SHIPPER OWNED AND LEASED EQUIPMENT

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INTRODUCTION

The merchandising of grain by country markets in North Dakota, and other states, relies heavily on an efficient and reliable transportation system. Without an effective transportation network, many agricultural crops could not be marketed in a timely manner. While bottlenecks in the system occasionally occur, the transportation network provides an efficient and much needed link between the various producing and consuming regions of the United States.

Throughout much of the 1970s increased grain export activity burdened the transportation industry's capacity to transport grain. Railroad equipment, in particular, was in short supply. Shortages of covered hopper cars were reported in every year from 1972 through 1980. Chronic shortages existed in 1973, 1974, 1977, 1978, and 1979. These shortages prompted substantial private investment in rail grain equipment. Private investment in covered hopper cars alone increased from less than $100 million in the period from 1975 to 1977 to more than $650 million in 1980. From 1973 to 1981, the proportion of railroad owned to privately owned covered hopper cars fell from over five to one to less than one and one half to one.

In North Dakota, country elevator operators opted for leasing covered hopper cars. According to a survey of country elevators by Griffin and Casavant in the fall of 1980, 175 firms leased covered hopper cars in 1980.[1] This compared to 31 firms leasing covered hopper cars in 1975. Leasing and ownership of boxcars and ownership of hoppercars was not very prevalent among country elevators.

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[1]Griffin, Gene C., and Ken Casavant, **Structure and Operating Characteristics of the North Dakota Grain Elevator Industry**, UGPTI, Fargo, North Dakota, forthcoming.

RAIL GRAIN FLEET

Railroads, like many other industries, have been making technological advances to enhance their operational efficiency. The transition from general to special purpose freight cars has increased the railroad's ability to transport commodities efficiently.

CAR TYPES

Railroads have been increasing the utilization of specialized equipment that facilitates the loading, movement, and unloading of various types of commodities in recent years. Current rail movements of grain have principally been in covered hopper cars (Table 1). Covered hopper cars accounted for 38 percent of the loads and 51 percent of the volume in 1970. Boxcars, on the other hand, accounted for 62 percent of the loads and 49 percent of the volume. By 1980, covered hopper cars carried 84 percent of the loads and 90 percent of the grain volume shipped by rail. This shift towards increased utilization of covered hopper cars underscores the preference of railroads to use specific freight car designs in moving commodities. Specially designed jumbo covered hopper cars are generally not suited for transporting products that do not have similar characteristics of grain.

TABLE 1. MOVEMENT OF GRAIN BY BOXCARS AND COVERED HOPPER CARS, 1970-80.

		COVERED HOPPER CARS			BOX CARS		
YEAR	TOTAL RAIL VOLUME	NUMBER OF LOADS	PERCENT OF LOADS	PERCENT OF VOLUME	NUMBER OF LOADS	PERCENT OF LOADS	PERCENT OF VOLUME
	000,000 BU	000 LOADS			000 LOADS		
1970	3,702	1,463	38	51	908	62	49
1971	3,390	1,288	45	58	707	55	42
1972	3,697	1,356	52	65	653	48	35
1973	4,501	1,678	49	62	852	51	38
1974	4,201	1,463	63	74	546	37	26

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	000,000 BU	000 LOADS			000 LOADS		
1975	4,065	1,342	74	83	355	26	17
1976	4,100	1,322	79	86	282	21	14
1977	3,911	1,249	81	88	239	19	12
1978	4,125	1,340	77	85	309	23	15
1979	4,410	1,425	78	86	311	22	14
1980	5,004	1,575	84	90	252	16	10

SOURCE: Association of American Railroads, **The Grain Book**, Office of Information and Public Affairs, Washington, D.C. 1981.

FLEET CAPACITY

Railroads built up their grain fleet capacity throughout much of the 1970s (Table 2). Although inter-year comparisons are difficult to make because of the characteristics of the available data, some generalizations can be made. It should be warned, however, that generalizations concerning capacity refer only to the size of the grain fleet (in bushels) and do not take into account equipment utilization. First, covered hopper cars have all but replaced boxcars for shipping grain. Boxcar numbers have declined from 207,600 in 1971 to 18,400 in 1982. This vast reduction in the boxcar fleet emphasizes the railroad's trend towards specialized equipment. Jumbo covered hopper car numbers have increased from

148,700 in 1978 to 232,800 in 1982. Comparisons of covered hopper car numbers using pre 1978 data are not conclusive since pre 1978 numbers included both "small" and "jumbo" covered hopper cars.[2]

Second, total grain fleet capacity has been increasing in recent years. Fleet capacity increased from 678.5 million bushels in 1978 to 828.3 million bushels in 1982. The numbers presented in Table 2 indicate that pre 1978 capacity was larger than post 1977 capacity. However, as stated earlier, compilers of covered hopper car numbers did not separate "small" covered hopper cars from "jumbo" covered hopper cars. Small hopper cars are normally used for carrying minerals such as salt and phosphate and are only used for transporting grain when car numbers are tight. Jumbo covered hopper cars are used almost exclusively for grain.

Fleet capacity stabilized in 1982 compared to 1981 (828.3 million bushels compared to 829.0 million bushels). This stabilization indicates that railroads may have reached an interim threshold level with respect to fleet capacity given current grain movements. Other indications include both reports of car surpluses and declines in freight car orders and deliveries. While car shortages plagued shippers throughout most of the 1970s, surpluses currently exist. Surpluses of jumbo covered hopper cars topped 5,000 cars per

[2]Small covered hopper cars generally refer to cars with capacities of 2,500 to 3,000 cubic feet. These cars are normally used to transport dense bulk commodities. Jumbo covered hopper cars are specifically designed for grain and normally have capacities of 4,500 to 5,000 cubic feet. Cars with 4,750 cubic feet of capacity are very common in North Dakota, for instance.

TABLE 2. NUMBER OF BOXCARS, COVERED HOPPER CARS, AVERAGE CAPACITIES AND TOTAL CAPACITY, UNITED STATES. 1970-82.

	BOXCARS (40' NARROW DOOR)			HOPPER CARS			
YEAR	NUMBER	AVERAGE CAPACITY	TOTAL CAPACITY	NUMBER	AVERAGE CAPACITY	TOTAL CAPACITY	TOTAL BOXCAR AND HOPPER CAPACITY
	000	TONS/CAR	MILLION BU.	000	TONS/CAR	MILLION BU.	MILLION BU.
1970	180.0	54.6	361.8	161.1	86.8	547.6	909.4
1971	207.6	54.9	415.2	170.7	88.2	580.7	995.9
1972	190.0	56.6	380.1	179.9	88.6	611.6	991.7
1973	178.5	57.5	357.0	186.2	88.2	633.2	990.2
1974	164.7	59.0	329.3	204.9	89.9	696.8	1,026.1
1975	149.5	59.0	299.0	219.4	91.3	745.9	1,044.9
1976	131.6	60.9	263.3	228.3	91.3	876.1	1,039.4
1977	107.8	62.4	215.5	230.1	92.3	782.2	997.7
1978[b]	86.5	62.8	172.9	148.7	92.9	505.6	678.5
1979[b]	66.2	62.4	132.4	161.8	94.3	550.0	682.4
1980[b]	58.5	62.5[c]	117.0	186.0	94.9[c]	632.3	749.3
1981[b]	43.8	62.5[c]	87.5	218.1	95.7[c]	741.5	829.0
1982[b]	18.4	62.5[c]	36.8	232.8	95.7[c]	791.5	828.3

[a] Increase due to reclassification of several cars from narrow door to wide door.

[b] Figures for 1978-82 are not comparable to previous years due to computer separation of small and jumbo covered hopper cars.

[c] Estimates.

SOURCE: Association of American Railroads, **Statistics of Railroads of Class I**, November 1980 and USDA, **Grain Transportation Situation**, Various Issues.

day in 1980. By 1981 and 1982 surpluses of 26,000 and 22,000 cars per day were being reported.[3] Car deliveries declined from over 89,000 cars in 1980 to less than 45,000 cars in 1981.[4] Car deliveries during the first nine months of 1982 were less than half compared to a similar time period in 1981.[5]

PRIVATE CAR OWNERSHIP

Rail cars that are "privately owned" versus "railroad owned" are cars that are owned by individuals or firms other than railroad companies. Shippers who use privately owned rail cars either own them directly or lease them. Owners or lessees normally receive a mileage credit, or other such form of compensatory payment, from carriers to reimburse them for supplying their own equipment. The basics involved in the transaction are much the same as the "per diem" paid by one carrier for using the equipment of another carrier.

Private car ownership of jumbo covered hopper cars (Car Type code L153)[6] has increased substantially in recent years (Table 3). Private ownership of type L153 covered hopper cars comprised only 16 percent of all type L153s being used by railroads in 1973. By 1981, 42 percent of all L153s were privately owned. Private ownership of all covered hopper cars in September 1982, (small and jumbo) totaled 130,079 cars, or about 43 percent of the total covered hopper car fleet.[7]

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[3]Figures from Association of American Railroads.

[4]Railway Age, Various Issues.

[5]**Ibid.**

[6]Car Type Code L153 is a designation given to jumbo covered hopper cars. Type L153 covered hopper cars are commonly used for shipping grain.

[7]Railway Age, October 25, 1982, p. 40.

TABLE 3. CLASS I RAILROAD AND PRIVATE OWNERSHIP OF TYPE L153 JUMBO COVERED HOPPER CARS, 1973-81.				
YEAR	PRIVATELY OWNED	OWNED BY CLASS I CARRIERS	TOTAL	PERCENT PRIVATELY OWNED
1973	9,777	50,669	60,446	16
1974	14,072	62,694	76,776	18
1975	25,209	63,907	89,116	28
1976	26,610	68,805	95,463	28
1977	26,131	72,039	98,170	27
1978	26,615	75,797	102,412	26
1979	32,686	79,102	111,788	29
1980	50,048	83,681	133,729	37
1981	64,315	87,252	151,567	42

SOURCE: Golstein, Andrew P., **Petition for the Institution of a Rule-Making Proceeding**, Docket No. 38692. Before the Interstate Commerce Commission, August 21, 1981.

OT-5

Essential "OT-5" is the process of obtaining proper authority to place and use privately owned freight cars on railroad lines. Shippers must direct a written application for OT-5 authority through the Association of American Railroads (AAR). The AAR approves or disapproves the application upon the direction of the applicable carrier (s) that serve the shipper. Once the application has been approved, the shipper may place and use the privately owned equipment for transporting products.

PRIVATE CAR COMPENSATION

As stated earlier, shippers receive compensation from the railroads for using privately owned equipment to transport their commodities. In the case of grain, shippers using privately owned hopper cars receive compensation in the form of a mileage credit. This mileage credit is based on the market value and the loaded mileage of the car. Table 4 contains selected mileage credits that were being paid as of September 1, 1982. A shipper using a privately owned covered hopper car "LO" type (LO designates covered hopper cars) having an "Original Fair Market Value" of $44,500 would accrue mileage credits of 47.0 cents per loaded mile.

TABLE 4. MILEAGE RATE ALLOWANCES FOR TYPE "LO" CARS.

	MILEAGE CREDIT	
	AGE OF CAR	
ORIGINAL FAIR MARKET VALUE[a]	1-29	30 AND OVER
($)	- - - - - ¢/LOADED MILE - - - - -	
1,000 - 2,000	10.9	9.8
10,001 - 11,000	18.5	10.5
20,001 - 21,000	26.9	11.2
30,001 - 31,000	35.3	12.0
40,001 - 41,000	43.6	12.8
44,001 - 45,000	47.0	13.2
50,001 - 51,000	52.0	13.6
51,001 - 52,000	52.9	13.6
52,001 - 53,000	53.7	13.7
53,001 AND OVER	54.6	13.8

[a] Mileage credits are paid based on $1,000 incremental changes in market value. This table contains only selected mileage credits.

SOURCE: Interstate Commerce Commission, **The Handling and Payment of Mileage**, ICC PHJ 6007-H, Supplement 9. Effective September 1, 1982.

If a car was shipped to a market destination 1,000 miles from the shipper's point of origin, $470 in mileage credits would accrue to the shipper. As Table 4 depicts, mileage credits increase as the value of the car increases. Actual mileage credits are prorated per $1,000 incremental change in car value. Value groups for privately owned cars are determined by car values that are recorded in Universal Machine Language Equipment Register (UMLER) data files. Car owners that do not report proper car valuation data to the AAR are assigned to the lowest applicable mileage allowance rate group. If the car has never been registered, mileage credits will not accrue to the shipper.

Recently some railroads have been restricting mileage allowances on shipper owned or leased covered hopper cars to 24 cents per loaded mile. It was common in the past for railroads to restrict mileage allowances on multiple car movements. However, some railroads have implemented tariff provisions that restrict all movements (i.e., single car, multiple car, etc.) to 24 cents per loaded mile.

LEASED EQUIPMENT IN NORTH DAKOTA

A survey was conducted by the Upper Great Plains Transportation Institute (UGPTI) in 1981 to collect information on covered hopper car lessees in North Dakota. A previous survey, also conducted by the UGPTI (1980), identified 175 country elevators as covered hopper car lessees. The 175 elevators were mailed questionnaires in the summer of 1981. Fifty elevators returned questionnaires for a 29 percent response rate. Data collected pertained to the number of cars, lease costs, age of cars, length of leases, grains shipped, markets used, equipment utilization, satisfaction or dissatisfaction with lease agreements, and future leasing intentions.

STATISTICS ON COVERED HOPPER CAR LESSEES

Respondents to the mail survey leased an average of seven covered hopper cars per elevator (Table 5). The fewest cars leased by the responding firms was two while the most was 23. Of the 348 hopper cars leased by the 50 firms, 302 were 4,750 cubic feet capacity cars. Cars classified as "small" covered hopper cars accounted for 15 of those leased by the 50 firms. Ten of these cars had capacities of 3,750 cubic feet while the remaining five had capacities of 3,500 cubic feet. The remaining 31 covered hopper cars had capacities that ranged from 4,500 cubic feet to 4,650 cubic feet.

Lessees made an average monthly lease payment of $430 per car. The lease payment ranged from a low of $195 to a high of $550 per month. North American Car Corporation and Grain Terminal Association (GTA) were the most prominent lessors. The two firms leased cars to 29 of the 50 responding firms. Both firms reported leasing most of their cars to country elevators in North Dakota under terms of "full-service operating" leases. Under terms of full-service operating leases, lessees are responsible only for the lease payment. Lessors are responsible for maintenance and ownership costs (taxes, insurance, administration, etc.).

TABLE 5. STATISTICS ON COVERED HOPPERCAR LESSEES.

VARIABLE	NUMBER OF OBSERVATIONS	MINIMUM VALUE	MAXIMUM VALUE	MEAN VALUE
Number of Cars	50	2	23	7
Lease Payment ($/mo.)	49	195	550	430
Car Ages (yrs.)	46	1	15	4
Lease Term (yrs.)	47	1	15	5

FREIGHT CAR UTILIZATION

As was mentioned in a previous section, shippers who use privately owned rail cars receive compensation, usually in the form of mileage credits. Higher degrees of utilization tend to lower the cost of owning or leasing the equipment while lower degrees of utilization tend to increase the cost. Therefore, shippers should strive to maximize the utilization of their privately owned freight car fleet.

COVERED HOPPER CAR UTILIZATION

Privately owned equipment is normally shipped loaded to a given market destination and returned to the shipper empty. Car cycles are a measure of utilization for equipment shipped loaded and returned empty. Respondents to the mail survey reported car cycles of 15.1 days to Duluth/Superior destinations, 16.1 days to Minneapolis/St. Paul destinations, 19.2 days to "Other" destinations, and 24.1 days to Pacific Northwest destinations (Table 6).

Economic-engineering estimates of car cycles were developed using analytical data compiled by the United States Railway Association (Table 7).[8] These estimates were developed so comparisons could be made with car cycles reported by lessees. These data indicated car cycle times of 8.5 to 14.8 days for eastbound (Duluth/Superior and Minneapolis/St. Paul) movements, and 17.5 to 23.8 days for westbound (Pacific Northwest) movements. Car cycle times reported by lessees compared with the highest economic

[8]United States Railway Association, **Viability of Light-Density Rail Lines**, March 1976.

-engineering estimates developed. This indicates that, while actual car cycles are high compared to the economic-engineering estimates, utilization of privately owned covered hopper cars during the survey period was satisfactory.

TABLE 6. CAR CYCLE TIMES FROM COUNTRY ELEVATOR POINTS TO VARIOUS DESTINATIONS FOR LEASED HOPPER CARS, NORTH DAKOTA. 1981.

DESTINATION	SAMPLE SIZE	MINIMUM VALUE	MAXIMUM VALUE	MEAN VALUE
		NUMBER OF CAR-DAYS		
Duluth/Superior	48	9	25	15.1
Minneapolis/St. Paul	20	11	30	16.1
Pacific Northwest	25	14	42	24.1
Other	10	8	42	19.2

TABLE 7. CAR CYCLE TIMES BASED ON MAIN AND BRANCH LINE MOVEMENTS, ECONOMIC-ENGINEERING ESTIMATES, 1981.

	DIRECTION OF MOVEMENT		
		WEST[a]	
TYPE OF MOVEMENT	EAST[b]	PRIORITY	SLOW
	NUMBER OF CAR-DAYS		
Main Line[c]	8.5	13.7	17.5
Branch Line[d]	10.5	15.7	19.5
Branch Line[e]	12.9	18.1	21.9
Branch Line[f]	14.8	20.0	23.8

[a] Based on 1,500 mile (one-way) movement to Pacific Northwest destination.

[b] Based on 400 mile (one-way) movement to Minnesota destinations.

[c] Calculated by adding two days for loading to the number of car-days spent off branch for combination branch/main line movements.

[d] Service on demand.

[e] Service three times per week.

[f] Service twice per week.

Lease/Purchase Decision

Once shippers make a decision to use privately owned hopper cars they must determine whether to lease or purchase the equipment. If shippers perceive a long-term need for the equipment, ownership may be preferable. However, if a short-term need is perceived, leasing may better suit the shipper's needs. While each option has advantages and disadvantages, an important consideration is net cost. The analysis that follows compares applicable discounted cash outlays and inflows for various covered hopper car lease/purchase scenarios.

Net Present Value Analysis

Cash outlays and inflows of various purchase and lease scenarios were discounted using a net present value (NPV) approach. Net present value of one dollar in the future was computed as:

$$NPV = \frac{\$1}{(1 + i)^n}$$

where: NPV = net present value

i = discount rate

n = number of years or time periods

For example, NPV of one dollar five years from today discounted at 12 percent would be:

$$NPV = \frac{\$1}{(1 + .12)^5} = \frac{\$1}{1.76} = \$0.57$$

Cash Flow Versus Profitability

Net present values of lease arrangements were analyzed on the basis of profitability. Lease options involved one source of funds (mileage credits) and one use of funds (lease payments). Purchase options were analyzed using both cash flow and profitability frameworks. The profitability analyses accounted for capital replacement while the cash flow analyses did not.

Tax Considerations

Covered hopper cars are classified by the IRS as 5-year section 1245 class property. As such, three methods may be used to recover capital costs. First, straight line depreciation may be used over a 12 year period. An investment tax credit of 10 percent of the purchase price may also be taken. Second, Accelerated Cost Recovery System (ACRS) may be used. Under ACRS the covered hopper car is depreciated over a five year period using the following depreciation schedule:

Year	Percent
1	15%
2	22%
3-5	21%

Again, a 10 percent investment tax credit is allowed.

The third method involves "Expensing" and ACRS. Expensing allows an additional $5,000 in depreciation in the first year. The purchase price minus the $5,000 is then depreciated according to the ACRS depreciation schedule. The investment tax credit is calculated by subtracting the additional depreciation from the purchase price.

Purchase Price

The purchase price used in the NPV analyses was $48,000. The Association of American Railroads (AAR) computed the average cost to Class I line-haul railroads of installing covered hopper cars during 1980 to be $43,618. This figure was updated to January 1, 1982 levels ($48,000) using the Producers Price Index (PPI) for railroad equipment.

Utilization

Tables 8 and 9 contain approximate utilization figures for covered hopper cars based on: (1) active car-days freight cars are available for service; (2) average turnaround times (car cycles) reported by lessees; (3) proportion of grain shipped to the various markets (1980-81 North Dakota grain movement data); and (4) average distances to the respective markets. Based on these data, the "average" covered hopper car will travel about 10,500 loaded miles per year (Table 8), make 18.4 trips per year (Table 9) and carry about 60,720 bushels of grain per year (18.4 trips times 3,300 bushels per trip).

TABLE 8. ESTIMATED ANNUAL UTILIZATION OF LEASED HOPPER CARS BY COUNTRY ELEVATORS.

DESTINATION	ACTIVE CAR-DAYS AVAILABLE FOR SERVICE		AVERAGE TURN-AROUND TIMES		PROPORTION OF GRAIN SHIPMENTS		AVERAGE DISTANCE TO MARKET		EXPECTED UTILIZATION (LOADED MILEAGE)
	--- NUMBER OF DAYS ---				-- PCT. -		----- MILES -----		
Duluth/Superior	305	÷	15	*	46	*	450	=	4,200
Minneapolis/St. Paul	305	÷	16	*	20	*	450	=	1,700
Pacific Northwest	305	÷	24	*	10	*	1,500	=	1,900
Other	305	÷	19	*	24	*	700	=	2,700
ESTIMATED UTILIZATION									10,500

TABLE 9. ESTIMATED NUMBER OF GRAIN SHIPMENTS.							
DESTINATION	ACTIVE CAR-DAYS AVAILABLE FOR SERVICE		AVERAGE REPORTED TURNAROUND		PROPORTION OF GRAIN SHIPMENTS		NUMBER OF SHIPMENTS
	- - - - NUMBER OF DAYS - - - -				- - - PCT. - - -		- - - # - - -
Duluth/Superior	305	÷	15	*	46	=	9.4
Minneapolis/St. Paul	305	÷	16	*	20	=	3.8
Pacific Northwest	305	÷	24	*	10	=	1.3
Other	305	÷	19	*	24	=	3.9
TOTAL NUMBER OF SHIPMENTS							18.4

Net Present Values

Appendix Table 1A - 8B contain net present values of various lease and purchase scenarios. Tables denoted with the letter A (i.e., 1A, 2A, 3A, etc.) contain net present values of **cash flows** for purchase agreements. Tables containing the letter B (i.e., 1B, 2B, 3B, etc.) consist of net present values of **profit after taxes** for purchase options.

Subject to the inputs, as detailed in Table 1A, the lease alternative is preferable to the purchase option. The lease option resulted in a net value of $-5,791 while the purchase option resulted in a net present value of $-20,910. The mileage credit used in the analysis was 24¢ per loaded mile. Tables 2A and 3A, respectively, contain the results based on mileage credits of 32¢ and 40¢ per loaded mile. Net present values of leasing a covered hopper car increased to $-3,589 and $-1,387 using mileage credits of 32¢ and 40¢, respectively. Net present values of purchasing a hopper car increased to $-18,708 and $-16,506, respectively. Discounting profits after taxes yielded net present values of $-54,354, $-52,152, and $-49,950 (Tables 1B - 3B).

Lowering the tax rate to zero decreases NPVs of leasing to $-8,272 and of purchasing to $-25,249 (Table 4A). A 46 percent tax rate results in NPVs increasing to $-4,467 for the lease alternative and $-18,596 for the purchase option (Table 5A). Increasing the mileage allowance to the maximum allowed (Table 4) results in NPVs of $353 for the lease option and $-12,226 for the purchase alternative (Table 6A).

Appendix Tables 7A and 8A contain NPVs for a ten year term. Doubling utilization to 21,000 loaded miles per year, increasing the mileage credit to 54 per loaded mile and increasing the tax rate to 46 percent results in positive NPVs for both the lease and purchase alternatives (Table 8A). Otherwise, negative NPVs are attained (Table 7A).

CONCLUSIONS

Country elevator operators in North Dakota substantially increased their use of privately owned rail equipment during the late 1970s. In 1975 31 elevators leased covered hopper cars. By 1980 this number had grown to 175. Today, elevator operators are finding it difficult to realize sufficient utilization on leased rail equipment. Depressed mileage credits and erratic grain movements often make private fleet management a difficult and costly venture. Unless country elevator managers can attain high utilization on private covered hopper cars, the lease option is preferable to the purchase option.

APPENDIX TABLES

1A - 8B

APPENDIX TABLE 1A

COMPARISON OF NPV OF PURCHASING AND LEASING HOPPER CARS

INPUTS:	Hopper Purchase Price	$48,000.00
	Utilization (In Loaded Miles Per Year)	10,500.00
	Mileage Allowance (In Dollars Per Loaded Mile)	0.2400
	Economic Life of Hopper Car (In Years)	5.
	Salvage Value (In Dollars)	25,000.00
	Maintenance Cost (Per Year)	1,000.00
	Lease Payment (Per Year)	5,160.00
	Discount Rate (Percent)	0.14
	Type Of Depreciation	Expensing + ACRS
	Year In Which Investment Tax Credit Is Taken	1.00
	Compound Interest Rate	0.05
	Tax Bracket	0.30

	LEASE				PURCHASE				
YEAR	REVENUE	TAXABLE INCOME	PROFIT AFTER TAXES	NET PRESENT VALUE	REVENUE	DEPR	TAXABLE INCOME	NET CASH FLOW AFTER TAXES	NET PRESENT VALUE
	---------- IN DOLLARS ----------								
1	2,520	-2,640	-1,848	-1,621	2,520	11,450	-9,930	8,799	7,717
2	2,646	-2,514	-1,760	-1,353	2,646	9,460	-7,814	3,990	3,068
3	2,778	-2,382	-1,667	-1,125	2,778	9,030	-7,252	3,954	2,669
4	2,917	-2,243	-1,570	-929	2,917	9,030	-7,113	4,051	2,398
5	3,063	-2,097	-1,468	-762	28,063	9,030	18,033	21,653	11,238
SUM	**13,925**	**-11,875**	**-8,313**	**-5,791**	**38,925**	**48,000**	**-14,075**	**42,447**	**27,090**
NET PRESENT VALUE OF LEASING A HOPPER CAR					**$ -5,791**				
NET PRESENT VALUE OF PURCHASING A HOPPER CAR					**$-20,910**				

APPENDIX TABLE 1B					
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR					
YEAR	**REVENUE**	**DEPR**	**TAXABLE INCOME**	**PROFIT AFTER TAXES**	**NET PRESENT VALUE**
			- - - - - - - - - - IN DOLLARS - - - - - - - - - -		
1	2,520	11,450	-9,930	-2,651	-2,325
2	2,646	9,460	-7,814	-5,470	-4,206
3	2,778	9,030	-7,252	-5,076	-3,426
4	2,917	9,030	-7,113	-4,979	-2,948
5	28,063	9,030	18,033	12,623	6,551
SUM	**38,925**	**48,000**	**-14,075**	**-5,553**	**-6,354**
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR				**$-54,354**	

APPENDIX TABLE 2A

COMPARISON OF NPV OF PURCHASING AND LEASING HOPPER CARS

INPUTS:	Hopper Purchase Price	$48,000.00
	Utilization (In Loaded Miles Per Year)	10,500.00
	Mileage Allowance (In Dollars Per Loaded Mile)	0.3200
	Economic Life of Hopper Car (In Years)	5.
	Salvage Value (In Dollars)	25,000.00
	Maintenance Cost (Per Year)	1,000.00
	Lease Payment (Per Year)	5,160.00
	Discount Rate (Percent)	0.14
	Type Of Depreciation	Expensing + ACRS
	Year In Which Investment Tax Credit Is Taken	1.00
	Compound Interest Rate	0.05
	Tax Bracket	0.30

	LEASE				PURCHASE				
YEAR	REVENUE	TAXABLE INCOME	PROFIT AFTER TAXES	NET PRESENT VALUE	REVENUE	DEPR	TAXABLE INCOME	NET CASH FLOW AFTER TAXES	NET PRESENT VALUE
	---------- IN DOLLARS ----------								
1	3,360	-1,800	-1,260	-1,105	3,360	11,450	-9,090	9,387	8,232
2	3,528	-1,632	-1,142	-879	3,528	9,460	-6,932	4,608	3,543
3	3,704	-1,456	-1,019	-688	3,704	9,030	-6326	4,602	3,106
4	3,890	-1,270	-889	-526	3,890	9,030	-6,140	4,732	2,801
5	4,084	-1,076	-753	-391	29,084	9,030	19,054	22,368	11,609
SUM	**18,566**	**-7,234**	**-5,064**	**-3,589**	**43,566**	**48,000**	**-9,434**	**45,696**	**29,292**
NET PRESENT VALUE OF LEASING A HOPPER CAR							**$ -3,589**		
NET PRESENT VALUE OF PURCHASING A HOPPER CAR							**$-18,708**		

APPENDIX TABLE 2B					
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR					
YEAR	**REVENUE**	**DEPR**	**TAXABLE INCOME**	**PROFIT AFTER TAXES**	**NET PRESENT VALUE**
---------- **IN DOLLARS** ----------					
1	3,360	11,450	-9,090	-2,063	-1,809
2	3,528	9,460	-6,932	-4,852	-3,731
3	3,704	9,030	-6,326	-4,428	-2,989
4	3,890	9,030	-6,140	-4,298	-2,545
5	29,084	9,030	19,054	13,338	6,922
SUM	**43,566**	**48,000**	**-9,434**	**-2,304**	**-4,152**
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR				**$-52,152**	

APPENDIX TABLE 3A

COMPARISON OF NPV OF PURCHASING AND LEASING HOPPER CARS

INPUTS:	Hopper Purchase Price	$48,000.00
	Utilization (In Loaded Miles Per Year)	10,500.00
	Mileage Allowance (In Dollars Per Loaded Mile)	0.4000
	Economic Life of Hopper Car (In Years)	5.
	Salvage Value (In Dollars)	25,000.00
	Maintenance Cost (Per Year)	1,000.00
	Lease Payment (Per Year)	5,160.00
	Discount Rate (Percent)	0.14
	Type Of Depreciation	Expensing + ACRS
	Year In Which Investment Tax Credit Is Taken	1.00
	Compound Interest Rate	0.05
	Tax Bracket	0.30

	LEASE				PURCHASE				
YEAR	REVENUE	TAXABLE INCOME	PROFIT AFTER TAXES	NET PRESENT VALUE	REVENUE	DEPR	TAXABLE INCOME	NET CASH FLOW AFTER TAXES	NET PRESENT VALUE
				---------- IN DOLLARS ----------					
1	4,200	-960	-672	-589	4,200	11,450	-8,250	9,975	8,748
2	4,410	-750	-525	-404	4,410	9,460	-6,050	5,225	4,018
3	4,630	-530	-371	-250	4,630	9,030	-5,400	5,250	3,544
4	4,862	-298	-209	-123	4,862	9,030	-5,168	5,412	3,204
5	5,105	-55	-38	-20	30,105	9,030	20,075	23,083	11,980
SUM	**23,208**	**-2,592**	**-1,815**	**-1,387**	**48,208**	**48,000**	**-4,792**	**48,945**	**31,494**
NET PRESENT VALUE OF LEASING A HOPPER CAR					**$ -1,387**				
NET PRESENT VALUE OF PURCHASING A HOPPER CAR					**$-16,506**				

APPENDIX TABLE 3B					
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR					
YEAR	**REVENUE**	**DEPR**	**TAXABLE INCOME**	**PROFIT AFTER TAXES**	**NET PRESENT VALUE**
---------- IN DOLLARS ----------					
1	4,200	11,450	-8,250	-1,475	-1,294
2	4,410	9,460	-6,050	-4,235	-3,257
3	4,630	9,030	-5,400	-3,780	-2,551
4	4,862	9,030	-5,168	-3,618	-2,142
5	30,105	9,030	20,075	14,053	7,293
SUM	**48,208**	**48,000**	**-4,792**	**945**	**-1,950**
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR				**$-49,950**	

APPENDIX TABLE 4A

COMPARISON OF NPV OF PURCHASING AND LEASING HOPPER CARS

INPUTS:	Hopper Purchase Price	$48,000.00
	Utilization (In Loaded Miles Per Year)	10,500.00
	Mileage Allowance (In Dollars Per Loaded Mile)	0.2400
	Economic Life of Hopper Car (In Years)	5.
	Salvage Value (In Dollars)	25,000.00
	Maintenance Cost (Per Year)	1,000.00
	Lease Payment (Per Year)	5,160.00
	Discount Rate (Percent)	0.14
	Type Of Depreciation	Expensing + ACRS
	Year In Which Investment Tax Credit Is Taken	1.00
	Compound Interest Rate	0.05
	Tax Bracket	0.00

	LEASE				PURCHASE				
YEAR	REVENUE	TAXABLE INCOME	PROFIT AFTER TAXES	NET PRESENT VALUE	REVENUE	DEPR	TAXABLE INCOME	NET CASH FLOW AFTER TAXES	NET PRESENT VALUE
	---------- IN DOLLARS ----------								
1	2,520	-2,640	-2,640	-2,315	2,520	11,450	-9,930	5,820	5,104
2	2,646	-2,514	-2,514	-1,933	2,646	9,460	-7,814	1,646	1,266
3	2,778	-2,382	-2,382	-1,608	2,778	9,030	-7,252	1,778	1,200
4	2,917	-2,243	-2,243	-1,328	2,917	9,030	-7,113	1,917	1,135
5	3,063	-2,097	-2,097	-1,088	28,063	9,030	18,033	27,063	14,046
SUM	**13,925**	**-11,875**	**-11,875**	**-8,272**	**38,925**	**48,000**	**-14,075**	**38,225**	**22,751**
NET PRESENT VALUE OF LEASING A HOPPER CAR							**$ -8,272**		
NET PRESENT VALUE OF PURCHASING A HOPPER CAR							**$-25,249**		

APPENDIX TABLE 4B					
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR					
YEAR	**REVENUE**	**DEPR**	**TAXABLE INCOME**	**PROFIT AFTER TAXES**	**NET PRESENT VALUE**
---------- IN DOLLARS ----------					
1	2,520	11,450	-9,930	-5,630	-4,938
2	2,646	9,460	-7,814	-7,814	-6,009
3	2,778	9,030	-7,252	-7,252	-4,895
4	2,917	9,030	-7,113	-7,113	-4,211
5	28,063	9,030	18,033	18,033	9,359
SUM	**38,925**	**48,000**	**-14,075**	**-9,775**	**-10,693**
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR				**$-58,693**	

APPENDIX TABLE 5A

COMPARISON OF NPV OF PURCHASING AND LEASING HOPPER CARS

INPUTS:	Hopper Purchase Price	$48,000.00
	Utilization (In Loaded Miles Per Year)	10,500.00
	Mileage Allowance (In Dollars Per Loaded Mile)	0.2400
	Economic Life of Hopper Car (In Years)	5.
	Salvage Value (In Dollars)	25,000.00
	Maintenance Cost (Per Year)	1,000.00
	Lease Payment (Per Year)	5,160.00
	Discount Rate (Percent)	0.14
	Type Of Depreciation	Expensing + ACRS
	Year In Which Investment Tax Credit Is Taken	1.00
	Compound Interest Rate	0.05
	Tax Bracket	0.46

	LEASE				PURCHASE				
YEAR	REVENUE	TAXABLE INCOME	PROFIT AFTER TAXES	NET PRESENT VALUE	REVENUE	DEPR	TAXABLE INCOME	NET CASH FLOW AFTER TAXES	NET PRESENT VALUE
	---------- IN DOLLARS ----------								
1	2,520	-2,640	-1,426	-1,250	2,520	11,450	-9,930	10,388	9,110
2	2,646	-2,514	-1,358	-1,044	2,646	9,460	-7,814	5,240	4,030
3	2,778	-2,382	-1,286	-868	2,778	9,030	-7,252	5,114	3,452
4	2,917	-2,243	-1,211	-717	2,917	9,030	-7,113	5,189	3,072
5	3,063	-2,097	-1,132	-588	28,063	9,030	18,033	18,768	9,741
SUM	**13,925**	**-11,875**	**-6,413**	**-4,467**	**38,925**	**48,000**	**-14,075**	**44,699**	**29,404**
NET PRESENT VALUE OF LEASING A HOPPER CAR							**$ -4,467**		
NET PRESENT VALUE OF PURCHASING A HOPPER CAR							**-18,596**		

APPENDIX TABLE 5B					
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR					
YEAR	**REVENUE**	**DEPR**	**TAXABLE INCOME**	**PROFIT AFTER TAXES**	**NET PRESENT VALUE**
---------- IN DOLLARS ----------					
1	2,520	11,450	-9,930	-1,062	-932
2	2,646	9,460	-7,814	-4,220	-3,245
3	2,778	9,030	-7,252	-3,916	-2,643
4	2,917	9,030	-7,113	-3,841	-2,274
5	28,063	9,030	18,033	9,738	5,054
SUM	**38,925**	**48,000**	**-14,075**	**-3,301**	**-4,040**
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR				**$-52,040**	

APPENDIX TABLE 6A

COMPARISON OF NPV OF PURCHASING AND LEASING HOPPER CARS

INPUTS:	Hopper Purchase Price	$48,000.00
	Utilization (In Loaded Miles Per Year)	10,500.00
	Mileage Allowance (In Dollars Per Loaded Mile)	0.5400
	Economic Life of Hopper Car (In Years)	5.
	Salvage Value (In Dollars)	25,000.00
	Maintenance Cost (Per Year)	1,000.00
	Lease Payment (Per Year)	5,160.00
	Discount Rate (Percent)	0.14
	Type Of Depreciation	Expensing + ACRS
	Year In Which Investment Tax Credit Is Taken	1.00
	Compound Interest Rate	0.05
	Tax Bracket	0.46

	LEASE				PURCHASE				
YEAR	REVENUE	TAXABLE INCOME	PROFIT AFTER TAXES	NET PRESENT VALUE	REVENUE	DEPR	TAXABLE INCOME	NET CASH FLOW AFTER TAXES	NET PRESENT VALUE
	---------- IN DOLLARS ----------								
1	5,670	510	275	242	5,670	11,450	-6,780	12,089	10,602
2	5,953	793	428	330	5,953	9,460	-4,507	7,026	5,403
3	6,251	1,091	589	398	6,251	9,030	-3,779	6,989	4,718
4	6,564	1,404	758	449	6,564	9,030	-3,466	7,158	4,238
5	1,362	-3,798	-2,051	-1,065	31,892	9,030	21,862	20,835	10,814
SUM	**25,800**	**0**	**0**	**353**	**56,330**	**48,000**	**3,330**	**54,098**	**35,774**
NET PRESENT VALUE OF LEASING A HOPPER CAR					**$ 353**				
NET PRESENT VALUE OF PURCHASING A HOPPER CAR					**$-12,226**				

APPENDIX TABLE 6B					
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR					
YEAR	REVENUE	DEPR	TAXABLE INCOME	PROFIT AFTER TAXES	NET PRESENT VALUE
---------- IN DOLLARS ----------					
1	5,670	11,450	-6,780	639	560
2	5,953	9,460	-4,507	-2,434	-1,871
3	6,251	9,030	-3,779	-2,041	-1,377
4	6,564	9,030	-3,466	-1,872	-1,108
5	31,892	9,030	21,862	11,805	6,127
SUM	**56,330**	**48,000**	**3,330**	**6,098**	**2,330**
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR				**$-45,670**	

APPENDIX TABLE 7A		
COMPARISON OF NPV OF PURCHASING AND LEASING HOPPER CARS		
INPUTS:	Hopper Purchase Price	$48,000.00
	Utilization (In Loaded Miles Per Year)	10,500.00
	Mileage Allowance (In Dollars Per Loaded Mile)	0.2400
	Economic Life of Hopper Car (In Years)	10.
	Salvage Value (In Dollars)	25,000.00
	Maintenance Cost (Per Year)	1,000.00
	Lease Payment (Per Year)	5,160.00
	Discount Rate (Percent)	0.14
	Type Of Depreciation	Expensing + ACRS
	Year In Which Investment Tax Credit Is Taken	3.00
	Compound Interest Rate	0.05
	Tax Bracket	0.30

APPENDIX TABLE 7A

COMPARISON OF NPV OF PURCHASING AND LEASING HOPPER CARS

	LEASE				PURCHASE				
YEAR	REVENUE	TAXABLE INCOME	PROFIT AFTER TAXES	NET PRESENT VALUE	REVENUE	DEPR	TAXABLE INCOME	NET CASH FLOW AFTER TAXES	NET PRESENT VALUE
				---------- IN DOLLARS ----------					
1	2,520	-2,640	-1,848	-1,621	2,520	11,450	-9,930	4,499	3,946
2	2,646	-2,514	-1,760	-1,353	2,646	9,460	-7,814	3,990	3,068
3	2,778	-2,382	-1,667	-1,125	2,778	9,030	-7,252	8,254	5,571
4	2,917	-2,243	-1,570	-929	2,917	9,030	-7,113	4,051	2,398
5	3,063	-2,097	-1,468	-762	3,063	9,030	-6,967	4,153	2,155
6	3,216	-1,944	-1,361	-620	3,216	0	2,216	1,551	707
7	3,377	-1,783	-1,248	-499	3,377	0	2,377	1,664	666
8	3,546	-1,614	-1,130	-397	3,546	0	2,546	1,782	626
9	3,723	-1,437	-1,006	-310	3,723	0	2,723	1,906	587
10	3,909	-1,251	-875	-236	28,909	0	27,909	19,537	5,275
SUM	**31,696**	**-19,904**	**-13,933**	**-7,853**	**56,696**	**48,000**	**-1,304**	**51,387**	**25,000**
NET PRESENT VALUE OF LEASING A HOPPER CAR							**$ -7,853**		
NET PRESENT VALUE OF PURCHASING A HOPPER CAR							**$-23,000**		

APPENDIX TABLE 7B					
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR					
YEAR	**REVENUE**	**DEPR**	**TAXABLE INCOME**	**PROFIT AFTER TAXES**	**NET PRESENT VALUE**
---------- IN DOLLARS ----------					
1	2,520	11,450	-9,930	-6,951	-6,096
2	2,646	9,460	-7,814	-5,470	-4,206
3	2,778	9,030	-7,252	-776	-524
4	2,917	9,030	-7,113	-4,979	-2,948
5	3,063	9,030	-6,967	-4,877	-2,531
6	3,216	0	2,216	1,551	707
7	3,377	0	2,377	1,664	666
8	3,546	0	2,546	1,782	626
9	3,723	0	2,723	1,906	587
10	28,909	0	27,909	19,537	5,275
SUM	**56,696**	**48,000**	**-1,304**	**3,387**	**-8,444**
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR				**$-56,444**	

APPENDIX TABLE 8A		
COMPARISON OF NPV OF PURCHASING AND LEASING HOPPER CARS		
INPUTS:	Hopper Purchase Price	$48,000.00
	Utilization (In Loaded Miles Per Year)	21,000.00
	Mileage Allowance (In Dollars Per Loaded Mile)	0.5400
	Economic Life of Hopper Car (In Years)	10.
	Salvage Value (In Dollars)	25,000.00
	Maintenance Cost (Per Year)	1,000.00
	Lease Payment (Per Year)	5,160.00
	Discount Rate (Percent)	0.14
	Type Of Depreciation	Expensing + ACRS
	Year In Which Investment Tax Credit Is Taken	1.00
	Compound Interest Rate	0.05
	Tax Bracket	0.46

APPENDIX TABLE 8A

COMPARISON OF NPV OF PURCHASING AND LEASING HOPPER CARS

	LEASE				PURCHASE				
YEAR	REVENUE	TAXABLE INCOME	PROFIT AFTER TAXES	NET PRESENT VALUE	REVENUE	DEPR	TAXABLE INCOME	NET CASH FLOW AFTER TAXES	NET PRESENT VALUE
	---------- IN DOLLARS ----------								
1	11,340	6,180	3,337	2,927	11,340	11,450	-1,110	15,151	13,287
2	11,907	6,747	3,643	2,802	11,907	9,460	1,447	10,241	7,876
3	12,502	7,342	3,965	2,676	12,502	9,030	2,472	10,365	6,996
4	13,127	7,967	4,302	2,547	13,127	9,030	3,097	10,703	6,336
5	2,723	-2,437	-1,316	-683	13,784	9,030	3,754	11,057	5,739
6	0	-5,160	-2,786	-1,271	14,473	0	13,473	7,275	3,318
7	0	-5,160	-2,786	-1,115	15,197	0	14,197	7,666	3,066
8	0	-5,160	-2,786	-978	15,957	0	14,957	8,077	2,835
9	0	-5,160	-2,786	-858	16,754	0	15,754	8,507	2,620
10	0	-5,160	-2,786	-752	42,592	0	41,592	22,460	6,064
SUM	**51,600**	**0**	**0**	**5,295**	**167,633**	**48,000**	**109,633**	**111,502**	**58,137**
NET PRESENT VALUE OF LEASING A HOPPER CAR							**$ 5,295**		
NET PRESENT VALUE OF PURCHASING A HOPPER CAR							**$10,137**		

APPENDIX TABLE 8B					
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR					
YEAR	**REVENUE**	**DEPR**	**TAXABLE INCOME**	**PROFIT AFTER TAXES**	**NET PRESENT VALUE**
---------- IN DOLLARS ----------					
1	11,340	11,450	-1,110	3,701	3,245
2	11,907	9,460	1,447	781	601
3	12,502	9,030	2,472	1,335	901
4	13,127	9,030	3,097	1,673	990
5	13,784	9,030	3,754	2,027	1,052
6	14,473	0	13,473	7,275	3,318
7	15,197	0	14,197	7,666	3,066
8	15,957	0	14,957	8,077	2,835
9	16,754	0	15,754	8,507	2,620
10	42,592	0	41,592	22,460	6,064
SUM	**167,633**	**48,000**	**109,633**	**63,502**	**24,693**
NET PRESENT VALUE OF GAIN (LOSS) FROM THE PURCHASE OF A HOPPER CAR				**$-23,307**	

Hopper Purchase Price:	Represents the approximate cost of a new jumbo covered hopper car.
Utilization:	Loaded miles traveled by the hopper car in one year.
Mileage Allowance:	The rate that railroads pay shippers to compensate them for supplying their own transportation equipment.
Economic Life of Hopper Car:	Refers to the term of the analysis period.
Salvage Value:	Salvage value of the hopper car.
Maintenance Cost:	Annual maintenance cost of the hopper car.
Lease Payment:	Yearly lease payment for leasing a jumbo covered hopper car.
Discount Rate:	Rate at which the cash flows and profits were discounted.
Type of Depreciation:	Expensing + ACRS, ACRS or straight line can be used.
Investment Tax Credit:	Year in which ITC is taken.
Compound Interest Rate:	Rate at which revenues are compounded annually.
Tax Bracket:	Tax rate.
Revenues:	Represent the mileage allowance times the mileage credit. Revenues are increased yearly according to the applicable "Compound Interest Rate". Total revenues cannot exceed the total of lease payments for the term of the investment for lease options (this is often stipulated by lessors in lease agreements for covered hopper cars).