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J&L RAILROAD

It was Saturday, April 25, 2009, and Jeannine Matthews, chief financial officer at J&L Railroad (J&L), was in the middle of preparing her presentation for the upcoming board of directors meeting on Tuesday. Matthews was responsible for developing alternative strategies to hedge the company's exposure to locomotive diesel-fuel prices for the next 12 months. In addition to enumerating the pros and cons of alternative hedging strategies, the board had asked for her recommendation for which strategy to follow.

Fuel prices had always played a significant role in J&L's profits, but management had not considered the risk important enough to merit action. During February as the board reviewed the details of the company's performance for 2008, they discovered that, despite an increase of $154 million in rail revenues, operating margin had shrunk by $114 million, largely due to an increase in fuel costs (**Exhibits 1** and **2**). Having operating profit fall by 11% in 2008 after it had risen 9% in 2007 was considered unacceptable by the board, and it did not want a repeat in 2009.

Recently in a conversation with Matthews, the chairman of the board had expressed his personal view of the problem:

> Our business is running a railroad, not predicting the strength of an oil cartel or whether one Middle East nation will invade another. We might have been lucky in the past, but we cannot continue to subject our shareholders to unnecessary risk. After all, if our shareholders want to speculate on diesel fuel prices, they can do that on their own; but I believe fuel-price risk should *not* be present in our stock price. On the other hand, if the recession continues and prices drop further, we could increase our profit margins by not hedging.

Diesel-fuel prices had peaked in early July 2008 but then had trended downward as a result of the worldwide recession and softening demand. By January 2009, diesel-fuel prices had fallen to their lowest level since early 2005. At February's meeting, the board had decided to wait and see how the energy markets would continue to react to the recession and softening

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demand. By March, however, oil and diesel-fuel prices had begun to rebound, so the board charged Matthews with the task of proposing a hedging policy at the meeting on April 28.

It was industry practice for railroads to enter into long-term contracts with their freight customers, which had both good and bad effects. On the positive side, railroads could better predict available resources by locking in revenues in advance. On the negative side, fixed-price contracts limited railroads' profit margins and exposed them to potentially large profit swings if any of their costs changed. In this regard, diesel fuel was a particularly troublesome cost for railroads, because it represented a large cost item that also was difficult to predict due to the volatility of fuel prices.

An ideal solution to the fuel-price risk would be for railroads to enter into long-term fixed-price contracts with their fuel suppliers. A fixed-price contract with suppliers when combined with the fixed-price contracts with freight customers would serve to steady future profits. Moreover, by contracting with fuel suppliers to deliver all of J&L's fuel needs at a fixed price, management could be assured of meeting its fuel budget numbers at year's end. At times, fuel suppliers had agreed to such contracts, but over the years, J&L had not been satisfied with the results. The problem was that when fuel prices had risen substantially, many suppliers walked away from their commitments leaving J&L with a list of three unattractive options:

1. *Force compliance*: J&L could take the supplier to court to enforce the contract; however, many suppliers were thinly capitalized, which meant that the legal action against them could put them into bankruptcy. As a result, J&L might get little or nothing from the supplier and yet would be saddled with significant legal fees.
2. *Negotiate a new price*: This usually meant that J&L would agree to pay at or near the current market price, which was equivalent to ignoring the original contract; plus it set a bad precedent for future contracts.
3. *Walk away and buy the fuel on the open market from another supplier*: This choice avoided "rewarding" the supplier for defaulting on its contract but was functionally equivalent to never having the contract in the first place.

Based on this history, J&L's board decided to "assume the fuel suppliers are not the answer to our fuel price problem." The board then asked Matthews to explore other alternatives to manage the fuel risk and preserve J&L's relationships with the fuel suppliers.

Mathews had determined that, if J&L were to hedge, it could choose between two basic strategies. The first was to do the hedging in-house by trading futures and options contracts on a public exchange. This presented a number of tradeoffs, including the challenge of learning how to trade correctly. The second was to use a bank's risk management products and services. This would cost more but would be easier to implement. For either alternative, she would need to address a number of important details, including how much fuel to hedge and how much risk should be eliminated with the hedge.

Railroad Industry

Railroads hauled record amounts of freight in 2006 and 2007 and began to encounter capacity constraints. In 2008, the industry hauled nearly 2-billion tons of freight, although rail traffic declined due to weakness in the economy. The transportation of coal was by far the number one commodity group carried. Other significant commodity groups were chemicals, farm products, food, metallic ores, nonmetallic minerals, and lumber, pulp, and paper products.

Freight and unit trains had expanded the industry since deregulation in the 1980s. Rail carriers served as long-distance haulers of *intermodal* freight, carrying the freight containers for steamship lines, or trailers for the trucking industry. *Unit* train loads were used to move large amounts of a single commodity (typically 50 or more cars) between two points using more efficient locomotives. A unit train would be used, for example, to move coal between a coal mine and an electric generating plant.

Several factors determined a railroad's profitability: government regulation, oligopolistic competition within the industry, and long-term contracts with shippers and suppliers. The railroad industry had a long history of price regulation; the government had feared the monopolistic pricing that had driven the industry to the brink of ruin in the 1970s. Finally recognizing the intense competition among most rail traffic, Congress passed the Staggers Rail Act of 1980, allowing railroads to manage their own assets, to price services based on market demand, and earn adequate revenues to support their operations. America's freight railroads paid almost all of the costs of tracks, bridges, and tunnels themselves. In comparison, trucks and barges used highways and waterways provided and maintained by the government.

After the Staggers Act was passed, railroad fuel efficiency rose 94%. By 2009, a freight train could move a ton of freight 436 miles on a single gallon of locomotive diesel fuel, approximately four times as far as it could by truck. The industry had spent considerable money on the innovative technology that improved the power and efficiency of locomotives and produced lighter train cars. Now, a long freight train could carry the same load as 280 trucks while at the same time producing only one-third the greenhouse-gas emissions.[1]

Market share was frequently won or lost solely on the basis of the price charged by competing railroads. Although rarely more than two or three railroads competed for a particular client's business, price competition was often fierce enough to prohibit railroads from increasing freight prices because of fuel-price increases. But, as fuel prices during 2008 climbed higher and faster than they had ever done before, there was some discussion in the railroad industry regarding the imposition of fuel surcharges when contracts came up for renewal. So far, however, none of the major carriers had followed up the talk with action.

[1] Association of American Railroads, http://www.freightrailworks.org.

J&L Railroad

J&L Railroad was founded in 1928 when the Jackson and Lawrence rail lines combined to form one of the largest railroads in the country. Considered a Class I railroad, J&L operated approximately 2,500 miles of line throughout the West and the Midwest. Although publicly owned, J&L was one of the few Class I railroads still managed by the original founding families. In fact, two of the family members still occupied seats on its board of directors. During the periods 1983–89, 1996–99, and 2004–08, J&L had invested significant amounts of capital into replacing equipment and refurbishing roadways. These capital expenditures had been funded either through internally generated funds or through long-term debt. The investment in more efficient locomotives was now paying off, despite the burden of the principal and interest payments.

J&L had one of the most extensive intermodal networks, accounting for approximately 20% of revenues during the last few years, as compared to the Class I industry average of 10%. Transportation of coal, however, had accounted for only 25% to 30% of freight revenues. With the projected increase in demand for coal from emerging economies in Asia, management had committed to increase revenues from coal to 35% within three years. That commitment was now subject to revision due to slowing global economic activity and the recent fall in energy prices.

Exchange-Traded Contracts

J&L's exposure to fuel prices during the next 12 months would be substantial. Matthews estimated that the company would need approximately 17.5 million gallons of diesel fuel per month or 210 million gallons for the coming year. This exposure could be offset with the use of heating oil futures and option contracts that were traded on the New York Mercantile Exchange (NYMEX) (**Exhibits 3** and **4**). NYMEX did not trade contracts on diesel fuel, so it was not possible to hedge diesel fuel directly. Heating oil and diesel fuel, however, were both distillates of crude oil with very similar chemical profiles and highly correlated market prices (**Exhibit 5**). Thus, heating-oil futures were considered an excellent hedging instrument for diesel fuel.

Futures allowed market participants to contract to buy or sell a commodity at a future date at a predetermined price. If market participants did not want to buy a commodity today based on its *spot price*, the current market price, they could use the futures market to contract to buy it at a future date at the futures price. A futures price reflected the market's forecast of what the spot price was expected to be at the contract's maturity date. Many factors influenced the spot price and futures prices, both of which changed constantly depending on the market news. With current market conditions, the futures market was expecting price to trend up from the spot of $1.36 to an average of $1.52 over the next 12 months.

A trader who wanted to buy a commodity would take a "long" position in the contract, whereas a seller would take a "short" position. Because J&L's profits fell when fuel prices increased, the company could offset its exposure by taking long positions in heating-oil futures.

For example, instead of waiting two months to buy fuel on the open market at the going price, J&L could enter into the July futures contract on April 25 to buy heating oil at $ 1.4138/gallon (**Exhibit 3**). Therefore, when the contract matured in two months,[2] J&L could buy heating oil at exactly $1.4138/gallon regardless of the price of heating oil at the time. This could work for or against J&L depending on whether prices rose or fell during the two months. For example, if at maturity of the contract, heating oil was selling at $1.4638, J&L would have benefited by $.05/gallon by owning the futures. If heating oil was selling for $1.3638 at maturity, J&L would have lost $.05/gallon on the futures. In either case, however, J&L would pay exactly $1.4138 per gallon and would face no uncertainty about the net price paid after entering into the July futures contract.

Fuel producers or distributors who wanted to fix their selling price would take a short position in the fuel futures. Alternatively, the seller might be a speculator who believed that the spot price of fuel at maturity would end up being lower than the current futures price. In either case, futures was a zero-sum game because one party's gain exactly equals the other party's loss. As long as the futures price was an unbiased estimate of the future spot price, the *expected* payoff at maturity was zero for both the long and short side of the contract. Thus, although the buyer and seller were required to pay a modest fee to the exchange to enter a futures contract, no money was exchanged between buyers and sellers at the outset. If the futures price increased over time, the buyer would collect, and if the futures price decreased, the seller would collect. When the contract matured, it was rare for the buyer to request physical delivery of the commodity, rather the vast majority of contracted futures were cash settled.

NYMEX futures created a few problems for J&L management. First, because J&L would have to use heating-oil contracts to hedge its diesel-fuel exposure, there would be a small amount of risk created by the imperfect match of the prices of the two commodities. This "basis," however, was minimal owing to the high correlation historically between the two price series. Of greater concern was that NYMEX contracts were standardized with respect to size and maturity dates. Each heating-oil futures contract was for the delivery of 42,000 gallons and matured on the last business day of the preceding month. Thus, J&L faced a maturity mismatch because the hedge would only work if the number of gallons being hedged was purchased specifically on the day the futures contract matured. In addition, J&L faced a size mismatch because the number of gallons needed in any month was unlikely to equal an exact multiple of 42,000 gallons.

Some institutional features of NYMEX futures contracts had to be considered as well. NYMEX futures were "marked to market" daily, which meant that every investor's position was settled daily, regardless of whether the position was closed or kept open. Daily marking-to-market limited the credit risk of the transaction to a single day's movement of prices. To further reduce the credit risk, the exchange required margin payments as collateral. When a contract was initially opened, both parties were required to post an initial margin equal to approximately 5% or less of the contract value. At the end of each trading day, moneys were added or subtracted from the margin account as the futures trader's position increased or decreased in value. If the

[2] NYMEX futures expired on the last trading day of the previous month; therefore, the July futures matured on June 30, 2009.

value of the position declined below a specified maintenance level, the trader would be required to replenish the margin to its initial margin level. Thus, the combination of daily marking-to-market and the use of margins effectively eliminated any credit risk for exchange-traded futures contracts. Still, the daily settlement process created a cash-flow risk because J&L might have to make cash payments well in advance of the maturity of a contract.

In addition to futures contracts, it was possible to buy NYMEX options on the futures. A call option gave the buyer the right, but not the obligation, to go long on the underlying commodity futures at a given price (the strike price) on or before the expiration date. A *put* option gave the buyer the right to go short on the futures at the strike price. The typical futures option expired a few days prior to the expiration of the underlying futures contract to give the counterparties time to offset their positions on the futures exchange. Options were offered at a variety of strike prices and maturities (**Exhibit 4**). Unlike the underlying futures contract, puts and calls commanded a market price called the *premium*. A call premium increased as the spread of the futures price over the strike price increased, whereas a put premium increased as the spread of the strike price over the futures price increased. The premiums of both puts and calls were higher for options with more time to maturity. Thus, unlike the futures, option buyers had to pay the premium to buy the contract in addition to both buyer and seller paying a fee for the transaction.

The Risk-Management Group at Kansas City National Bank

Walt Bernard, vice president of the risk management group of Kansas City National Bank, (KCNB) had recently given a presentation to J&L senior management in which he described the wide range of risk-management products and techniques available to protect J&L's profit margin. Each technique used a particular financial product to hedge by various degrees J&L's exposure to diesel-fuel price changes. The products offered by KCNB were completely financial in design (i.e., no actual delivery of the commodity took place at maturity). To hedge diesel fuel, KCNB offered No. 2 heating-oil contracts, the same commodity traded on the NYMEX. Also similar to trading on the NYMEX, working with KCNB meant that J&L could continue to do business as usual with its suppliers and perform its hedging activities independently.

The primary risk-management products offered by KCNB were commodity swaps, caps, floors, and collars (see **Exhibit 6** for cap and floor quotes). KCNB's instruments were designed to hedge the *average* price of heating oil during the contract period. By contrast, NYMEX futures and options were contracts designed against the spot price in effect on the last day of the contract. In a commodity swap, the bank agreed to pay on the settlement date if the average price of heating oil was above the agreed-upon swap price for the year. Conversely, J&L would have to pay the bank if the average price was below the contracted swap price. Thus, a swap was essentially a custom-fit futures contract, with KCNB rather than NYMEX carrying the credit risk. Because the swap was priced on the average heating-oil price, settlement occurred at the end of the swap (12 months in J&L's case) rather than daily as with NYMEX futures. In

addition, KCNB would not require J&L to post a margin but would charge a nominal up-front fee as compensation for accepting J&L's credit risk. KCNB was currently quoting the 12-month swap price for heating oil as $1.522/gallon.

KCNB also offered commodity options, referred to as caps, floors, and collars. A *cap* was essentially a call option; a *floor* was a put option; and a *collar* was the combination of a cap and a floor. For a cap, KCNB agreed to pay the excess of the realized average fuel price over the cap's "strike price." If the average fuel price never reached the strike price, KCNB would pay nothing. As for any option, J&L would need to pay KCNB a premium for the cap. The cap premium varied according to how far the strike price was above the expected price. If the strike was close to the expected price implied by the futures contracts, J&L would have to pay a relatively high premium. If J&L was willing to accept some risk by contracting for a strike price that was significantly higher than the expected average price, the premium would be smaller. In any case, the cap would allow J&L to take advantage of price decreases and yet still be protected from price increases above the cap's strike price.

A commodity collar was used to limit the movement of prices within the range of the cap and floor strike prices. By choosing a collar, J&L would be selling a floor while simultaneously buying a cap. KCNB agreed to pay the excess, if any, of the average heating-oil price over the cap strike price. Conversely, J&L would have to pay if the average price fell below the floor strike price. Collars could be designed to have a minimal up-front cost by setting the cap and floor strike prices so that the revenue derived from selling the floor exactly offset the premium for buying the cap. If J&L management wanted to guard against prices rising above a certain price (the cap's strike price) but were willing to give up the benefit of prices falling below a certain level (the floor's strike price), a collar could be the logical choice.

Matthews's Choice

Jeannine Matthews had decided to recommend that J&L hedge its fuel costs for the next 12 months, at least to some extent. Her analysis revealed that despite using more efficient equipment, the cost of fuel as a percentage of revenues had increased every year since 2001 (**Exhibit 7**). The immediate questions to be answered were: How much fuel should be hedged, and how should the hedge be structured?

Bernard had presented Matthews with a myriad of possibilities, each of which provided some degree of profit protection. A commodity swap, for example, could be used to completely fix the price of fuel for the next year. If the price of diesel fuel ended up falling below the swap price, however, the hedge would be more of an embarrassment than a benefit to Matthews. Defending a newly initiated hedging policy would be difficult if J&L's profits lagged those of other railroads because of a failure to capture lower fuel costs.

Then there was the issue of how much fuel to hedge. If the economy experienced a slowdown, J&L would experience a drop in rail loads, which would result in using less than the

210 million gallons currently expected. If the hedge was constructed based on more fuel than needed, it was conceivable that J&L could end up paying to settle its position with the bank for fuel that it could not use. At the same time, it was also possible that the economy would pick up, and J&L would end up having to buy a significant amount of fuel on the open market without the benefit of a hedge.

Instead of a swap, Matthews could use a cap to eliminate the risk of high fuel prices. This would seem to alleviate the problem of over- or under-hedging because the cap would only be exercised if it was profitable (i.e., if prices rose beyond the cap's strike price). At that point, J&L would prefer to have been over-hedged because the company would get a higher payoff from the cap. The biggest concern about the cap strategy was that the price of heating oil might not rise high enough to trigger the cap, in which case the premium paid for the cap would have only served to reduce profits with no offsetting benefits. Another alternative was to enter into a collar, which could be structured to have a zero cost; however, a collar carried a hidden cost because it gave up the savings if fuel prices happened to fall below the floor's strike price.

Matthews knew that it was important for her to keep in mind that all of KCNB's product could be mimicked using NYMEX futures and options. In fact, maybe there was a creative way to combine NYMEX securities to give J&L a better hedge than provided by KCNB's products. Regardless of what she recommended, Matthews realized that she needed to devise a hedging strategy that would give J&L the maximum benefit at the lowest cost and would not prove to be an embarrassment for her or J&L.

Exhibit 1

J&L RAILROAD

Consolidated Income Statement, 2006–08 (in millions of dollars)
December 31

	2008	2007	2006
Revenues by market group:			
Coal	$1,080	$ 871	$ 857
Merchandise	1,907	1,954	1,878
Intermodal	714	722	725
Total operating revenues	3,701	3,547	3,461
Expenses:			
Compensation and benefits	987	939	970
Purchased service and rent	588	571	581
Fuel	603	430	403
Depreciation	296	285	271
Materials and other	313	294	295
Total operating expenses	2,787	2,519	2,520
Operating income:	914	1,028	941
Other income	40	34	55
Interest expense, net	(163)	(162)	(175)
Income (loss) before income taxes:	791	900	820
Income tax provision	(297)	(310)	(276)
Net income	$ 494	$ 589	$ 545

Source: Main Street Trading data.

Exhibit 2

J&L RAILROAD

Consolidated Balance Sheets, 2007–08 (in millions of dollars)
December 31

Assets	**2008**	**2007**
Current assets:		
Cash	$ 227	$ 76
Receivable net	320	347
Materials and suppliers, at average cost	71	65
Deferred income taxes, current	55	70
Other current assets	62	58
Total current assets	735	616
Properties:		
Investment	654	726
Property, road and structures, net	8,184	7,940
Other assets	101	336
Total assets	$9,674	$9,618
Liabilities and shareholders' equity		
Current liabilities:		
Accounts payable	$ 419	$ 419
Current portion of long-term debt	96	75
Income taxes payable	81	87
Other accrued expenses	178	136
Total current liabilities	774	717
Long-term debt	2,275	2,207
Deferred income taxes	2,344	2,366
Other liabilities and reserves	747	750
Total liabilities	6,140	6,040
Shareholders' equity:		
Common stock	135	140
Additional paid-in capital	618	539
Accumulated other comprehensive income (loss)	(347)	(147)
Retained income	3,128	3,046
Total shareholders' equity	3,534	3,578
Total liabilities and shareholders' equity	$9,674	$9,618

Source: Main Street Trading data.

Exhibit 3

J&L RAILROAD

NYMEX Heating Oil Exchange Futures (in dollars per gallon)
April 24, 2009

Month	Last
May ’09	$1.368
Jun ’09	$1.386
Jul ’09	$1.414
Aug ’09	$1.443
Sep ’09	$1.472
Oct ’09	$1.502
Nov ’09	$1.533
Dec ’09	$1.563
Jan ’10	$1.593
Feb ’10	$1.614
Mar ’10	$1.626
Apr ’10	$1.629
May ’10	$1.638

Spot = $1.360

Each heating-oil futures contract was for the delivery of 42,000 gallons and matured on the last business day of the preceding month (e.g., the June 2009 contract expires May 29, 2009).

Source: New York Mercantile Exchange data.

Exhibit 4

J&L RAILROAD

NYMEX Heating Oil Call Option Premiums (in dollars per gallon)
April 24, 2009

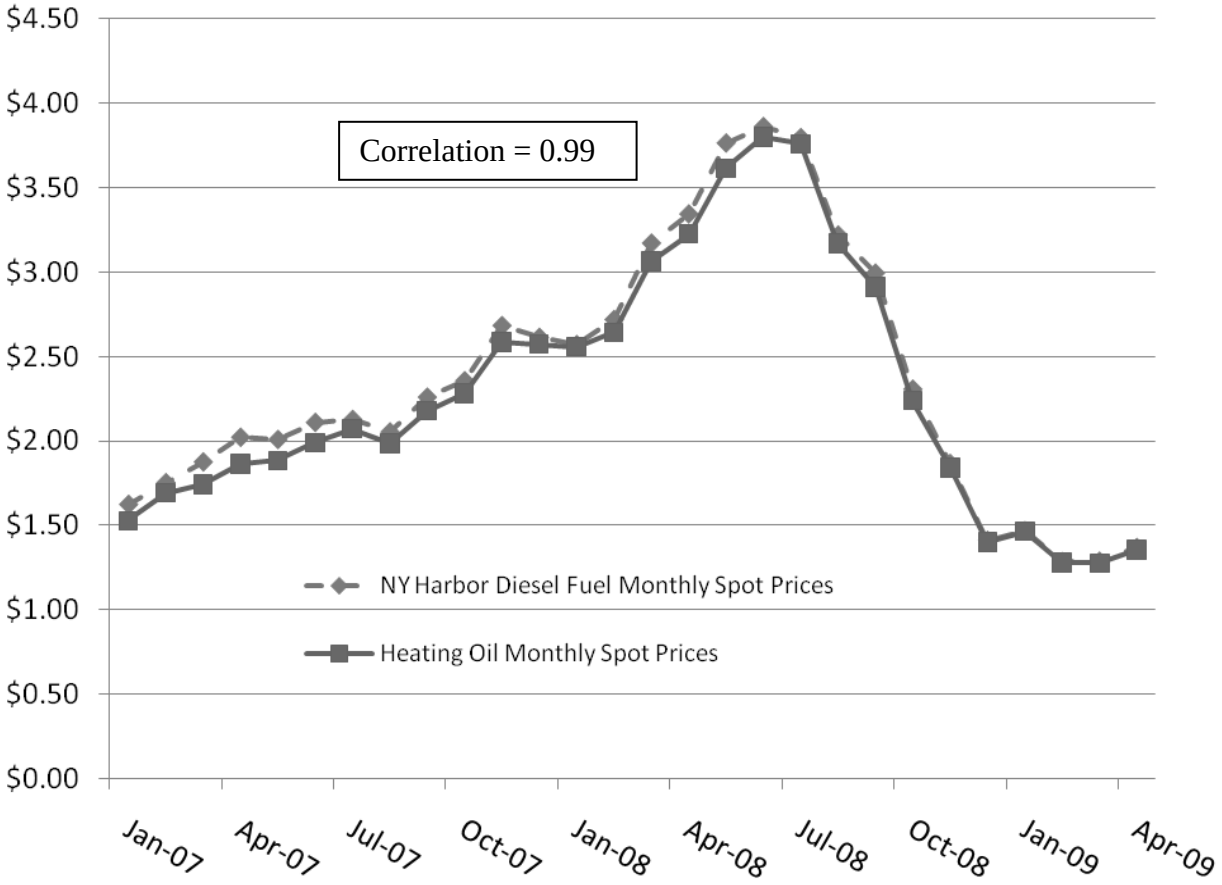
Strike Price	Aug. '09 Calls	Oct. '09 Calls	Dec. '09 Calls	Feb. '10 Calls	May '10 Calls
1.36	0.196	0.265	0.326	0.376	0.394
1.40	0.175	0.244	0.303	0.353	0.371
1.45	0.151	0.219	0.277	0.326	0.344
1.50	0.131	0.196	0.253	0.301	0.319
1.55	0.113	0.176	0.230	0.277	0.295
1.60	0.098	0.158	0.210	0.255	0.272
1.65	0.084	0.142	0.192	0.235	0.252
1.70	0.072	0.127	0.175	0.216	0.233
Expiry date	7/28/2009	9/25/2009	11/24/2009	1/26/2010	4/27/2010
Days to expiry	95	154	215	278	369
Futures price	$1.443	$1.502	$1.563	$1.614	$1.638
Treasury yield	0.11%	0.17%	0.31%	0.38%	0.49%

Source: Main Street Trading data.

Exhibit 5

J&L RAILROAD

Diesel Fuel versus Heating Oil Prices (in dollars per gallon)
January 2007 to March 2009



Source: Graph created by case writer using data from Energy Information Association.

Exhibit 6

J&L RAILROAD

KCNB Cap and Floor Prices (in dollars per gallon)
April 24, 2009

Strike Price	1-Year Cap	1-Year Floor
1.40	0.201	0.079
1.45	0.172	0.101
1.50	0.147	0.125
1.55	0.125	0.152
1.60	0.105	0.182
1.65	0.088	0.215
1.70	0.073	0.250

Note: Cap and floors prices are based on the average daily closing price of heating fuel for one year.

Data source: Company documents.

Exhibit 7

J&L RAILROAD

Fuel Costs 2001–2008

Year	Rail Revenues ($ millions)	Fuel Costs ($ millions)	Fuel Costs/ Revenues	Gallons (millions)
2008	3,701	603	16.3%	205.1
2007	3,547	430	12.1%	205.6
2006	3,461	403	11.6%	216.6
2005	3,137	285	9.1%	170.0
2004	2,690	220	8.2%	191.2
2003	2,379	189	7.9%	216.1
2002	2,307	126	5.5%	179.4
2001	2,270	152	6.7%	206.4

Data source: Company documents.