions net import requirements of dirty products were 600,000bbls/d.¹⁶ During 1995 however, supply and demand have come into balance and the residual market was tight by only 50,000 bbls/d. An important feature of the Asian oil market is its heavy reliance on the middle

¹⁴ Diwan, The International Oil Market Medium and Long-Term Outlook, Stockwatch Quarterly Review p. 33.

¹⁵ Petroleum Market Intelligence (New York: Edward L. Morse, [August 31, 1995]) p. 5.

¹⁶ They imported around 1.2mb/d of dirty products against exports of less than 600,000b/d.

distillates. Kerosene, jet fuel and diesel comprise 44% of the barrel versus an average of 39% in the rest of the world. The incremental demand for the barrel is for 58% middle distillate and for less than 10% heavy fuel oil. Only highly sophisticated hydrocracking refineries can meet this pattern of demand and the number of refining projects that will come on stream in the future is uncertain.

Developments in the future will depend on whether or not refinery plans to boost cracking capacity will materialize. If they do, the increase in the production of low value fuel oil means that much of it will be exported. If they don't, expensive clean products, mainly diesel will be imported and the growth in the supply of fuel oil will not outpace the growth of demand. Supply from the Middle East should keep coming in the region attracted by high prices. Middle East oil availability should also be on the rise, pushed by rising production and higher domestic prices which will limit demand.

Two more developments are expected to become factors that will affect fuel oil prices in the Far East. The first is that environmental awareness has also taken root in the Far East. Fuel oil sulphur specifications have tightened. Secondly, and this is important for the scope of this study, oil prices in Asia exhibit lower volatility than elsewhere in the world. The lower volatility is attributed to regional trade and hedging issues, the near absence of price

speculators, price reporting methodologies and relative regulation of markets. (See second table Appendix 6.) Asian oil prices typically exhibit a lagged response to Atlantic basin oil price moves.

In conclusion, a company considering a bunker price hedging strategy should at least track the following developments relating to the oil markets. To the extent that fuel oil prices are affected by the price of crude oil, the fuel oil price outlook is likely to be relatively stable in the future. One event which is certain to interrupt this stability is the lifting of the United Nations embargo on Iraqi crude oil exports. Most analysts think this is not likely to happen before 1997, due to the 1996 US presidential elections. Increased exports from the Arabian Gulf are going to have a temporary effect on the oil markets until Opec and other producing countries readjust to lower quotas. Low crude oil prices are not to the detriment of many of Opec's economies.

Short term fluctuations on crude oil prices will certainly occur in the meantime. However, during this time it would be better for a hedging strategy to center around fuel oil price developments occurring because of fundamental developments in this product's market. Events in the three major markets of the product in Europe, the Americas and the Far East should be examined against the background of two major predictable trends. The first is "the whitening of the

barrel" due to increased demand for clean petroleum products. The second is the effect of resumed Iraqi crude oil exports in the composition of the crude slate hitting the world markets.

In regional terms, the fuel oil market in Europe is expected to remain tight in the short to medium term future. Again, Iraqi oil sales, limits in production withdrawal and the potential use of alternative sources of energy, namely gas, are predictable factors that should affect the European market. The uncertainty regarding Russian oil exports has the potential of defining price trends. In the Americas, demand has been on the decline but export opportunities due to the tightness in the European basin should keep prices in a relative equilibrium. Weather patterns and the outlook of gas prices comprise the unpredictable factors that will affect fuel oil prices. Finally in the Far East, much depends on the addition of refining capacity. If refining projects are completed, fuel oil produced regionally should become cheaper. However, this development will take place over a long time. An important fact for this study is that fuel oil prices in the Far East will continue to lack volatility. The table in the following page should summarize the findings of this chapter on market fundamentals.

	Predictable Events	Unpredictable Events
General	<ul style="list-style-type: none"> -Iraqi Exports affecting crude oil prices and slate. -The "whitening of the barrel." 	<ul style="list-style-type: none"> -???
Europe	<ul style="list-style-type: none"> -Composition of crude oil slate. -Limits on production withdrawal. -Use of alternative energy sources (gas.) 	<ul style="list-style-type: none"> -Russian Exports.
Americas	<ul style="list-style-type: none"> -Declining demand. -Arbitrage opportunities to tight European markets. 	<ul style="list-style-type: none"> -Gas prices. -Weather patterns.
Far East	<ul style="list-style-type: none"> -Inherent lack of volatility. 	<ul style="list-style-type: none"> -Refining capacity.

Chapter 3: Hedging Instruments

There are numerous ways for a shipping company to put together a hedging program. Hedging instruments however, differ in sophistication and structure. The purpose of this chapter is to present the main tools that make hedging possible and explain the advantages or the characteristics of each one. Futures are the easier and most liquid instruments but do not eliminate basis risk, the price differential between bunker delivered at a ship's manifold and paper oil. Over-the-counter instruments like swaps and options are less liquid but can match closely the particular hedging strategy of a shipping company. Following this discussion it will be possible to define the particular instruments that will be more suitable for the strategy of the Eletson Corporation given a favorable pricing environment.

a. Futures Contracts

The most basic paper oil instrument that hedgers, speculators or arbitrageurs can trade is the futures contract. Therefore, the heart of the paper oil market beats in the three exchanges that trade futures contracts. West Texas Intermediate crude oil, heating oil and regular unleaded gasoline are traded in the New York Mercantile Exchange (NYMEX). North Sea Brent crude oil, heavy fuel oil and gasoil are traded in the International Petroleum Exchange of London (IPE). The Singapore International Monetary Exchange (SIMEX) trades fuel oil and crude oil.

An example of a futures contract:

Now

*Fears price
increase*

*Buys Brent
futures at \$20/bl*

*(spot bunkers
cost \$72/mt)*

Future

Prices increase

*Sells Brent
futures at
21.50/bl*

*Makes profit of
\$1.50/bl on
futures*

*(spot bunkers
cost \$87/mt)*

*Buys spot bunkers
at \$87/mt*

*Bunker purchase
is more expensive
by \$15/mt*

Net cost is:

\$76.80/mt

Not all futures contracts are successful. A successful contract has to satisfy three requirements. The first is price volatility. Insufficient price movement in a product means there is little need for a futures market. The growth of the paper oil market is a direct result of the commodity's price volatility. The second is standard quality. It must be possible to define a standard quality on which delivery and price are based. Lastly, a futures market can only succeed if there are a large number of participants to provide the necessary liquidity. The most liquid contracts are those of crude oil in the NYMEX and the IPE. This makes sense. Crude oil is one of the most heavily traded commodities. The fuel oil contract of the IPE and the heating oil contract of the NYMEX are successful contracts although less liquid than their crude oil counterparts. The SIMEX fuel oil contract is illiquid and is probably going to be discontinued.¹⁷ (See Appendix 4.)

Before venturing further to the suitability of a futures contract in covering a hedging requirement, it would be useful explaining what a futures contract is and how it is traded. A futures contract is a commitment to buy or sell a standard lot of a specified commodity at a certain time in the future. Each lot of futures is of a quantity and quality laid down by the exchange concerned. The contract is for a specified time, i.e. a calendar month. Each month will cease to trade on a specified date and if nothing is done with the contract prior to that date it will become a

¹⁷ "Singapore," Petroleum Intelligence Weekly (New York: Edward L. Morse, [September 25, 1995]), p. 8.

physical contract to take delivery or to deliver according to the contract rules. Very few contracts run through to delivery. The vast majority, more than 99%, are sold or bought back before the expiry of the contract. (See Appendix 5.)

Once a contract has been traded on the floor of the exchange, its details are registered with the clearing house. This organization guarantees the financial performance of all futures contracts and deals with all the administrative aspects of futures trading. The clearing house effectively steps in between buyer and seller so that each has a contract with the clearing house and their dealings with each other are at an end.

Financial dealings with the clearing house take place every day. As soon as a contract is traded, a deposit or an initial margin has to be paid. The amount of this deposit varies from contract to contract but is usually around \$2,000 per contract on NYMEX, \$500-1,000 on the IPE and \$500 on SIMEX. In addition to the deposit, a variation margin is calculated for every unclosed futures contract, based on the settlement price for the previous day's trading. Any difference between the value of a contract as traded and the market value at the settlement is payable to the clearing house if it is a debit and to the client if a credit. These margins are the means by which the clearing house is able to guarantee the financial performance of the contracts.

All dealings with the exchange are done through a broker. The commissions paid to a broker are negotiable. They can be quoted in one of two ways, either as an inclusive commission of \$y or as \$x plus fees. In order to compare the two prices, it would be necessary to determine the current market costs. The broker is responsible for paying the market registration fees, the clearing fees and the floor brokerage fees. He also has to cover his own costs. So, the inclusive commission should be the same as \$x plus the fees mentioned above.

The following example illustrates how hedging works for a shipowner who wishes to protect himself against an adverse bunker price movement. If he knows he will have to buy 5,000 tonnes of bunkers in the future and fears that prices will be significantly higher by then, he could buy his bunkers now at \$72/mt but he would have nowhere to store the oil. He can buy futures instead. If he chooses to buy Brent crude oil futures for delivery in a future month at \$20.00/bbl, feeling that they will give him the best protection, he would need to buy 34,000 barrels to cover his 5,000 tonnes of fuel oil requirement. Suppose that when the time comes for the shipowner to buy his bunkers, his fears have come true and fuel oil prices have indeed increased. So have crude oil prices, although not in tandem. The shipowner will buy his physical material at a cost of \$87.00/MT and sell his futures at \$21.50/bbl. Effectively, he has offset his loss in the physical market, since he was right predicting the price increase, with a gain in the futures market. His futures profit of \$1.50/bbl has reduced

his net cost of fuel by \$10.20/mt to \$76.80/mt, less costs.

There are two important observations to make in this example. First, is that the shipowner managed to reduce his bunker costs because he correctly predicted the increase in prices. Obviously that is not easy to do. Had prices actually decreased, the shipowner would have lost out on this transaction if he chose to close out, i.e. sell his futures contracts, instead of rolling them forward. Obviously, he would have bought bunkers at a cheaper price and that could offset the paper loss but he would have purchased his bunkers at a better price anyway. Therefore, futures lock in a purchase price and do not guarantee a real gain. Neither do they prevent a real loss. What actually happens depends on whether or not one has the correct view on the market's trends. This is what speculators do, not hedgers.

The second observation is that the shipowner chose to use crude oil futures in order to hedge his fuel oil exposure. Furthermore, he probably did not get too concerned about the fact that the place he needed to get physical delivery of his bunkers was different to the one where the crude oil futures contract would stipulate delivery if it ever became a physical cargo. This last observation leads to the discussion of basis risk, the biggest disadvantage of futures contracts.

The relationship between crude oil price and product prices is extremely complex and

inconsistent. Factors such as location, seasonality, weather, refinery capacity and product slate logistics, stocks and regulatory restrictions determine the movements in product prices as the crude price varies. Hence, any consumer of products faces a price risk which moves out of step and without a predictable correlation to the crude price. This is the basis risk. (See Appendix 6.)

So, the actual price volatility of individual products is often very different from that of the underlying crude. Now, among the major products of crude oil, fuel oil has the poorest correlation to crude oil, mainly because the influences on fuel oil include its competitor fuels such as coal and natural gas. Such factors can have a dramatic effect on fuel oil demand. As a general rule of thumb, a correlation of less than 80% is considered unsuitable for a hedge. The correlation of fuel to crude oil is closer to 60%.

Basis risk is more of a problem when a fuel oil hedge is done with a crude oil futures position like in the example earlier. However, basis risk exists even when fuel or heating oil futures are used to hedge bunker purchases. Fuel oil prices do not move in unison everywhere and qualities are not uniform. The liquid IPE fuel oil contract can not serve as a perfect hedge for bunker purchases.

One way to mitigate the effects of basis risk is with the use of Alternative Delivery Procedures (ADPs) or the Exchange For Physicals (EFPs). Most of the oil contracts have adopted a delivery

procedure to match as closely as possible the local physical market conditions. In all markets, once the contract has expired, the clearing house matches up the buyers and sellers with outstanding positions. Buyers must then take delivery from the seller to whom they have been allocated under the rules of the exchange concerned. The only exceptions are the ADPs and the EFPs. In the first of these, the buyer and seller, having been matched up by the exchange, can agree to deliver under different conditions, for example in a different place, or even to deliver a different product. In this case, they notify the exchange that they are doing an ADP and their delivery can take place as agreed between them. The exchange and clearing house will not however guarantee the fulfilment of the contract if it is made under an ADP.

Under an EFP, buyer and seller again agree to a physical delivery outside the rules of the exchange but in this case they make the arrangements before they are matched by the exchange and notify the exchange that the agreement has been made. Their futures positions are then closed by the exchange and again, the exchange and clearing house no longer guarantee the contracts. Theoretically, both the ADPs and the EFPs would make it easier for a shipowner to match his demand for physical product to the futures position he has chosen to take. However, this added flexibility would rather complicate things. There is no good reason that justifies connecting the physical bunkering operation to the use of paper instruments. In any case, other available tools increase the flexibility

of a hedging program without complicating the logistics.

One more potential problem when hedging with futures is the time horizon of the contracts. Contracts trade for twelve months forward. This might be inconvenient for shipowners who might wish to hedge their exposures beyond this time period. Furthermore, futures contracts for the distant months tend to be illiquid. The trading of large volumes then becomes problematic. Other hedging instruments that will be examined later can offer price protection for up to five years. Finally, the costs of operating a futures hedge although not significant, might be of concern. Since positions are marked to market as explained earlier, the whole operation can create budgetary problems and have repercussions for the cash management of a company.

Before discussing other hedging instruments it would be worth mentioning another way of hedging one's exposure to the volatility of bunker prices, similar to the use of futures. The forward contract is similar to a futures contract in that both are a commitment to buy or sell a specific quantity of a specified product in named locations at a fixed time in the future. However, the forward contract is a private contract between two parties that reaches maturity and becomes a physical cargo on a specified delivery date. For purposes of fuel oil hedging, forward contracts do not pose the same problems with futures as far as basis risk goes. Theoretically, they could be contracts for the delivery of the same kind of fuel oil that needs to be bought by a vessel on a particular date in a specified place. However,

this physical end of their structure makes it problematic to tie them in with a company's hedging strategy.¹⁸ A shipowner may not know in advance where his ship is going to be at any given time. Consequently, he can not take the risk associated with being at the receiving end of a mature, physical, forward contract.

Over the last few years there has been a rapid growth of similar instruments traded off the exchanges or "over the counter." These products were introduced initially by the major US investment banks, or Wall Street refiners, as they became known, but are now offered by a large number of traders and others including some of the major oil companies. These derivative instruments are widely used on the financial markets and the banks saw oil as being a commodity very similar to money. The rapid growth in their use amongst shipping companies is in part attributed to the lack of liquid futures contracts in fuel oil.

Swaps and options, the fundamental forms of these instruments, will be discussed in greater detail (see also Appendix 7.) However, they can be combined in numerous ways, to produce more "exotic" structures which can cover unusual price risks. The main advantage then, of these over-the-counter contracts is their flexibility. They do not have strict parameters and can be tailored to perfectly fit a shipowner's requirements. They offer shipowners "a higher level of precision giving them the ability to hedge the price of the fuel they lift

¹⁸ John Hull, Introduction to Futures and Options Markets, (Englewood Cliffs: Prentice Hall, 1991), p. 38.

in the markets they lift it. This eliminates both location and product basis risk."¹⁹ The majority of over-the-counter contracts settle against the monthly average prices as quoted in Platt's European Marketscan. This is published daily and the most commonly used references are the following:

High Sulphur Fuel Oil 3.5% Barges FOB Rotterdam,
High Sulphur Fuel Oil 180 or 380 cst FOB Singapore,
High Sulphur Fuel Oil cst FOB Arab Gulf,
High Sulphur Fuel Oil Resid 3S (3% sulphur) US Gulf
Coast Waterborne and
High Sulphur Fuel Oil No 6 3% CIF New York.

Other locations can be hedged against Platt's Oilgram "Bunkerwire."

b. Swaps

The most widely used instrument is the swap, where a shipowner can buy fixed price fuel oil for a given period and volume at a fixed price. For example, a shipowner might agree to buy bunker fuel for a month in the future at \$77/mt. If the average price of fuel in that month is higher than \$77/mt, say \$89/mt, the shipowner will be paid the difference of \$12/mt. If however, the average price is lower than the \$77/mt mark, the shipowner will have to compensate his counterparty by the corresponding amount. The deal with the market maker will be simply financial, money will be transferred to whichever party has made a profit.

¹⁹ Ramsey El-Fakir, "The Art of Stabilizing Bunker Prices," Seatrade Review, May 1992, p. 67.

The bunker fuel will be taken from the normal supplier in the normal way, but the buyer will have fixed the price ahead of time. Thus, in the previous example, if physical oil is bought at \$89/mt, the buyer will be paying \$12/mt more for his physical supply. This loss will be counterbalanced by the gain from the swap.

The difference between a futures deal and a swap is that the latter is negotiated with a counter party and is not a standard contract. Basis risk can often be reduced or eliminated with a swap, provided that the counterparty is agreeable in using the terms at which the physical trading is normally done. Large fuel oil swap markets have surfaced throughout Europe, Asia and the United States. It is now possible to hedge 180 or 380 cst fuel oil in almost any market for up to three years. In some markets it is even possible to hedge out to five to ten years. The number of brokers doing swaps deals has also grown from a handful to over twenty five. The market has become very transparent and pricing tactics include open outcry conference calling where brokers have to quote their best price at the same time.²⁰ In addition to the price references mentioned earlier, swaps can also be quoted based on Mediterranean, United States West Coast and Japan fuel oil prices.²¹

²⁰ "Swaps Market Matures as Brokers Bring Transparency," Petroleum Intelligence Weekly (New York: Edward L. Morse, [May 1, 1995]), p. 2.

²¹ "Bunker Fuel Swaps and Options, BP's New Solutions to Your Pricing Risk," London, 1992.

An example of a swap contract:

Now

Fears price increase *Enters swap at \$77/mt*

(spot bunkers cost \$74/mt)

Future

Prices increase *Buys spot bunkers at \$89/mt* *Pays \$89/mt*

(spot bunkers cost \$89/mt) *Gets compensated for difference* *Earns \$12/mt*

Net cost is: \$77/mt

It could be argued that an advantage of futures over swaps is that a futures position can be adjusted according to the changing views of the market, whereas a swap is generally less flexible. For example, in the regulated exchange, it is easier to close out a futures position or even roll it over when market trends indicate that a loss is imminent. A swap does not offer the same opportunities for readjustments once an initial position has been agreed with a counterparty. The question really is to what extent a hedge should be tradable. Swaps hedges are not easily tradable. This is not to say that they are totally inflexible when priced. Instead of fixing a price for the whole quantity of oil at the time the deal is agreed, the two parties can agree to fix it over a specified period of time, e.g. a month. Thus someone agreeing to buy 5,000 tonnes of bunkers might agree to price it over a month, in lots of not less than 500 tonnes. He can then choose any day over the month agreed to fix the price of 500 tonnes or more until he has priced the whole 5,000 tonnes. Once established, the deal will operate like a normal swap deal and will be reversed in a similar way when the physical oil is delivered.

In conclusion, swaps give 100% upside protection but expose the hedger to all the downside of the market. Therefore, they are best used when prices are at market lows where the downside risk is much less than the upside risk. However, if a shipowner wants to retain some of the advantage of lower prices he could enter into a participating swap where he would give up part of the downside and

participate in lower prices. Obviously then, the swap will be done at a higher rate. For example, if swap levels are quoted at \$77/mt, the shipowner can agree to a \$79/mt, 50% participating swap. The probability of a loss becomes greater for him but if physical prices remain below the \$79/mt mark he only pays for half the difference between the lower average price and the swap mark. He participates in the potential profits of his counterparty and limits his downside.

c. Options

Options are another significant over-the-counter hedging instrument. All the active oil futures contracts have options and the companies involved in the over-the-counter market also offer a number of option packages. An option gives the buyer the right but not the obligation to buy or sell a commodity at a specified price (the strike price) within a certain time period. A premium is paid by the buyer to the seller. There are two types of options, a call and a put. A call option gives the buyer the right to buy and a put option, the right to sell. The fundamental difference between the use of futures and options is that the former "are designed to neutralize risk by fixing the price that the hedger will pay or receive for the underlying asset. Options contracts however, provide insurance in that a hedger can protect against an adverse price movement in the future while still being able to benefit from favorable

An example of a call option contract:

Now

Fears price increase *Buys call option at \$78/mt*

(spot bunkers cost \$72/mt) *Pays premium of \$2/mt*

Future

Prices increase *Exercises option* *Gets compensated by \$4/mt*

(spot bunkers cost \$82/mt) *Buys spot bunkers at \$82/mt* *(has paid premium upfront)*

Net cost is: \$80/mt

price movements."²² The financial consequences of the use of options are magnified. "Good outcomes become very good, while bad outcomes become very bad."²³

Thus, the buyer of a \$78 fuel oil call option for a future month has the right to buy fuel oil at \$78 at any time between the time the option is bought and the time of its expiry. If fuel oil does not reach \$78 the option will simply expire worthless, in which case the buyer has lost the premium he has paid but nothing else. The buyer can not lose more than the premium. If fuel oil rises above \$78 he will exercise his option, giving him a long position on the fuel oil futures market at \$78. This is then treated in the same way as any other futures position. He can also sell the option back to the market at any time since, as opposed to a swap, an option is a traded instrument in its own right. The type of option in the previous example is also called a cap since it places a limit to what the buyer might have to pay. A put option is the reverse of a call and is also called a floor. The buyer of a \$78 fuel oil January put option will exercise it if Brent falls below \$78 but not otherwise.

The buyer of an option has rights but not obligations. It therefore follows that the seller of an option has obligations but no rights. An option will only be exercised if it is in the buyer's favor which by definition means it is

²² John Hull, Introduction to Futures and Options Markets, (Englewood Cliffs: Prentice Hall, 1991), p. 8.

²³ *Ibid.*, p. 11.

against the seller. The seller of an option receives the premium which represents his maximum profit. If the buyer exercises the option, the seller will take the other side of the futures position created. It is therefore important that the seller of an option takes cover on the market for any adverse movements. This can be in the form of a futures position or a physical position.

Exchange options are defined in a similar way to the futures contracts. There is a specified expiry date for each month and defined strike prices. Over the counter options can be tailored more specifically to the buyer's requirements. Options are usually treated as an insurance policy to cover undesirable turns of events. If a shipowner strongly believes that the fuel oil market is going to rise, he might enter into a swap or open a futures position, but if he does not think it will but is worried that it might, he can buy an option in case it does. He can always sell it later.

In buying the option, the shipowner will specify the reference quotation, the duration of the contract, the settlement periods and the quantities per period, the preferred currency and the ceiling price. The counterparty will then specify the premium. Option premiums vary with market conditions. They are dependent on various factors, the most important being time to expiry and market volatility. The theoretical value of an option can be calculated from the various known factors such as the historical volatility, the time to expiry, the price, interest rates and so on, but the market

price can be very different as it takes account of expected volatility and supply and demand.

Put and call options can be combined in numerous ways depending on the needs of the shipowner or the imagination of his broker. A simple combination is that of a cap and a floor. The attractive feature of this arrangement is that the so called collar is usually structured to involve no premium payments. A shipowner buys a cap worth \$x and sells a floor worth the same in order to offset the premiums. For example, a zero-cost collar could give a \$78/mt cap in exchange for a \$70/mt floor. If the market is above \$78/mt, the hedge provider would compensate the shipowner 100%. If the market price is between \$78/mt and \$70/mt, no payments would be made by either party and if the market is below \$70/mt the shipowner would pay the difference to the hedge provider. Collars work well in a low market, where historically low levels can be achieved on the cap, but they should only be viewed as a form of disaster insurance as the bands are by necessity fairly wide and the protection is limited to major market moves. For a cash rich company which can take the day to day swings on the market, but would be adversely affected by the price increases similar to those following the Gulf War, they would be the best hedging tool.²⁴

²⁴ "Bunker Fuel Swaps and Options, BP's New Solutions to Your Pricing Risk," London, 1992.

An example of a collar:

Now

*Fears severe
price increase*

*Buys call option
at \$78/mt*

*(spot bunkers
cost \$72/mt)*

*Pays premium of
\$2/mt*

*Sells put option
at \$66/mt*

*Earns premium of
\$2/mt*

Future

Prices increase

Exercises option

*Gets compensated
by \$8/mt*

*(spot bunkers
cost \$86/mt)*

*Buys spot bunkers
at \$86/mt*

*(has paid premium
upfront)*

*Put option
expires worthless*

net cost is:

\$78/mt

d. Swaptions

As the market and its users have become more sophisticated, a whole battery of flexible, new structures has emerged. Most of these products are simply imaginative variations of the basic hedging tools mentioned above but one of the most common additions is a swaption. A swaption is simply the option on a swap and it can be bought or sold. It can either be a call swaption, the right to buy a swap, or a put swaption, the right to sell a swap. For example, a shipowner could buy a call swaption with a strike level of \$70/mt for 1996, expiring on December 31st, 1995. For this swaption he would be paying a premium. He would then be able to exercise his right by the end of 1995 and enter into a swap for 1996 at \$70/mt. If he chooses not to exercise this right, the option would expire worthless.

Since shipping companies need to purchase fuel oil in the future, they can take advantage of any product that will place them in the position of holding paper fuel oil now. If prices increase, paper fuel oil sold later will generate a profit. If they decrease, the physical purchase at a lower price will counterbalance the paper loss. Consequently, a frequent transaction involves a shipping company selling a put swaption, i.e. selling the right to be put into a swap at a level, volume and time period fixed now on a particular date in the future.

An example of a swaption:

Now

*Feels market
overestimates
chance of price
decrease*

*Sells put
swaption at
\$70/mt*

*(spot bunkers
cost \$74/mt)*

*Earns premium of
\$2/mt*

Future

Prices decrease

*Option is
exercised*

*Has to compensate
counterparty by
\$4/mt*

*(spot bunkers
cost \$66/mt)*

*Buys spot bunkers
at \$66/mt*

net cost is:

\$70/mt

For example, a shipowner might sell a put swaption for 1996 at \$70/mt, exercisable on December 31st, 1995 for a volume of 5,000 mt per month. On December 31st 1995, the buyer will have the right to put the shipowner into a swap as above. Because this option has a premium value, the buyer will pay the shipowner a fee per ton up front (option premiums are typically payable up front). If prices increase subsequently, the shipowner will have generated revenues in premiums. If prices fall, he will be subsidizing the buyer of the swaption but he will be balancing out this loss by buying cheaper fuel. The premium generating capacity of swaptions means that they can be embedded into other hedging strategies as a means of subsidizing the cost. Three of the most common strategies, extendables, double-ups and caps for swaption are presented below, although double-ups and extendables lost much of the popularity they gained in 1994 to straight one through five year swap contracts.²⁵

An extendable swap is where the shipowner enters into a swap and gives his counterparty the right to extend the swap for a further period at the same price. If a shipowner can purchase a \$70/mt swap for one year but has targeted a level of \$68/mt, he could sell an option to his counterparty; the right to extend the swap to cover one more equal time period for an equal volume of fuel. By doing this effectively he is reducing his swap level for the first time period with the premium he has generated on the option. The same principle applies to the double-up. The only difference is that the

²⁵ "Swaps Market Matures as Brokers Bring Transparency," Petroleum Intelligence Weekly (New York: Edward L. Morse, [May 1, 1995]), p. 2.

shipowner is giving his counterparty the right to double the volume of the swap at the same price. This will achieve a reduced level on the swap. In the caps for swaption strategy, the shipowner can purchase a call option and offset the premium by selling a swaption for a future period. Swaptions are probably the most versatile hedging instrument. As with any option, when volatility levels are high, the option has more premium value. Buying caps then works against the shipowner whereas selling swaptions works for him.

There are more exotic, customized hedging instruments but it makes sense to stay away from them unless there is a very clear investment side justification for their use. Dealers make more profit selling cutting edge instruments for which competition is less intense. Unless a company can explain why an exotic instrument protects its investment opportunities better than a plain-vanilla one, it is better to go with a plain-vanilla.²⁶

²⁶ Kenneth A. Froot et al., "A Framework For Risk Management," Harvard Business Review, November-December 1994, p. 102.

Chapter 4: Hedging Bunkers in Shipping: Why and How?

It has already been demonstrated how crude and fuel oil prices are likely to be influenced in the near future. Crude oil prices have been going through a period of relative stability which is expected to continue into the future until Iraqi oil enters the market. As for the fuel oil market, it is likely to remain strong for as long as the crude oil slate favors the production of the lighter by-products of oil. Developments in the three major markets of the product already presented serve as indications of the more specific trends evolving regionally. Subsequent to this analysis, it was shown how a shipping company could protect itself against adverse bunker price movements. A number of hedging mechanisms allow for increased flexibility in devising a hedging strategy.

This Chapter will present an attempt to formulate such a strategy. It will consist of two parts. The first one will introduce the argument for the usefulness of hedging and present the necessary conditions under which such a strategy should be pursued. Reference will be made to the hedging strategies undertaken by transportation companies. The second part of this chapter will attempt to formulate a strategy suited specifically to the needs of a shipping company:

a. Hedging as a Corporate Strategy

Hedging strategies need not only apply to the need of a shipping company to protect itself from

bunker price volatility. The same hedging instruments presented earlier can also be applied towards the protection from foreign exchange or interest rate risk. Therefore the question that needs to be addressed first is a rather generic one. What is the need of a company for a hedging program?

Nobel prize winner Merton Miller comes up with a rudimentary answer to this basic question. According to him, commodity risk need not be managed at the corporate level because it is managed by the very structure of efficient and well-functioning capital markets. Thus investors buy shipping shares for example, because they want to embrace freight rate risk. They can then hedge that risk by diversifying their investment portfolio between commodities and other investments. Accordingly, efforts by shipping company managers to hedge freight, exchange, interest rate or energy price risk deprive investors of the risk they are trying to take by buying the stock themselves.

This view assumes that shareholders have as much information about the risks faced by a company as the company's management. This is not always the case. A shipping company might be faced with a type of risk that investors do not know about. If the company's management thinks that this risk can be hedged to the benefit of the company, it should go ahead and hedge it. The primary goal of a manager is to enhance the value of the company stock for the shareholders and hedging strategies that the manager thinks will protect the company's equity or cash flow should be pursued.

Miller would argue against such action because it would affect the risk profile the investor is looking for in buying the company's stock in the first place. The investor who wishes to include particular risks in his portfolio can do it himself by picking commodities or other investments. But an investment in a company should also be an investment in the company's ability to manage the risks it is faced with. If hedging is a financial policy that enhances risk management effectiveness, it should be pursued. Miller's view also ignores commissions and other transaction costs which are less expensive per dollar of hedging for large transactions done by companies than for small ones by investors.

Kenneth Froot, David Scharfstein and Keith Stein introduce another concept in hedging theory. They accept the Modigliani and Miller position that a company grows by investment in and correct management of its assets. The overarching purpose of hedging then is to "ensure that a company has the cash available to make value-enhancing investments... Financial policy (including hedging) [is] critical in enabling companies to make valuable investments." The extension of this principle is that hedging "lets companies transfer funds from situations in which they have an excess supply to situations where they have a shortage. In essence, it allows companies to borrow from themselves." Subsequently, hedging becomes a desirable strategy for a company whose need for investment is not synchronous to its availability of funds.

Managers who adopt this approach should ask themselves two questions: How sensitive are cash flows to risk variables and how sensitive are investment opportunities to those risk variables. The answer will help managers understand whether the supply of funds and the demand for funds are naturally aligned or whether they can be better aligned through risk management.²⁷

Using the example of an oil company, Froote et al. make a surprising statement against oil producer hedging in stating that there is less reason for an oil company to hedge than there is for a multinational pharmaceutical company. The reason for this is that the latter is exposed to currency risk which is not directly correlated with the company's investment needs, whereas the risk of the oil company is directly correlated with the need to invest. For an oil company the supply of funds tends to match the demand for funds, even if the company does not actively manage risk. Investments need to be made when oil prices rise and in such an environment revenues from expensive oil generate the required funds. The problem with this analysis is that it assumes that the market is by definition right about the desirability of investing in oil production. According to it, when oil prices are down, companies should invest less in exploration and production. This is equivalent to saying that investment programs into the future should be based on the present price outlook and that future production need not be hedged today since the latter

²⁷ Ibid., p. 98.

is most likely to differ from the ultimate "real" or spot price of the future.

It is not clear what Froote et al would say about the case of a shipping firm. In the cyclical shipping industry a company that sees little need in hedging because it invests in capital when freight rates are buoyant and ship prices inflated would probably go bankrupt. Investment in new ships should not be undertaken when healthy freight rates generate sufficient revenues. Shipowners who buy ships in rising markets usually find themselves in trouble. So, in the case of shipping at least, history disproves academic theory in that success is probable when capital investment is not justified by the current level of operating profits.

So far, this analysis challenges the positions of two schools of thought. First, Miller's position that companies which hedge negate the risk that investors are looking for when investing in them, does not account for the growth of the commodities markets which offer the ground for direct risk taking opportunities. Secondly, the position of Froote et al. that if a company's supply of funds matches its demand it need not hedge is also problematic in that it makes the wrong assumptions about the workings of certain markets, especially cyclical ones. Hedging is a desirable strategy when managers can effectively manage it and is appropriate for companies who want to control risk, regardless of the industry segment they operate in. The evaluation of the usefulness of hedging should

be based on how it affects revenues instead of how it matches investment needs.

Before proceeding to discuss how a shipping company should consider devising a hedging strategy, it will be useful presenting how companies in the oil and the transportation industries deal with risk and hedging strategies. This will facilitate defining the parameters that are relevant for the case of a particular shipping company.

It was recently reported that "a tortuous rethink on the merits of oil price hedging is underway within the United States oil industry. Already many end-users are responding to cost pressures and derivative losses by becoming more cautious about their use of paper instruments to lock in prices."²⁸ Oil major Chevron has largely abandoned its oil price hedging strategies in its domestic refining operations, preferring to focus its profit-enhancing efforts in cost containment. Other companies are restricting hedging activities to periods when prices move outside fixed bands. Oil analysts note that investors may barely give a second thought to whether majors such as Chevron are hedging a portion of daily operations, but concede that shares of smaller firms such as Oryx and Amerada Hess, have suffered at times from the perception that unsuccessful hedging activities have depressed quarterly earnings. Do real world developments then disprove the position taken earlier that hedging is a desirable, value enhancing strategy?

²⁸ "To Hedge or Not to Hedge?," Petroleum Intelligence Weekly (New York: Edward L. Morse, [September 4, 1995]), p. 1.

The answer is no. It is important to realize that a company's hedging strategy can result in a loss or a gain, relative to the outcome that would occur without this strategy. Therefore, the decision for a company to enter a hedging program can not be made on the presumption that results will always be positive. Losses will be bound to occur and it should be normal for a company to reevaluate its hedging strategy. Before a company enters into a hedging program it should consider the following arguments.

Firstly, every business needs to expose itself to risks in order to seek profits. But there are some risks that a company is in business to take and others that it is not. A risk management program should reduce a company's exposure to the classes of risk it is not in the business to take while reshaping its exposure to those it is.²⁹ Hedging theory as discussed by Froote et al. does not differentiate between the risks that a company might be faced with, although this is an important distinction. In the case of the oil company, the price of oil is a risk inherent to the business. In the case of the pharmaceutical company, foreign exchange risk is not inherent to the industry. This distinction will be critical for the case of a shipping company.

Secondly, if hedging is the norm in a particular industry then it should be done in a competitive fashion. Conversely, if hedging is not the norm in a certain industry, it may not make

²⁹ David Weinberger, "Using Derivatives: What Senior Managers Must Know," Harvard Business Review, January-February 1995, p. 34.

sense for one particular company to chose to be different from everyone else. In an industry environment where everyone is hedging, losses due to unfortunate hedging strategies should not be unexpected. The situation becomes problematic when competitors become more successful in choosing the right strategy. When analysts compare the results of competitors, the company with the unsuccessful hedge is then perceived to be mismanaging its risks. It was stated earlier that shareholders of a company's stock also invest in the ability of executives to manage risks. Successful management is only possible when information on market trends and developments justifies hedging positions. For the case of a shipping company it will be indicated how a successful risk management strategy will be integrated with an overall corporate strategy.

Thus, making the distinction between the different kind of risks a company is faced with and how they tie in with its revenues and realizing that a loss resulting from a hedging activity might be attributed to the choice and management of the hedging strategy are critical. The importance of these factors can be made clear with a reference on how a railroad company and the airlines hedge against fuel price risk and incorporate it into an overall corporate strategy. In the railroad industry, New Jersey Transit (NJT), has been successfully hedging fuel price risk for over ten years. It either makes its purchases on the spot market or it locks in a price which is based on the NYMEX heating oil futures plus a differential which reflects basis risk. The agency's philosophy is not

to "try to beat the market" but rather to stabilize costs. On a yearly basis, it buys 30 million gallons of diesel fuel so 1 cent of paper gains means a \$300,000 growth in the budget. Obviously, if the futures market trend goes against its position it can sell it although this is something NJT has never done. Management realizes it is in the transportation business, not in that of trading futures and commodities. It is also interesting to note that the agency does not go to the exchange directly or through a broker but hedges through its fuel suppliers by telling them the month for which it wants to lock in a price.³⁰

In the transportation industry fuel price hedging is much more prevalent among airlines. Fuel costs are the second largest operating expense after labor; 12 versus 35%. ATA estimates that half the airlines have some sort of risk management contract in place, although they cover less than 50% of the industry's fuel requirements. Airlines cover between 5 and 50% of their fuel although most hover around the 15% mark. Like the railroad industry, airlines have a wide range of options available, i.e. committing forward volumes at fixed prices with futures, doing EFPs of heating oil or WTI to jet fuel, or going into swaps. According to a fuel purchaser of a US carrier, volatility in jet prices, "makes planning hard. If an airline sells advance tickets for the summer vacation season, it knows the yields, it knows its equipment leasing costs and the only variable is fuel... If the management is confident with their revenue forecast, they should

³⁰ Richard Bava, "Futures Market Helps Transit Agency Economically Budget Fuel Purchases," Energy in the News, Winter 1994/1995, p. 19.

be confident of their fuel costs. We are hedging for predictability on revenue. We are not in the business of forecasting fuel prices, we are in the airline business."³¹

The two examples drawn from the transportation industry illuminate the connection between a company's revenue base and the type of price risks it is trying to protect itself from. In both the railroad and the airline industries, revenues rely on freight rates which are more often than not fixed into the future. In case they are variable, this has more to do with supply and demand for transportation rather than with changing energy costs. In either case then, if freight levels and thus revenues have nothing to do with energy costs, it makes sense to hedge the exposure to fuel costs. Put more simply, a railroad company with fixed price freight will be better off when projecting its cash flows, if in addition to fixed revenues from freight it incorporates fixed fuel costs which it can actually attain. The airline executive makes a clear statement regarding the case of the industry he works for. If all margins but one are known, then it makes sense to set a fixed energy cost as well. For the case of a shipping company then, the connection between revenues and fuel costs is critical in devising a hedging strategy.

Clearly, the railroad and the airline industry examples also demonstrate a realization of the overarching principle of a hedging policy. That risk management should not be implemented in order

³¹ Sam Glasser, "Airlines Look to Hedging Programs As a Way of Stabilizing Fuel Costs," Energy in the News, Winter 1994/1995, p. 10.

for a company to improve its financial results but rather to stabilize them as far as certain risks are concerned. NJT is not trying to beat the market and the airline executive realizes that his company does not have any expertise in trading commodities. Of course, as mentioned earlier this is not to say that hedging is not done competitively; the statement is consistent with the fact that the purpose of a hedging program is to reduce a company's exposure to risks it is not in the business to take.

So far then it is concluded that a company should set the following guidelines in devising a hedging program. Firstly, it should make the distinction between the risks it is in business to take and those it is not. The latter should be limited depending on how they affect the revenue base. Secondly, negative results from a hedging strategy can not be excluded but could be avoided or minimized if the strategy is well thought off and justified. A company need not gain expertise in trading positions but should rather make sure it is getting properly advised on its hedging positions.

b. The Case of a Shipping Company

A 1992 report on bunker hedging estimated that 20% of shipowners used swaps and call options in order to cover some of their bunker fuel price exposure. According to the same report this percentage was expected to increase to 90% in five years perhaps because of bunker price volatility or even competitive pressures.³² It is doubtful that

³² El-Fakir, "The Art of Stabilizing Bunker Prices," p. 69.

hedging has become so popular amongst shipowners. The absence of severe volatility in either crude, fuel oil prices or refining margins in the last two years is a key underlying cause of the growing hesitancy among managers to spend money, or risk foregoing profits in order to lock in a price that protects them against extreme market moves.³³ However, this is not to say that changing market conditions in the future will not revive interest in hedging strategies. More importantly, a company should be in position to act quickly and take an advantageous hedging position when a weak market creates a window of opportunity.

The rest of this chapter will outline a hedging strategy that a shipping company, Eletson Corporation, should follow in covering its exposure to bunker price volatility. Although many companies are heavily involved in risk management, it is safe to say that there is no single well-accepted set of principles that underlies their hedging programs. Ultimately, a company's risk management strategy needs to be integrated with its overall corporate strategy. The corporate strategy of Eletson Corporation to the extent that it is relevant to risk management will be outlined so as to set the stage for a hedging strategy.

Eletson Corporation is a privately owned Greek shipping company involved in the transportation of petroleum products. It is considered a high quality, dedicated product carrier operator and its current fleet consists of 21 tankers of different

³³ "To Hedge or Not to Hedge?," Petroleum Intelligence Weekly (New York: Edward L. Morse, [September 4, 1995]), p. 1.

sizes. Within the next three years the company will have completed its fleet modernization program. At that time, the composition of the fleet will be 24 handymax and panamax tankers. During 1993, the company issued public debt, thus increasing its transparency and accountability to outsiders. The company's philosophy is consistent with taking well thought out and long term strategic positions in the segment of the tanker industry it knows best and has established itself in. However, even if the products trade is less volatile and more rewarding than the crude oil trade, Eletson is still operating in the high risk environment of tanker shipping.

Several aspects of Eletson's corporate strategy affect or reflect the company's perception of risk. During the time of the debt issue the company's rating was BB and Ba2 from S&P and Moody's respectively³⁴. The speculative grade of the ratings indicates that Eletson faces major ongoing uncertainties or exposure to adverse business, financial or economic conditions which could lead to inadequate capacity to meet timely interest and principal payments of its debt.

The company is not an asset player in the shipping markets. Its primary source of income is from operating revenue. The company has traditionally refrained from timechartering its tonnage and has preferred the uncertain but more rewarding spot market. This operating strategy has two implications which are relevant in considering a suitable hedging strategy.

³⁴Since then, the S&P rating has been downgraded to BB-.

First, since the company has a long term view on the market, it could put together a hedging program which would extend far into the future. Obviously, if the company chooses to lock in a fuel price this way, it misses the advantages of dynamic strategic planning; it runs the risk of missing opportunities as they become pronounced in the future and foregoes factoring future developments into its strategy. For example, suppose that Eletson locks in its fuel prices soon after the announcement that Iraq will be allowed to resume exports. The predominant view in the market is that oil prices will hit very low levels then, before they pick up again. Fuel oil prices will be particularly affected.

But what if Iraq no longer feels the need to abide by its Opec quota? It could increase its revenues by selling more oil at cheaper prices. Under this prolonged scenario of depressed oil prices, Saudi Arabia might refuse to support price levels by limiting its own exports and resuming the role of the swing producer. If Opec's quota system falls apart, it will be hard to do away with the ensuing oil glut. Even today, without Iraq's production capacity, Opec finds it hard to discipline its members to abide by their quotas. Over the past twenty years, consensus forecasts have consistently failed to predict major turning points in the price of oil. If a hedging strategy based on a long term view of the market is not flexible it might be unsuccessful. The answer to this question is that a hedging strategy can be flexible and can

be terminated, at a cost. A new hedging position can be taken up.

Second, the company's affinity towards the spot market is a good indicator of the company's attitude towards the inherent risk of tanker shipping. When an owner timecharter his ship, he receives fixed income for the period of the timecharter in advance. This income does not include bunker expenses which are paid directly by the charterer. However, the certainty of long term employment costs a premium which an efficiently run fleet would otherwise gain in the spot market. Eletson does not give up this premium and spots its vessels. The result is that earnings are uncertain and more volatile depending on the day to day developments of the spot market. It could be said then that Eletson takes the full risk it is in the business to take. Whether this strategy will change in the future depends on market conditions. A change of strategy can not be excluded but it is likely that the company will remain a predominantly spot operator.

Seven newbuildings on order are contracted in US dollars which is also the currency in which Eletson earns its revenues. There are no other plans of a major investment that would necessitate the consideration of exchange rate risk. As for the company's interest rate exposure, a hedging strategy has been implemented and is constantly reviewed. This is a risk the company is not in the business to take and prefers to manage it. However, hedging the exposure to bunker price volatility has not been

considered although fuel price price volatility is also a risk the company is not in the business to take. In order to understand why this is so it is critical to understand the relationship between freight rates and bunker prices. This analysis will also highlight the difference between a shipping company like Eletson and NJT or an airline.

When a cargo needs to be lifted from one location and transported to another, a shipowner will run a basic calculation in order to determine his profit or loss from this voyage if his ship ends up performing it. Given the market levels at any given time, the owner has the option of either bidding for the transportation of this cargo if profitability looks good or passing it if he is likely to face a loss. Obviously, the decision is somewhat more complicated in that other factors come into play. The critical notion, however, is that the owner incorporates his bunker costs into his rudimentary calculation. So does every other owner who is looking at the same business.

Eventually, if bunker prices increase, every owner whose vessel is in position to transport a cargo will be looking to increase the levels of the freight market in order to reflect the new bunker costs. In reality however, the freight market adjusts slowly to changes in bunker prices and more often than not conforms to its own dynamics on a short term basis. Eventually, freight rates reflect significant changes in bunker prices. For that reason when Eletson bids for the transportation of a cargo, it does not use a specific bunker cost for

the voyage in question but rather an average price of bunker costs of the whole fleet. This number is revised whenever bunker costs change by 10-\$20.

The implication of this procedure is that bunker costs become running rather than operating expenses. They are variable and taken into consideration before the conclusion of a voyage charter. In contrast, in the railroad and airline industries fuel costs are incurred regardless of whether a trip is profitable or not. If the transport price is fixed, and it does not incorporate changes in fuel costs, then it makes sense to fix those as well.

In conclusion then, fluctuating bunker prices are incorporated into the risk Eletson is in business to take. If the company is not averse towards freight rate risk, then it need not be averse towards bunker price risk. However, this is not to say that Eletson should not consider hedging its exposure to bunker price volatility. On the contrary it might enjoy a competitive advantage if it does. However, since a hedging strategy ceases to be a necessary exercise, if it is followed, it should have a very limited downside potential. In other words Eletson's hedging strategy should be conservative and designed for implementation when a window of opportunity occurs. The following recommendations could lead to the formulation of such a strategy:

First, Eletson should use over-the-counter instruments in its hedging strategy. There are a

number of advantages in this. Over-the-counter instruments can be tailor made to cover a company's exposure to the fuel oil market as well as suit its particular requirements in terms of volumes and locations of purchase. Basis risk can thus be limited. A hedging strategy using futures contracts would be more suitable for a company with the resources necessary to enable it to follow the oil markets on a daily basis. Such an operation would be more risky and suitable for a trading company, not a shipping one. The market of frequently used options and swaps has many participants and is rather competitive. This will be reflected in the pricing of a transaction which should not be based on complicated schemes where the risk is fully covered at a higher price. Using over-the-counter instruments would also favor a long term strategy which Eletson is in position to take. Such a strategy, can be designed so as to take advantage of cyclicalities in the oil markets. Since hedging is an option, not a necessity for Eletson, the company can wait for favorable market conditions before taking a position. Once an opportunity presents itself, it might as well be taken advantage of for a long period of time.

Second, Eletson should start monitoring the over-the-counter markets on a frequent basis in order to select the timing of its transaction and familiarize itself with the workings of the swaps and options markets. This approach is necessary for a newcomer in the world of oil trading. A number of financial institutions and oil companies have approached the company in order to market their

services regarding hedging. Such activity raises the question of who should undertake to execute such a transaction for Eletson. Although the question can't be answered here it is worth noting that oil companies which trade derivatives have internal physical positions which are related to the companies' oil supplies. Therefore, it would be necessary for Eletson to examine whether there is any conflict of interest in dealing with a particular party. The quality and volume of market information that could originate from a trading rather than an oil company should also be a factor. Trading companies have assumed the dominant role that oil companies used to have in the oil trade. NJT's policy of hedging its exposure through its suppliers would not be suitable for Eletson since the company uses numerous suppliers. Furthermore, the issue of bunker quality dictates that Eletson retains the flexibility of being able to purchase from the parties that provide the best service.

Third, once Eletson decides on the timing of its transaction, it should examine the advantages of a swap and a collar. A transaction involving a swap or one where the premium paid on a call option is earned by selling an equally expensive put option are easy to follow strategies. Their cost would be minimal, an attractive feature at a time when many shipping companies are reviewing their cost structures. Their biggest advantage however, is their low downside potential when they are entered into at the right time. Eletson can afford to wait to pick the right time since hedging is not a necessity but an option.

The Eletson vessels trade world-wide although more favorable returns in Europe and the Americas result in a higher concentration of them in these geographical areas. Therefore, the hedging of the exposure to bunker prices should be limited in Europe-North West Europe and the Mediterranean-and the Americas-United States Gulf. The figures for 1995 indicate that less than 20% of bunker purchases were done in the Pacific region. In any case, the lack of a liquid fuel oil futures contract in the SIMEX is an indication that hedging an exposure in the Far East would be problematic anyway.

One of the most difficult questions facing shipping organizations is who should be responsible for hedging fuel price risk operations; treasury, a risk management unit or senior management? Some companies view bunker price risk as a financial risk and lump it into the treasury function. Others feel it is a strategic purchasing division and deal with it in the operations units. For Eletson, hedging is a function that should be administered by the Treasury although decisions should be made in close consultation with senior management and the Chartering department. This would be in line with management's hands on attitude as well as the prevailing practice relating to other hedging activities (interest rates.) Bunker purchases have so far been coordinated by the Operations department. There is no need for the hedging program to interfere with the physical deliveries of bunkers apart from the fact that it would be necessary for the Operations department to relay

their intentions on time to facilitate the paper transaction.

Accounting issues need not be handled differently from the way the interest rate swap, the company has entered into, is accounted for. This applies for both the swap and the collar since settlement would be done once per month in either case. This is an obvious advantage over a strategy where futures are involved. The Financial Accounts Board has issued a standard (FASB 10/94) requiring companies to make a distinction between derivatives held or issued for purposes other than trading. Companies are required to disclose their objectives, their strategies for achieving those objectives, their recognition and measurement policies and information about hedges of anticipated transactions. For now the standard encourages but does not mandate disclosure of all quantitative information related to market risks. However, the disclosure requirements may get more rigorous over the next several years in response to demands from investors and regulators.

Chapter 5: Conclusions

The concept of hedging against the volatility of future prices of commodities has existed for a very long time, since the growth of the first commodity exchanges. However, the relevance of bunker price risk management in shipping, has only recently become a financial policy considered by shipping executives. A contributing factor to this development is the urgent need to control costs in an industry where a chronic imbalance in the supply of ships and demand for transportation have resulted in very low profitabilities for shipping companies. In the tanker sector of this industry risks do not seem to justify rewards. Many of the major oil companies have diversified out of a trade that used to be a significant segment of their vertically integrated structure. For the independent shipowners who are left behind, one way to stay in business is either by cutting costs or by controlling them. The second alternative leads to risk management considerations.

Bunker prices are one of the more significant costs that a shipping company is faced with. Over the last two years, a relative price stability, albeit at high levels, indicates that controlling the relevant price risk need not be an immediate priority. However, developments that took place in the not too distant past, the Gulf War in 1990, have shown that hedging is a financial policy that shipping companies should consider in their effort to control costs. The expansion of the oil trade in the exchange markets of New York, London and

Singapore has allowed for the growth, diversity and competitive pricing of hedging techniques. The purpose of this thesis then was to present considerations regarding market fundamentals, hedging strategies and implementation issues that a shipping company should be aware of before venturing to put together its own hedging program.

A pure hedging strategy, i.e. the locking in of a price, need not be pursued in light of information regarding fuel oil price trends. The difference between hedging and speculating is that the former offers the certainty of a cost, as opposed to the latter which offers a loss or a profit depending on a price change. The certainty of a cost can be arranged anytime, at a high or a low level. However, it was argued early on in the introduction that a successful hedging strategy should not be a simple arithmetic exercise. A strategy executed when prices are at relatively low levels has a greater probability of success. Therefore, someone interested in price risk management of a commodity should know how its pricing structure is determined and what changes are likely to affect it in the future. This was the purpose of the first -in part,- and second chapters of this thesis.

To the extent that bunker prices are affected by the price of the underlying commodity fuel oil is derived from, the lifting of the United Nations' sanctions against Iraq and the resumption of Iraqi crude oil exports will create a temporary imbalance in the crude and products markets. Opec will find it difficult to accommodate Iraqi capacity into its

quota system. An oversupply of crude oil is likely to depress price levels before production is eventually curtailed to bring oil revenues back to sustainable levels. Therefore, it could be stated with some degree of certainty that after the oil price decline when Iraqi oil hits the market, crude oil prices will not slide to lower levels. If the quantity of Iraqi crude will affect the oil markets in general and depress prices, the quality of this fuel oil rich crude will have an even more pronounced effect on fuel oil prices. The resumption of Iraqi exports then constitutes a long term opportunity to be taken advantage of with a hedging strategy. The certainty of a fixed bunker price can be combined with the added advantage of this price being close to historically low levels. Otherwise, regardless of how other petroleum products fare after this short crisis, fuel oil production will be continuously diminished. By all accounts, demand for clean oil products, induced by the Pacific region's energy requirements, will continue to soar well into the future. The whitening of the barrel is a gradual process in slow progress which would result in tightening markets for dirty oil products if regional developments do not have more pronounced effects on prices.

On a regional level, different factors will influence fuel oil prices in the major markets of Europe, the Americas and the Far East. In Europe, fuel oil markets are expected to remain tight in the short to medium term future. However, limits on production withdrawal which have occurred in the recent past, the effects of Iraqi oil when it hits

European markets and the introduction of gas into the equation of energy consumption are developments that could result in a reduction of fuel oil prices. Erratic exports from Russia should also have a dampening price effect whenever they occur. In the bunker markets of the Caribbean and the US Gulf, prices are likely to stay around their current levels. The effects of declining demand for fuel oil are likely to be negated by the export of product to Europe. Adjustments in price levels should originate from the use of gas in US markets and seasonal weather patterns which have had severe effects in the recent past. Finally, prices in the Far East will be determined by the number of refining projects that go on stream but structural characteristics of the oil markets in that part of the world will prevent them from becoming volatile, thus reducing the need for a hedging action. Overall, fuel oil prices are currently undergoing a period of relative strength. Careful monitoring of the possibilities already presented will help determine the proper time for action. Again, a successful hedging strategy should be taking advantage of depressed prices.

The purpose of the third chapter was to outline the ways in which hedging is actually done. The basic hedging instrument used in the oil markets is the futures contract traded in the exchanges of New York, London and Singapore. Although the principles making hedging instruments work are the same regardless of whether the hedged commodity is a currency, gold or oil, the case of the latter has a peculiarity. Basis risk is the differential that

exists at any time between the futures price of the oil used for the hedge and the spot price of the oil the hedge is for. The complex price dynamics of petroleum products with each other and crude oil, as well as the geographical location of physical, bunker operations augment fuel oil's basis risk with paper oil. Consequently, futures contracts may cover bunker price risk but inadequately.

Swaps and options are based on futures contract prices but offer the advantage of reducing basis risk. They can also be tailor made to match a particular strategy towards risk management, for example by setting a price protection level. Swaps and options can be mixed to form more exotic instruments but complicated combinations are not recommended. They are offered at higher prices and are unlikely to affect the effectiveness of a properly timed hedging transaction. Among the instruments presented, those that could form the backbone of a hedging policy include a swap at a low price level or a collar, i.e. the combination of a put and a call option. The latter arrangement is done to reduce premium payments. The selling of a put swaption is not a hedging transaction by itself but helps the generation of premiums which can be used to offset the cost of other hedging transactions.

The fourth chapter was divided in two parts. The first one looked at the value of hedging as a useful financial policy. Contrary to the views adopted by two academic theories, this thesis supported the argument that hedging activities

implemented by companies' managers should not be perceived to be conflicting with investors' desire to determine their portfolio's risk profile. Successful hedging should be perceived as part of sound management. Furthermore, the usefulness of a hedging strategy should not be valued against the relationship between investing and financing requirements but should rather be measured according to its effects on profits. Examples drawn from the railroad and airline industries helped demonstrate that a company wishing to start a hedging program should consider two issues. Firstly, a company should classify the type of risk it is trying to protect itself from and determine whether it is a risk it is in business to take or not. This will determine the effects of risk management on the revenue base. Secondly, competitive pressures dictate that a hedging strategy should not just minimize a risk by providing certainty but should also do so in a competitive fashion. A hedging strategy should be well thought out and justified.

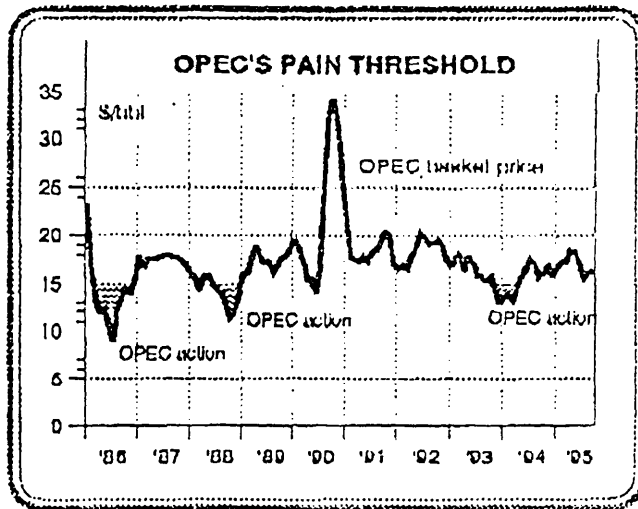
Once the conditions for a successful hedging strategies have been defined, a company needs to implement a hedging program which will be consistent with its corporate strategy. The second part of this chapter was devoted to implementation issues that a shipping company, Eletson Corporation, should consider before venturing into a bunker price risk management program. A sketch of the company's risk exposure was outlined and showed that managing bunker price risk is not a necessity but an option. Consequently, Eletson Corporation should consider a conservative, probably long term strategy that takes

advantage of a weak fuel oil price environment. It was recommended that the company start monitoring pricing developments of the basic over-the-counter, swap and option contracts. These instruments eliminate basis risk and are competitively priced. The company need not think about fuel oil price developments in the Far Eastern markets but should consider which would be the ideal counterparty in a hedging transaction. The current, buoyant fuel oil price environment and the prospects for the future indicate that there is no need for immediate action. The company can weigh its options, formulate a hedging program and implement it when the time is right.

Appendices

Appendix 1

Over the last ten years, the price of the Opec basket of crudes has always stayed under the \$20/bl mark, with the exception of the Gulf War period. Whenever oil prices have dropped well below \$16/bl, during the same period, Opec has acted decisively to reduce output. In 1993, Opec introduced quotas which tightened the market considerably. (Source: Monthly Oil Report, Center for Global Energy Studies. London, October 13, 1995.)



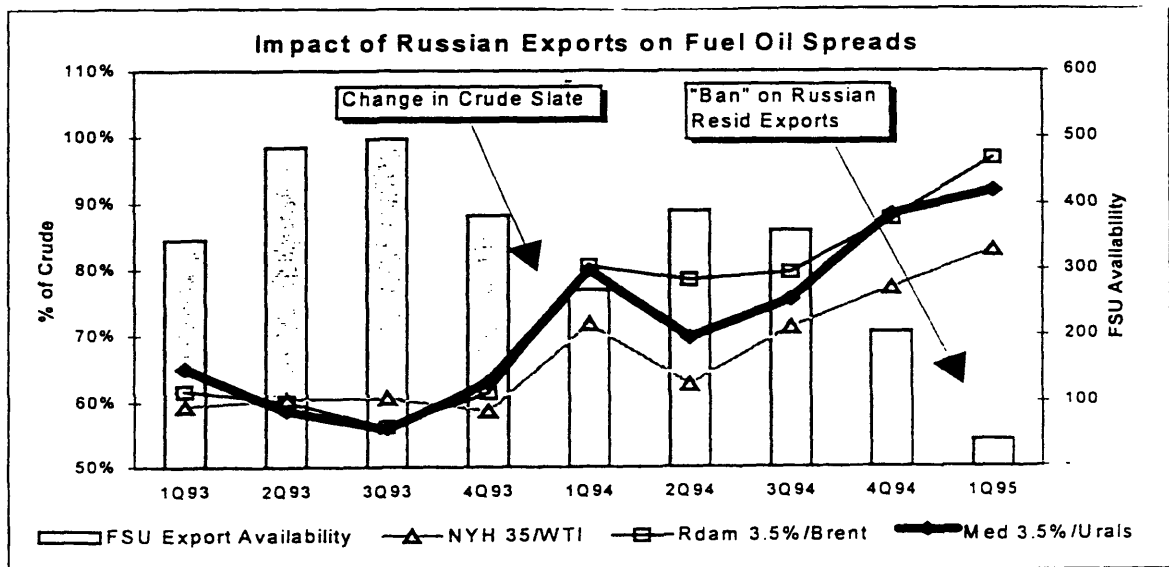
Appendix 2

This table shows how erratic Russian fuel oil exports have been since the beginning of the year. There is always an uncertainty on export licenses whose availability depends on domestic requirements. (Source: Russiawatch, Energy Security Analysis Inc. Washington D.C., September 27, 1995.)

Table 3-c: Summary of Russian Petroleum Product Implied Export Availability in 000 b/d

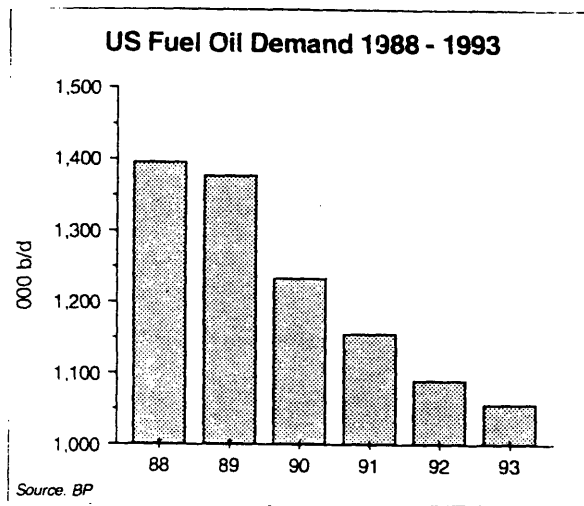
	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
3 Main Prod.	423	501	487	1046	1023	679	827	765				
3 Main Prod. 94	664	946	548	485	(77)	1520	575	402	68	442	589	(52)
Mogas	68	26	39	143	(9)	(42)	(54)	18				
Mogas 94	84	24	60	(54)	(174)	60	(95)	(111)	(163)	(136)	62	13
Diesel	278	274	302	388	325	282	242	246				
Diesel 94	266	432	337	259	(73)	591	214	45	(32)	144	272	(47)
Fuel Oil	77	200	146	515	707	439	639	501				
Fuel Oil 94	314	490	151	280	170	869	456	468	263	434	255	(18)

This table complements the previous one and shows the effect of Russian fuel oil exports in the US, North European and Mediterranean fuel oil prices over a longer period of time. Decreasing export availability has resulted in an increase of fuel oil prices; fuel oil becomes a more valuable commodity when compared to other oil products. (Source: The International Oil Market Medium and Long-Term Outlook, Stockwatch Quarterly Review. Energy Security Analysis Inc. Washington D.C. April 1995.)



Appendix 3

This graph shows the dramatic decline in US Fuel oil demand. It should be attributed, in part, to increases in the use of gas. (Source: Low Oil Prices - Is Demand the Key?, Kleinwort Benson Research. London April 1995.)



Appendix 4

This table does not differentiate between the volumes traded in the three exchanges but shows how the interest of speculators in oil futures contracts has increased substantially over the last two years, thus adding liquidity to the markets. (Source: Hedge-Memo, Energy Security Analysis Inc. Washington D.C. May 23, 1995.)

Average Annual Speculator Open Interest In Commodities				
(000 US dollars)				
	Agriculturals	Precious Metals	Others	Fuels
1986	\$ 1,383,941	\$ 1,345,531	\$ 465,292	\$ 343,428
1987	\$ 1,280,905	\$ 2,199,816	\$ 750,807	\$ 448,286
1988	\$ 3,334,890	\$ 2,025,322	\$ 576,046	\$ 540,341
1989	\$ 2,156,079	\$ 2,380,990	\$ 638,920	\$ 566,168
1990	\$ 2,834,421	\$ 1,708,595	\$ 675,159	\$ 677,549
1991	\$ 2,975,514	\$ 1,561,766	\$ 643,542	\$ 707,715
1992	\$ 3,468,926	\$ 1,389,649	\$ 531,117	\$ 1,005,640
1993	\$ 4,685,564	\$ 3,198,963	\$ 484,496	\$ 976,632
1994	\$ 3,392,005	\$ 3,253,610	\$ 624,237	\$ 1,367,824
1995	\$ 2,797,041	\$ 2,158,623	\$ 939,073	\$ 1,653,348
Percentage of Total Commodity Investment				
1986	39%	38%	13%	10%
1987	27%	47%	16%	10%
1988	51%	31%	9%	8%
1989	38%	41%	11%	10%
1990	48%	29%	11%	11%
1991	51%	27%	11%	12%
1992	54%	22%	8%	16%
1993	50%	34%	5%	10%
1994	39%	38%	7%	16%
1995	37%	29%	12%	22%

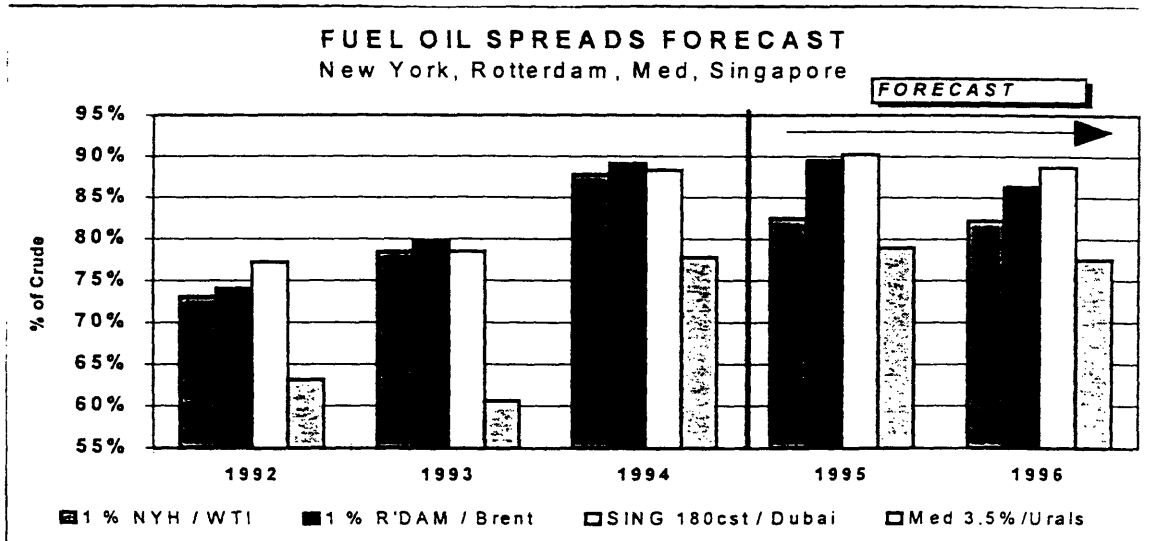
Appendix 5

The column on the right hand side of the table shows the number of deliveries of NYMEX futures contracts as a percent of the total traded volume. Most of the physical deliveries take place with the unleaded gasoline contract in New York. The heating oil contract follows. (Source: Energy in the News, Winter 1994/1995.)

NYMEX DELIVERIES (IN 000'S OF BARRELS)						
Contract Month	Standard Deliveries (Excluding ADPs/EFPs)		Total EFPs ^b	Total Deliveries ^c	Trading Volume (No. Contracts) ^d	Deliveries as of % Cumulative Trading Volume
	ADPs ^a	EFPs ^a				
CRUDE OIL						
Total 1993	8,886	21,275	568,339	598,500	22,712,402	0.13
Total 1994	17,935	9,776	467,036	494,747	26,611,518	0.10
Jan 1994	639	1,016	45,913	47,568	2,178,871	0.08
Feb	1,016	508	33,091	34,615	1,938,916	0.08
Mar	1,907	2,501	40,309	44,717	2,110,225	0.21
Apr	2,373	72	31,901	34,346	1,912,288	0.13
May	1,735	1,661	36,950	40,346	2,023,022	0.17
June	991	1,018	35,130	37,139	2,780,975	0.07
July	1,650	965	35,714	38,329	2,352,305	0.11
Aug	814	442	41,516	42,772	2,225,912	0.06
Sept	1,887	379	46,440	48,706	2,345,754	0.10
Oct	1,037	99	36,621	37,757	2,050,572	0.06
Nov	1,569	435	34,941	36,945	1,873,384	0.11
Dec	2,317	680	48,510	51,507	2,819,294	0.11
HEATING OIL						
Total 1993	10,334	6,284	452,047	468,665	8,439,375	0.20
Total 1994	8,237	6,981	429,993	445,211	9,183,276	0.17
Jan 1994	1,603	655	52,130	54,388	922,134	0.24
Feb	724	569	50,363	51,656	920,366	0.14
Mar	922	622	42,020	43,564	996,625	0.15
Apr	391	93	36,904	37,388	802,750	0.06
May	69	629	25,495	26,193	716,043	0.10
June	249	510	31,115	31,874	726,971	0.10
July	424	1,186	31,200	32,810	726,343	0.22
Aug	157	1,257	33,097	34,511	624,242	0.23
Sept	967	64	29,468	30,499	605,080	0.17
Oct	145	386	30,340	30,871	607,780	0.09
Nov	838	139	30,105	31,082	542,812	0.18
Dec	1,748	871	37,756	40,375	992,130	0.26
NEW YORK HARBOR UNLEADED GASOLINE						
Total 1993	7,015	6,355	449,302	462,672	7,082,990	0.19
Total 1994	12,007	4,814	532,749	549,570	7,743,330	0.22
Jan 1994	1,078	451	34,563	36,092	633,257	0.24
Feb	802	77	40,593	41,472	591,328	0.15
Mar	1,212	249	40,564	42,025	608,863	0.24
Apr	981	228	44,162	45,371	604,181	0.20
May	1,021	205	52,799	54,025	734,994	0.17
June	596	715	41,948	43,259	701,054	0.19
July	687	136	51,944	52,767	653,270	0.13
Aug	907	987	48,551	50,445	651,016	0.29
Sept	1,967	459	56,066	58,492	704,677	0.34
Oct	648	165	40,487	41,300	605,742	0.13
Nov	379	515	39,817	40,711	587,238	0.15
Dec	1,729	627	41,255	43,611	667,710	0.35

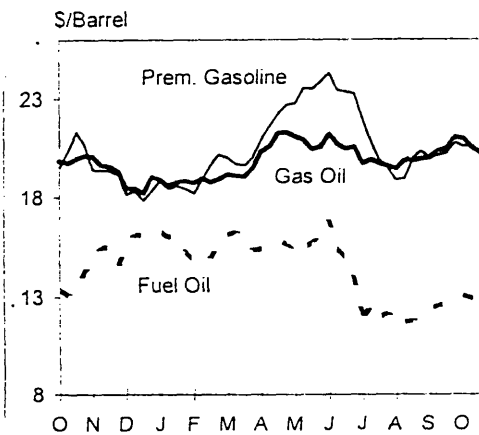
Appendix 6

In 1992-1994, the value of fuel oil, as a percent of the value of the crude it was derived from increased from the low 70s to the high 80's in the North European, US and Far Eastern markets. The correlation between Mediterranean fuel and Russian crude is much worse and should be attributed to quantities of product coming into the Mediterranean basin from the Middle East and North Africa or the discontinuous flows of Russian exports. In any case, the graph illustrates the significance of basis risk. (Source: The International Oil Market Medium and Long-Term Outlook, Stockwatch Quarterly Review. Energy Security Analysis Inc. Washington D.C. April 1995.)

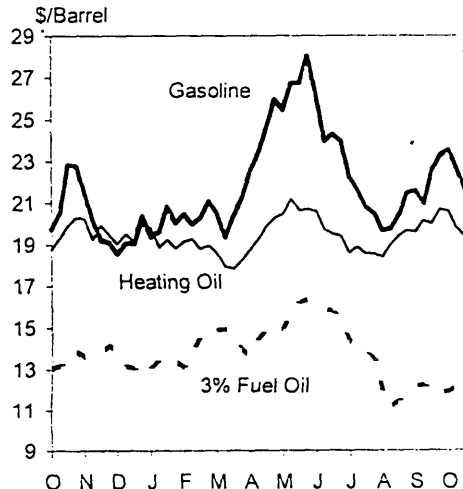


Prices of the major oil products also vary with each other. These three graphs illustrate the differences between the products in Rotterdam, the US Gulf and Singapore. Basis risk exists between products as well. It is interesting to note how prices in the Far East correlate much better and lack volatility. (Source: Petroleum Market Intelligence. New York, October 5, 1995.)

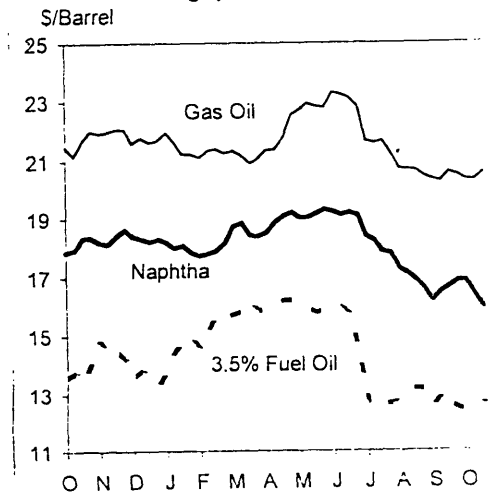
Rotterdam Spot Prices



US Gulf Coast Spot Prices



Singapore Spot Prices



Appendix 7

The following pages present sample swap and option contracts. (Source: Elf Trading S.A. Geneva, 1989.)

SWAP CONTRACTS - I

CONTRACT NO: GSWBS.....

WE ARE PLEASED TO CONFIRM THE FOLLOWING EXCHANGE CONTRACT DONE ON CONSTITUTING THE SWAP DEFINED HEREINAFTER, WITHOUT PHYSICAL DELIVERY TAKING PLACE, MADE UP OF TWO PARTS AS FOLLOWS :

PART A:

SELLER

ELF TRADING S.A.
WORLD TRADE CENTER
10, ROUTE DE L'AEROPORT
CH - 1215 GENEVA 15 / SWITZERLAND
(HEREINAFTER CALLED "ELF")

BUYER

(HEREINAFTER CALLED THE "COUNTERPARTY")

PRODUCT :

PERIOD (BOTH DATES INCLUSIVE) :

SUB-PERIODS (BOTH DATES INCLUSIVE IN EACH SUB-PERIOD) :

ONE SUBPERIOD BY MONTH INCLUDED IN THE SAID PERIOD THAT IS :

SUBPERIOD 1 :

TO SUBPERIOD ... :

TOTAL QUANTITY:

EXACTLY METRIC TONS

SUB-PERIODICAL QUANTITY:

EXACTLY METRIC TONS PER ...

PRICE:

EXACTLY USD PER METRIC TON FIXED AND FLAT.

PART B:

SELLER : THE BUYER UNDER PART A

BUYER : THE SELLER UNDER PART A

PRODUCT: SAME AS IN PART A

PERIOD: SAME AS IN PART A

SUB-PERIODS: SAME AS IN PART A

TOTAL QUANTITY: SAME AS IN PART A

SUB-PERIODICAL QUANTITY: SAME AS IN PART A

PRICE:

SUBJECT TO THE PROVISIONS OF SCHEDULE 1 HEREINAFTER AND MADE A PART HEREOF THE PRICE PER METRIC TON FOR EACH SUB-PERIODICAL QUANTITY SHALL BE THE ARITHMETIC AVERAGE OF THE OF EACH DAILY QUOTATION EFFECTIVELY PUBLISHED IN PLATT'S FOR RELATIVE TO THE CORRESPONDING SUB-PERIOD.

PROVISIONS APPLICABLE TO PART A AND PART B

INVOICING:

- 1) FOR EACH COMPLETED SUB-PERIOD THE PAYMENT FOR SAID SUB-PERIOD SHALL BE MADE BY THE PARTY WHICH EMERGES AS DEBTOR WHEN COMPARING THE FIXED AND FLAT PRICE UNDER PART A WITH THE PRICE CALCULATED UNDER PART B AND THE AMOUNT DUE FOR PAYMENT SHALL BE THE DIFFERENCE BETWEEN SAID TWO PRICES MULTIPLIED BY THE SUB-PERIODICAL QUANTITY OF SAID SUB-PERIOD.
- 2) WITHIN THREE BANKING DAYS IN NEW YORK FOLLOWING THE END OF EACH SAID SUB-PERIOD ELF SHALL FORWARD TO THE COUNTERPARTY A TELEX INVOICE SETTING FORTH THE SAID DUE AMOUNT, THE CREDITOR AND THE DEBTOR, AND THE DETAILS OF THE CALCULATION RESULTING IN THE SAID DUE AMOUNT. SUCH TELEX INVOICE MAY BE FOLLOWED BY A HARD COPY INVOICE.

PAYMENT:

- 1) PAYMENT OF EACH INVOICE SHALL BE MADE BY THE DEBTOR TO THE CREDITOR WITHOUT DISCOUNT, DEDUCTION, SET-OFF OR COUNTERCLAIM IN UNITED STATES DOLLARS BY TELEGRAPHIC TRANSFER OF IMMEDIATELY AVAILABLE FUNDS ("SAME DAY FUNDS") ON OR BEFORE THE DUE DATE FOR PAYMENT TO THE BANK ACCOUNT DESIGNATED BY THE CREDITOR. THE DUE DATE FOR PAYMENT SHALL BE THE SECOND BANKING DAY IN NEW YORK IMMEDIATELY FOLLOWING THE DATE OF THE SAID INVOICE.

- 2) ANY DELAY BY THE DEBTOR IN EFFECTING ANY PAYMENT BY ITS DUE DATE SHALL ENTITLE THE CREDITOR TO RECEIVE PAYMENT OF INTEREST FOR EACH DAY OF DELAY CALCULATED AT LIBOR (LONDON INTER BANK OFFERED RATE) FOR CALL MONEY IN EFFECT ON SUCH DUE DATE PLUS TWO (2) PERCENTAGE POINTS PER ANNUM, SUCH INTEREST BEING IN ADDITION TO ANY OTHER RIGHTS OF CREDITOR ARISING OUT OF SUCH DELAY, AND IS IN NO CIRCUMSTANCES TO BE CONSIDERED AS AN AGREEMENT BY THE CREDITOR TO PROVIDE EXTENDED CREDIT.
- 3) IN ANY EVENT BEFORE THE FIFTH BANKING DAY IN NEW YORK FOLLOWING THE LAST DAY OF THE PERIOD OF THIS EXCHANGE CONTRACT, THE ACCOUNT BETWEEN THE PARTIES MUST BE SETTLED.
- 4) FOR THE PURPOSES OF THIS EXCHANGE CONTRACT ELF NOMINATES THE FOLLOWING BANK ACCOUNT WHERE PAYMENTS HEREUNDER SHALL BE MADE: THE COUNTERPARTY SHALL NOMINATE BY TELEX TO ELF ITS BANK FOR SAID PURPOSES WITHIN ONE BANKING DAY IN NEW YORK FOLLOWING THE DATE OF THIS EXCHANGE CONTRACT.
- 5) IF THE COUNTERPARTY FAILS TO MAKE PAYMENT HEREUNDER WHEN DUE, OR FAILS TO MAKE PAYMENT UNDER ANOTHER EXCHANGE CONTRACT WITH ELF WHEN DUE, THEN ELF SHALL HAVE THE RIGHT TO BRING THIS EXCHANGE CONTRACT TO AN END UPON THE IMPLEMENTATION OF THE PROVISIONS SET FORTH IN SCHEDULE 3 HEREUNDER AND MADE A PART HEREOF. SAID TERMINATION BEING WITHOUT PREJUDICE TO ANY OTHER RIGHT OF ELF ARISING OUT OF SAID FAILURE.

PERFORMANCE BONDS

- 1) THE COUNTERPARTY AGREES TO PUT IN PLACE A PERFORMANCE BOND ISSUED BY A FINANCIAL INSTITUTION AGREED UPON BY ELF FOR AN AMOUNT OF AT LEAST UNITED STATES DOLLARS AND WITH A FINAL VALIDITY DATE BEING
- 2) THE COUNTERPARTY FURTHER AGREES THAT, WHENEVER THE POTENTIAL MARGIN DUE TO ELF AND CALCULATED PURSUANT TO THE PROVISIONS OF SCHEDULE 2 HEREINAFTER AND MADE A PART HEREOF EXCEEDS THE TOTAL AMOUNT OF THE PERFORMANCE BOND(S) PUT IN PLACE MULTIPLIED BY EIGHTY PERCENT, IT SHALL ESTABLISH A FURTHER PERFORMANCE BOND ISSUED BY A FINANCIAL INSTITUTION AGREED UPON BY ELF FOR AN AMOUNT OF AT LEAST UNITED STATES DOLLARS AND WITH THE SAME VALIDITY DATE AS IN PARAGRAPH 1) ABOVE
- 3) SAID POTENTIAL MARGIN SHALL BE CALCULATED FROM TIME TO TIME BY ELF AND ELF SHALL, WHENEVER THE SO CALCULATED POTENTIAL MARGIN FALLS WITHIN THE DESCRIPTION UNDER PARAGRAPH 2) ABOVE, BY TELEX NOTICE ADVISE THE COUNTERPARTY THAT THE PROVISIONS OF SAID PARAGRAPH 2)

ARE EFFECTED AND THAT A FURTHER PERFORMANCE BOND SHALL BE PROVIDED. DETAILS OF THE CALCULATION OF THE SAID POTENTIAL MARGIN SHALL BE SET FORTH IN SAID TELEX NOTICE.

- 4) FURTHERMORE THE COUNTERPARTY AGREES AND UNDERTAKES TO PROVIDE THE PERFORMANCE BOND REFERRED TO IN PARAGRAPH 1) ABOVE BY THE END OF THE THIRD BANKING DAY IN NEW YORK IMMEDIATELY FOLLOWING THE DATE OF THIS EXCHANGE CONTRACT AND TO PROVIDE ANY REQUIRED FURTHER PERFORMANCE BONDS BY THE END OF THE THIRD BANKING DAY IN NEW YORK IMMEDIATELY FOLLOWING THE DATE OF THE TELEX NOTICE REFERRED TO IN PARAGRAPH 3) ABOVE.
- 5) IF THE COUNTERPARTY FAILS TO DULY PROVIDE A PERFORMANCE BOND AND/OR FURTHER PERFORMANCE BOND(S) THEN ELF SHALL HAVE THE OPTION TO BRING THIS EXCHANGE CONTRACT TO AN END UPON THE IMPLEMENTATION OF THE PROVISIONS SET FORTH IN SCHEDULE 3 HEREINAFTER AND MADE A PART HEREOF.
- 6) THE PERFORMANCE BOND AND ANY FURTHER PERFORMANCE BONDS SHALL BE IN THE FORMAT SET FORTH IN SCHEDULE 4 HEREINAFTER AND MADE A PART HEREOF.
- 7) ELF SHALL CALL AND UNDERTAKE TO CALL THE PERFORMANCE BOND AND/OR ANY FURTHER PERFORMANCE BONDS SOLELY TO THE EXTENT THAT THE COUNTERPARTY HAS NOT MADE DUE PAYMENT HEREUNDER.

GOVERNING LAW

THIS EXCHANGE CONTRACT AND THE SCHEDULE HEREINAFTER SHALL BE CONSTRUED IN ACCORDANCE WITH THE LAWS OF ENGLAND WITHOUT REFERENCE TO THE CONFLICT OF LAW RULES. ANY DISPUTE ARISING HEREUNDER SHALL BE REFERRED TO THE NON-EXCLUSIVE JURISDICTION OF THE HIGH COURT SITTING IN LONDON AND THE PARTIES EXPRESSLY AGREE TO SERVICE OF PROCESS BY REGISTERED MAIL.

TIME

TIME IS OF THE ESSENCE.

REPRESENTATIONS

EACH PARTY HERETO HEREBY REPRESENTS TO THE OTHER THAT IT IS ENTITLED TO ENTER INTO AND FULLFIL THIS EXCHANGE CONTRACT, THAT IT IS LAWFULLY DOING SO, THAT IT IS NOT AND WILL NOT BE REQUIRED TO DEDUCT FOR TAX PURPOSES OR OTHERWISE ANY SUM FROM ANY PAYMENT TO BE MADE BY IT HEREUNDER AND IF SO THAT IT WILL FULLY COMPENSATE THE OTHER, AND THAT IT WILL BE IN A POSITION TO MAKE ALL PAYMENTS HEREUNDER IN ACCORDANCE WITH THE PAYMENT PROVISIONS OF THIS EXCHANGE CONTRACT.

SCHEDULE 1

- 1) IF FOR ONE BANKING DAY IN NEW YORK OR MORE BANKING DAYS IN NEW YORK (BUT IN THE LIMIT OF FIVE SUCCESSIVE BANKING DAYS IN NEW YORK) OF THE SAID SUB-PERIOD, THE SAID DAILY QUOTATION IS NOT PUBLISHED BY PLATT'S, THIS BANKING DAY IN NEW YORK OR THESE BANKING DAYS IN NEW YORK (AS THE CASE MAY BE) SHALL BE EXCLUDED FOR THE PURPOSES OF THE CALCULATION OF THE PRICE FOR THE SAID SUB-PERIOD.
- 2) IF FOR MORE THAN FIVE SUCCESSIVE BANKING DAYS IN NEW YORK OF THE SAID SUB-PERIOD THE SAID DAILY QUOTATION IS NOT PUBLISHED BY PLATT'S, BOTH PARTIES WILL ENDEAVOUR TO AGREE ON A NEW WAY TO CALCULATE THE PRICE FOR SAID SUB-PERIOD AND SUBSEQUENT SUB-PERIODS. IF SUCH AGREEMENT IS REACHED A FORMAL TELEX ADDENDUM TO THIS EXCHANGE CONTRACT SHALL BE MADE AND APPLIED TO THE SAID SUB-PERIOD AND SUBSEQUENT SUB-PERIODS (IF ANY). IF SUCH AGREEMENT IS NOT REACHED WITHIN TWO BANKING DAYS IN NEW YORK AFTER THE LAST OF THE SAID FIVE SUCCESSIVE BANKING DAYS IN NEW YORK, WHERE PLATT'S SAID DAILY QUOTATION IS NOT PUBLISHED, THEN THIS EXCHANGE CONTRACT SHALL AUTOMATICALLY COME TO AN END UPON THE IMPLEMENTATION OF THE PROVISIONS SET FORTH IN THE FOLLOWING SUB-PARAGRAPHS OF THIS PARAGRAPH 2 OF THIS SCHEDULE 1:
 - 2.1 ALL SUB-PERIODS THEN COMPLETED, IF ANY, MUST BE SETTLED AND CLOSED IN ACCORDANCE WITH THE PROVISIONS APPLICABLE TO PART A AND PART B.
 - 2.2 THE SUM OF THE QUANTITIES COVERING THE REMAINING SUB-PERIODS SHALL BE DIVIDED BY THE NUMBER OF BANKING DAYS IN NEW YORK DURING THE CORRESPONDING SUB-PERIODS, THE RESULT BEING HEREINAFTER REFERRED TO AS A "DAILY QUANTITY" AND EACH BANKING DAY IN NEW YORK OF THE REMAINING SUB-PERIODS BEING ALLOCATED A DAILY QUANTITY.
 - 2.3 EACH DAILY QUANTITY SHALL BE PLACED IN ONE OF TWO GROUPS: GROUP 1, IF ANY, BEING THE DAILY QUANTITIES COVERING THE PERIOD STARTING ON THE FIRST DAY OF THE FIRST REMAINING SUB-PERIOD AND TERMINATING ON THE LAST DAY PRIOR TO THE SAID FIVE SUCCESSIVE BANKING DAYS IN NEW YORK WHEN THE DAILY QUOTATIONS WERE NOT PUBLISHED (BOTH THE FIRST DAY AND LAST DAY INCLUSIVE) AND GROUP 2 BEING THE RESIDUAL DAILY QUANTITIES.
 - 2.4 DAILY QUANTITIES GROUP 1 TO BE PRICED IN ACCORDANCE WITH PRICE PROVISIONS APPLICABLE TO PART A AND PART B.
 - 2.5 DAILY QUANTITIES GROUP 2 TO BE PRICED IN ACCORDANCE WITH THE PRICE PROVISIONS APPLICABLE TO PART A AND AS FAR AS PART B IS CONCERNED ON THE

ARITHMETIC AVERAGE OF LAST FIVE SAID DAILY QUOTATIONS PUBLISHED BY PLATT'S IMMEDIATELY PRIOR TO SAID FIVE SUCCESSIVE BANKING DAYS IN NEW YORK WHEN SAID DAILY QUOTATIONS WERE NOT PUBLISHED.

- 2.6 FOR THE DAILY QUANTITIES GROUP 1 AND GROUP 2 ELF TO PREPARE AN INVOICE SHOWING THE PARTY WHICH EMERGES AS DEBTOR AND CREDITOR RESPECTIVELY WHEN COMPARING FOR DAILY QUANTITIES GROUP 1 PRICES ESTABLISHED UNDER SUB-PARAGRAPH 2.4 OF THIS SCHEDULE 1 AND FOR DAILY QUANTITIES GROUP 2 PRICES ESTABLISHED UNDER SUB-PARAGRAPH 2.5 OF THIS SCHEDULE 1. THE AMOUNT DUE FOR PAYMENT FOR EACH SAID GROUP SHALL BE THE PRICE DIFFERENCE APPLICABLE TO EACH OF THEM MULTIPLIED BY THE CORRESPONDING QUANTITIES, SAID INVOICE TO BE FORWARDED BY ELF TO THE COUNTERPARTY WITHIN THE FIRST TWO BANKING DAYS IN NEW YORK IMMEDIATELY FOLLOWING THE IMPLEMENTATION OF PARAGRAPH 2 OF THIS SCHEDULE 1 AND TO BE PAID BY DEBTOR IN ACCORDANCE WITH PAYMENT PROVISIONS OF THIS EXCHANGE CONTRACT.
3. THE PROVISIONS OF PARAGRAPH 2 OF THIS SCHEDULE 1 SHALL ALSO BE IMPLEMENTED IF THE SAID DAILY QUOTATION IS NOT PUBLISHED FOR MORE THAN FIVE SUCCESSIVE BANKING DAYS IN NEW YORK OR IF PLATT'S ANNOUNCES SUCH CESSATION OF THE SAID DAILY QUOTATION DURING THE DAYS BETWEEN THE DATE OF THIS TELEX AND THE LAST DAY OF THE LAST SUB-PERIOD WHICH ARE NOT INCLUDED IN A SUB-PERIOD.

SCHEDULE 2

1. THE POTENTIAL MARGIN DUE TO THE CREDITOR BY THE DEBTOR SHALL BE CALCULATED AS FOLLOWS:

POTENTIAL MARGIN

SUM OF THE SUB-PERIODICAL POTENTIAL MARGINS

WHERE

EACH SUB-PERIODICAL POTENTIAL MARGIN IS THE SUB-PERIODICAL QUANTITY FOR EACH SUB-PERIOD NOT YET SETTLED OR PAID FOR MULTIPLIED BY THE DIFFERENCE BETWEEN AVERAGE PRICE FOR PART B AND THE PRICE FOR PART A.

WHERE

AVERAGE PRICE FOR PART B

ARITHMETICAL AVERAGE OF THE DAILY REFERENCE QUOTATIONS FOR EACH BANKING DAY IN NEW YORK OF THE SUB-PERIODS NOT YET SETTLED OR PAID FOR. THE DAILY REFERENCE QUOTATIONS USED FOR EACH SUCH BANKING DAY IN NEW YORK IS THAT QUOTATION REFERRED TO IN PART B ABOVE PUBLISHED FOR SAID DAY, OR, IF NOT YET PUBLISHED, THE LAST SAID PUBLISHED QUOTATION.

SCHEDULE 3

ELF FORWARDS A TELEX AND AN INVOICE TO THE COUNTERPARTY IMPLEMENTING THE TERMINATION OF THIS EXCHANGE CONTRACT AND SETTING FORTH THE AMOUNT DUE TO THE CREDITOR BY THE DEBTOR, SAID AMOUNT BEING CALCULATED AS FOLLOWS:

1. ALL SUB-PERIODICAL QUANTITIES FOR WHICH PAYMENT HAS BEEN MADE IN ACCORDANCE WITH THE PROVISIONS OF THIS EXCHANGE CONTRACT SHALL BE CONSIDERED SETTLED AND CLOSED.
2. THE AMOUNT DUE FOR PAYMENT BY THE DEBTOR TO THE CREDITOR FOR ALL REMAINING SUB-PERIODICAL QUANTITIES SHALL BE EQUAL TO THE POTENTIAL MARGIN CALCULATED IN ACCORDANCE WITH THE PROVISIONS OF SCHEDULE 2 HEREINABOVE APPLIED TO THE DATE OF THE BANKING DAY IN NEW YORK FOLLOWING THE DATE OF SAID TERMINATION TELEX. THE SAID TERMINATION TELEX TO BE FOLLOWED BY AN INVOICE TO BE ISSUED BY ELF ON THE NEXT BANKING DAY IN NEW YORK AND TO BE PAID IN ACCORDANCE WITH THE PAYMENT PROVISIONS OF THIS EXCHANGE CONTRACT.

SCHEDULE 4

PROFORMAT PERFORMANCE BOND

FOR THE ATTENTION OF:

ELF TRADING S.A.
WORLD TRADE CENTER
CASE POSTALE 532
10, ROUTE DE L'AEROPORT
CH - 1215 GENEVE 15

DEAR SIRs,

YOU HAVE CONCLUDED ON WITH (NAME OF COUNTERPARTY) AN EXCHANGE CONTRACT REFERENCE NUMBER AS SECURITY FOR THE PAY-

MENT OF ANY SUMS DUE TO YOU UNDER SAID EXCHANGE CONTRACT A GUARANTEE BY A FINANCIAL INSTITUTION SHALL BE FURNISHED.

THEREFORE AT THE REQUEST (NAME OF COUNTERPARTY) WE, (NAME OF FINANCIAL INSTITUTION), HEREWITH IRREVOCABLY UNDERTAKE TO PAY YOU ON FIRST DEMAND, IRRESPECTIVE OF THE VALIDITY AND THE EFFECTS OF THE ABOVE MENTIONNED CONTRACT AND WAIVING ALL RIGHTS OF OBJECTION AND DEFENSE ARISING FROM SAID CONTRACT, ANY AMOUNT UP TO UNITED STATES DOLLARS UPON RECEIPT OF YOUR WRITTEN AND DULY SIGNED REQUEST FOR PAYMENT AND YOUR CONFIRMATION THAT (NAME OF COUNTERPARTY) HAS FAILED TO MAKE DUE PAYMENT TO YOU UNDER THE SAID CONTRACT, COPY OF UNPAID INVOICE(S) TO BE ATTACHED TO SAID REQUEST.

THIS GUARANTY IS VALID UNTIL AND IS GOVERNED BY THE LAWS OF ENGLAND, PLACE OF JURISDICTION BEING THE HIGH COURT SITTING IN LONDON.

(SIGNATURE OF FINANCIAL INSTITUTION)

PLEASE CONFIRM BY RETURN TELEX TO BE RECEIVED BY US BEFORE 15:00 HOURS (GENEVA TIME) ON THE FIRST BANKING DAY IN NEW YORK IMMEDIATELY FOLLOWING THE DATE OF THIS TELEX. ADDITIONAL TERMS OR TERMS DIFFERENT FROM THOSE SET FORTH HEREIN SHALL BE CONSTRUED AS PROPOSALS FOR ADDITIONS TO THIS EXCHANGE CONTRACT AND SHALL NOT BECOME PART OF THIS EXCHANGE CONTRACT UNLESS EXPRESSLY AGREED UPON BY SUPPLEMENTAL TELEX.

BEST REGARDS
ELF TRADING SA

OTC OPTIONS CONTRACTS - I

CONTRACT NO : GAC

FURTHER TO OUR AGREEMENT REACHED ON
....., 19.. ELF TRADING SA OF 10 ROUTE DE
L'AEROPORT CH - 1215 GENEVA 15, SWITZERLAND
(HEREINAFTER REFERRED TO AS "ELF") IS HEREBY
CONFIRMING THE ISSUE IN FAVOUR OF
.....(NAME)..... OF

.....(ADDRESS).....

..... (HEREINAFTER REFERRED TO AS THE
"COUNTERPARTY") WHICH ACCEPTS IT, A NO-
TIONAL PRODUCT CALL OPTION (HEREINAFTER
REFERRED TO AS THIS "CALL OPTION") THAT IS
TO SAY THE RIGHT FOR THE COUNTERPARTY TO
BUY FROM ELF A SPECIFIC QUANTITY OF A NO-
TIONAL PRODUCT OVER A SPECIFIC PERIOD AT A
FIXED PRICE WITHOUT PHYSICAL DELIVERY TAK-
ING PLACE BUT WITH A CASH SETTLEMENT. THIS
CALL OPTION IS MADE UP AS FOLLOWS :

1. NOTIONAL PRODUCT

THE NOTIONAL PRODUCT, THE OBJECT OF THIS
CALL OPTION, IS
..... (HEREINAFTER CALLED THE
"PRODUCT")

2. PERIOD

2.1 GLOBAL PERIOD

THIS CALL OPTION COMES INTO EFFECT AT THE
DATE OF THIS TELEX AND SHALL COVER THE
PERIOD (BOTH DATES INCLUSIVE)

STARTING ON :, 19..

AND TERMINATING ON:, 19..

SUCH PERIOD IS HEREINAFTER REFERRED TO AS
THE "GLOBAL PERIOD".

2.2 SUB-PERIODS

THE GLOBAL PERIOD INCLUDES THE FOLLOWING
MONTHLY SUB-PERIODS:

- 1ST SUB-PERIOD (BOTH DATES INCLUSIVE)

STARTING ON :, 19..

AND TERMINATING ON :, 19..

- 2ND SUB-PERIOD (BOTH DATES INCLUSIVE)

STARTING ON :, 19..

AND TERMINATING ON :, 19..

- LAST SUB-PERIOD (BOTH DATES INCLUSIVE)

STARTING ON :, 19..

AND TERMINATING ON :, 19..

EACH SAID SUB-PERIOD IS HEREINAFTER RE-
FERRED TO AS A "SUB-PERIOD" AND WHEN MORE
THAN ONE THE "SUB-PERIODS".

3. QUANTITY

3.1 THE GLOBAL QUANTITY

THE QUANTITY (HEREINAFTER REFERRED TO AS
THE "GLOBAL QUANTITY") COVERED BY THIS CALL
OPTION DURING THE GLOBAL PERIOD IS
..... METRIC TONS OF PRODUCT.

3.2 SUB-PERIODICAL QUANTITY

THE QUANTITIES (EACH HEREINAFTER REFERRED
TO AS A "SUB-PERIODICAL QUANTITY" AND TO-
GETHER AS THE "SUB-PERIODICAL QUANTITIES")
COVERED BY THIS CALL OPTION DURING EACH
SUB-PERIOD OF THIS CALL OPTION ARE AS FOL-
LWS :

- FIRST SUB-PERIODMETRIC TONS OF
PRODUCT

- LAST SUB PERIOD METRIC TONS OF
PRODUCT

4. STRIKE PRICE

FOR THE PURPOSES OF THIS CALL-OPTION EACH
SUB-PERIODICAL QUANTITY IS ALLOCATED A PRICE

(HEREINAFTER REFERRED TO AS THE "STRIKE PRICE") OF UNITED STATES DOLLARSPER METRIC TON FIXED AND FLAT.

5. SETTLEMENT

5.1 QUOTED PRICE

SUBJECT TO THE PROVISIONS OF SCHEDULE 1 HERETO AND MADE A PART HEREOF, FOR THE PURPOSES OF THIS CALL OPTION EACH SUB-PERIODICAL QUANTITY IS ALLOCATED A FURTHER PRICE PER METRIC TON (HEREINAFTER REFERRED TO AS THE "QUOTED PRICE") EQUAL TO THE ARITHMETIC AVERAGE OF THE OF EACH DAILY QUOTATION EFFECTIVELY PUBLISHED IN PLATT'S/..... FOR DURING THE SUB-PERIOD CORRESPONDING TO THE SAID SUB-PERIODICAL QUANTITY.

5.2 SETTLEMENT AMOUNT

FOR EACH COMPLETED SUB-PERIOD THE STRIKE PRICE SHALL BE COMPARED TO THE QUOTED PRICE. IF THE QUOTED PRICE IS GREATER THAN THE STRIKE PRICE SUCH POSITIVE DIFFERENCE EXPRESSED IN US DOLLARS PER METRIC TON SHALL BE MULTIPLIED BY THE SUB-PERIODICAL QUANTITY CORRESPONDING TO SAID SUB-PERIOD AND THE RESULTING AMOUNT (HEREINAFTER REFERRED TO AS THE "SETTLEMENT AMOUNT") SHALL BE PAID BY ELF TO THE COUNTERPARTY. IF THE QUOTED PRICE IS LOWER THAN OR EQUAL TO THE STRIKE PRICE, THEN THE SETTLEMENT AMOUNT SHALL BE ZERO AND NO PAYMENT SHALL BE EFFECTED AND DUE.

6. PREMIUM

IN CONSIDERATION OF BEING GRANTED THIS CALL OPTION THE COUNTERPARTY SHALL PAY TO ELF AN AMOUNT (HEREINAFTER REFERRED TO AS THE "PREMIUM") EQUAL TO US DOLLARS PER METRIC TON OF PRODUCT MULTIPLIED BY THE GLOBAL QUANTITY THAT IS AN AGREGATE AMOUNT OF US DOLLARS

7. INVOICE, PAYMENT, AND STATEMENT

7.1 PREMIUM INVOICE AND PAYMENT

THIS TELEX CONSTITUTES AN INVOICE OF THE PREMIUM TO BE PAID BY COUNTERPARTY TO ELF WITHIN TWO BANKING DAYS IN NEW YORK AFTER THE DATE OF THIS TELEX. IF COUNTERPARTY FAILS TO MAKE SUCH PAYMENT ELF SHALL FORTHWITH BE RELEASED OF ALL OBLIGATIONS HEREUNDER SAID RELEASE BEING WITHOUT PREJUDICE TO ANY OTHER RIGHTS OF ELF ARISING OUT OF SAID FAILURE.

7.2 SETTLEMENT AMOUNT STATEMENT AND PAYMENT

WITHIN THREE BANKING DAYS IN NEW YORK FOLLOWING THE END OF EACH SUB-PERIOD ELF SHALL FORWARD TO THE COUNTERPARTY A TELEX STATEMENT SETTING FORTH THE VALUE OF THE CORRESPONDING SETTLEMENT AMOUNT AND THE RELEVANT CALCULATION IN REASONABLE DETAILS. SAID SETTLEMENT AMOUNT SHALL, IF GREATER THAN ZERO, BE PAID BY ELF TO THE COUNTERPARTY WITHIN FIVE BANKING DAYS IN NEW YORK FOLLOWING THE END OF THE SAID SUB-PERIOD.

7.3 DELAYS

ANY DELAYS BY A PARTY IN EFFECTING ANY PAYMENT BY ITS DUE DATE SHALL ENTITLE THE OTHER PARTY TO RECEIVE PAYMENT OF INTEREST FOR EACH DAY OF DELAY CALCULATED AT LIBOR (LONDON INTER BANK OFFERED RATE) FOR CALL MONEY IN EFFECT ON SUCH DUE DATE PLUS TWO (2) PERCENTAGE POINTS PER ANNUM, SUCH INTEREST BEING IN ADDITION TO ANY OTHER RIGHTS OF THE PARTY NOT DULY PAID ARISING OUT OF SUCH DELAY, AND IS NO CIRCUMSTANCES TO BE CONSIDERED AS AN AGREEMENT BY THE PARTY NOT DULY PAID TO PROVIDE EXTENDED CREDIT.

7.4 FULL SETTLEMENT

IN ANY EVENT BEFORE THE FIFTH BANKING DAY IN NEW YORK FOLLOWING THE LAST DAY OF THE

GLOBAL PERIOD. THE ACCOUNT BETWEEN THE PARTIES MUST BE SETTLED.

7.5 BANK ACCOUNTS

FOR THE PURPOSES OF THIS CALL OPTION, ELF NOMINATES THE FOLLOWING BANK ACCOUNT WHERE PAYMENT HEREUNDER SHALL BE MADE : THE COUNTERPARTY SHALL NOMINATE BY TELEX TO ELF ITS BANK ACCOUNT FOR SAID PURPOSES WITHIN ONE BANKING DAY IN NEW YORK FOLLOWING THE DATE OF THIS TELEX.

7.6 U.S. DOLLARS

EACH PAYMENT HEREUNDER SHALL BE MADE WITHOUT DISCOUNT, DEDUCTION, SET OFF OR COUNTERCLAIM IN UNITED STATES DOLLARS BY TELEGRAPHIC TRANSFER OF IMMEDIATELY AVAILABLE FUNDS ("SAME DAY FUNDS") ON OR BEFORE THE DUE DATE FOR PAYMENT.

8. MISCELLANEOUS

8.1 TIME

TIME IS OF THE ESSENCE AND ANY REFERENCE TO TIME HEREUNDER SHALL BE, UNLESS OTHERWISE EXPRESSLY STATED, A REFERENCE TO THE EFFECTIVE TIME IN NEW YORK.

8.2 REPRESENTATIONS

EACH PARTY HERETO HEREBY REPRESENTS TO THE OTHER THAT IT IS ENTITLED TO ENTER INTO AND FULLFIL THIS CALL OPTION, THAT IT IS LAWFULLY DOING SO, THAT IT IS NOT AND WILL NOT BE REQUIRED TO DEDUCT FOR TAX PURPOSES OR OTHERWISE ANY SUM FROM ANY PAYMENT TO BE MADE BY IT HEREUNDER AND IF SO THAT IT WILL FULLY COMPENSATE THE OTHER, AND THAT IT WILL BE IN A POSITION TO MAKE ALL PAYMENTS HEREUNDER IN ACCORDANCE WITH THE PROVISIONS OF SECTION 7. ABOVE.

8.3 GOVERNING LAW

THIS CALL OPTION SHALL BE CONSTRUED IN ACCORDANCE WITH THE LAWS OF ENGLAND WITHOUT REFERENCE TO THE CONFLICT OF LAW RULES.

ANY DISPUTE ARISING HERUNDER SHALL BE REFERRED TO THE NON-EXCLUSIVE JURISDICTION OF THE HIGH COURT SITTING IN LONDON AND THE PARTIES EXPRESSLY AGREE TO SERVICE OF PROCESS BY REGISTERED MAIL.

SCHEDULE 1

LACK OF QUOTATION

- I IF FOR ONE BANKING DAY IN NEW YORK OR MORE BANKING DAYS IN NEW YORK (BUT IN THE LIMIT OF FIVE SUCCESSIVE BANKING DAYS IN NEW YORK) OF A SUB-PERIOD, THE DAILY QUOTATION REFERRED TO IN SUB-SECTION 5.1 OF THIS CALL OPTION, IS NOT PUBLISHED BY PLATT'S, THIS BANKING DAY IN NEW YORK OR THESE BANKING DAYS IN NEW YORK (AS THE CASE MAY BE) SHALL BE EXCLUDED FOR THE PURPOSES OF THE CALCULATION OF THE QUOTED PRICE FOR THE SAID SUB-PERIOD.
- II IF FOR MORE THAN FIVE SUCCESSIVE BANKING DAYS IN NEW YORK OF A SUB-PERIOD, THE DAILY QUOTATION REFERRED TO IN SUB-SECTION 5.1 OF THIS CALL OPTION IS NOT PUBLISHED BY PLATT'S, BOTH PARTIES WILL ENDEAVOUR TO AGREE ON A NEW WAY TO CALCULATE THE QUOTED PRICE FOR SAID SUB-PERIOD AND SUBSEQUENT SUB-PERIODS (IF ANY). IF SUCH AGREEMENT IS REACHED A FORMAL TELEX ADDENDUM TO THIS CALL OPTION SHALL BE MADE AND APPLIED TO SAID SUB-PERIOD AND SUBSEQUENT SUB-PERIODS (IF ANY). IF SUCH AGREEMENT IS NOT REACHED WITHIN TWO BANKING DAYS IN NEW YORK AFTER THE LAST OF THE SAID FIVE SUCCESSIVE BANKING DAYS IN NEW YORK, WHERE PLATT'S SAID DAILY QUOTATION WAS NOT PUBLISHED, THEN THIS CALL OPTION SHALL AUTOMATICALLY COME TO AN END UPON THE IMPLEMENTATION OF THE PROVISIONS SET FORTH IN THE FOLLOWING SUB-PARAGRAPHS OF THIS CLAUSE II:
 - II A ALL SUB-PERIODS THEN COMPLETED, IF ANY, MUST BE SETTLED AND CLOSED IN ACCORDANCE WITH THE RELEVANT PROVISIONS OF

ARTICLES 5 AND 7 OF THIS CALL OPTION.

II B THE SUM OF THE QUANTITIES COVERING THE REMAINING SUB-PERIODS SHALL BE DIVIDED BY THE NUMBER OF BANKING DAYS IN NEW YORK DURING THE CORRESPONDING SUB-PERIODS, THE RESULT BEING HEREINAFTER REFERRED TO AS A "DAILY QUANTITY" AND EACH BANKING DAY IN NEW YORK, OF THE REMAINING SUB-PERIODS BEING ALLOCATED A DAILY QUANTITY.

II C EACH DAILY QUANTITY SHALL BE PLACED IN ONE OF TWO GROUPS :

GROUP 1, IF ANY, BEING THE DAILY QUANTITIES COVERING THE PERIOD STARTING ON THE FIRST DAY OF THE FIRST REMAINING SUB-PERIOD AND TERMINATING ON THE LAST DAY PRIOR TO THE SAID FIVE SUCCESSIVE BANKING DAYS IN NEW YORK WHEN THE DAILY QUOTATIONS WERE NOT PUBLISHED (BOTH THE FIRST DAY AND THE LAST DAY INCLUSIVE) AND GROUP 2 BEING THE RESIDUAL DAILY QUANTITIES.

II D DAILY QUANTITIES GROUP 1 SHALL BE SETTLED AND CLOSED IN ACCORDANCE WITH THE PROVISIONS OF ARTICLES 5 AND 7 OF THIS CALL OPTION SAVE THAT THE DAILY QUOTATION PUBLISHED BY PLATT'S ON THE BANKING DAY IN NEW YORK CORRESPONDING TO A DAILY QUANTITY SHALL BE USED TO CALCULATE THE QUOTED PRICE OF THAT DAILY QUANTITY.

II E DAILY QUANTITIES GROUP 2 SHALL BE SETTLED AND CLOSED IN ACCORDANCE WITH THE PROVISION OF ARTICLES 5 AND 7 OF THIS CALL OPTION SAVE THAT THE ARITHMETIC AVER-

AGE OF THE LAST FIVE SAID DAILY QUOTATIONS PUBLISHED BY PLATT'S IMMEDIATELY PRIOR TO THE SAID SUCCESSIVE FIVE BANKING DAYS IN NEW YORK WHEN SAID DAILY QUOTATIONS WERE NOT PUBLISHED SHALL BE USED TO CALCULATE THE QUOTED PRICE OF THOSE DAILY QUANTITIES.

II F FOR DAILY QUANTITIES GROUP 1 AND GROUP 2 ELF TO PREPARE A STATEMENT TO BE FORWARDED BY TELEX TO COUNTERPARTY SETTING FORTH THE RESULTING SETTLEMENT AMOUNT AND THE RELEVANT CALCULATIONS IN REASONABLE DETAILS. SAID TELEX STATEMENT TO BE FORWARDED WITHIN THREE BANKING DAYS IN NEW YORK FOLLOWING SAID SUCCESSIVE FIVE BANKING DAYS IN NEW YORK WHEN SAID DAILY QUOTATIONS WERE NOT PUBLISHED AND TO BE PAID, IF GREATER THAN ZERO, BY ELF TO COUNTERPARTY WITHIN FIVE BANKING DAYS IN NEW YORK THEREAFTER IN ACCORDANCE WITH SUB-SECTIONS 7.5 AND 7.6 OF THE CALL OPTION.

PLEASE CONFIRM THE FOREGOING BY RETURN TELEX TO BE RECEIVED BY US BEFORE 15:00 HOURS (GENEVA EFFECTIVE TIME) ON THE FIRST BANKING DAY IN NEW YORK IMMEDIATELY FOLLOWING THE DATE OF THIS TELEX. ADDITIONAL TERMS OR TERMS DIFFERENT FROM THOSE SET FORTH HEREIN SHALL BE CONSTRUED AS PROPOSALS FOR ADDITIONS TO THIS CALL OPTION AND SHALL NOT BECOME PART OF THIS CALL OPTION UNLESS EXPRESSLY AGREED UPON BY SUPPLEMENTAL TELEX.

BEST REGARDS
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