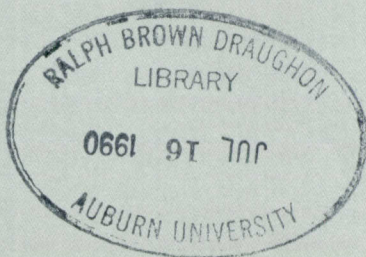


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MACHINE RATES FOR SELECTED FOREST HARVESTING **M**ACHINES



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*Information contained herein is available to all
without regard to race, color, sex, or national origin.*

MACHINE RATES FOR SELECTED FOREST HARVESTING MACHINES

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INTRODUCTION

DESPITE the growing complexity of harvesting machinery and systems and escalating owning and operating costs, the degree of mechanization in harvesting operations continues to increase. Rapidly changing machine technology and operating methods require that the timber harvesting manager continuously evaluate ongoing harvesting system costs to minimize overall production costs and compare prospective machines and systems at replacement time. These evaluations require long-term records and knowledgeable estimates to determine expected costs for comparison of alternatives.

The objective of the project reported here is to provide a survey of up-to-date cost estimates for forest harvesting machines. These estimates may be used to compare machines or systems of machines to determine the most economical combinations for various harvesting conditions.

It would be impossible in this report to list every machine and attachment combination currently available, therefore representative machines were selected from the many classes of logging equipment. Test machines are listed by brands to represent machines currently available and simplify data collection.² Machines were selected from 12 categories of forest harvesting machines, including skidders, forwarders, feller bunchers, loaders, crawler tractors, and chippers.

METHODS

OVERVIEW OF MACHINE RATES

Matthews (5) in his classic textbook, *Cost Control in the Logging Industry*, described a cost analysis method called the "machine rate." With some modification, this method of calculating machine costs is

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²The use of brand or trade names is for the reader's convenience and is not an endorsement by the authors or their respective organizations.

still widely used. The machine rate is used to calculate a machine's lifetime average hourly cost. Both the fixed costs of ownership and the variable costs of operation are included in the calculation.

Like any cost estimation method, the quality of the results depends on the quality of the information used. A system to classify the accuracy of cost estimates was proposed by Jarck (4). The three categories of estimates, in order of preference, are calculations based on: (1) empirical data (i.e. long-term costs records), (2) best estimates made by knowledgeable sources, and (3) unknown or questionable sources or by use of rule-of-thumb values. In this circular, calculations were based on empirical data and published estimates as much as possible. Some data were based on conservative estimates, such as working hours per year and fuel prices.

The use of machine rates requires caution on the part of the user. Since the machine rate calculation reflects an average cost, actual cash expenditures for ownership will normally be greater than estimated costs early in the machine's life, and will usually be less than estimated in later years (2). It follows that total system costs determined by machine rates also must be interpreted carefully, since it is most likely that the machines in the system will not all be the same age. In addition, the user must be aware that machine rates should not be used for replacement analysis situations, such as evaluating whether to purchase a used or new machine.

TIME STANDARDS

Costs may be expressed over any unit of time (seconds, hours, or years) as long as the results have meaning to the user. Machine rates are usually expressed per productive machine hour (PMH) or scheduled machine hour (SMH). Scheduled time is the time during which equipment is scheduled to do productive work. Productive time is that part of scheduled time during which a machine is performing its scheduled function (1). The sum of productive time and non-productive time equals the scheduled operating time. The ratio of the productive time to the scheduled time for a machine is known as the utilization rate of the machine.

For the costs presented in this circular, 2,000 scheduled machine hours per year were assumed for all machines. Utilization rates, table 1, were determined from a review of the literature and standardized by machine category or sub-category. Total machine costs were expressed in both dollars per SMH and dollars per PMH.

CALCULATION OF MACHINE RATES

The actual machine rate calculation procedure, in the form of a machine rate worksheet, is shown in table 2. In the calculation of ma-

chine rates, costs must be determined for both owning and operating the machine.

OWNERSHIP COSTS

Ownership costs, also known as fixed or overhead costs, are those which can be predicted and accumulate with the length of ownership (5). These machine costs are not dependent on operating conditions or machine usage. Instead, they occur constantly, even if the machine is stored for a season. While owning costs may be predicted, these can be controlled only partially by the logging manager once a machine is purchased. The components of ownership costs are traditionally defined as depreciation, interest, insurance, and taxes.

Depreciation

The fixed cost known as depreciation is a charge against production to cover the cost of a fixed asset used. This decline in value is not an “out-of-pocket” cost in the sense that a cash payment is made. Rather, it is the loss in value “associated with the production of a unit of output.”³ Depreciation cost may be expressed per unit of time or unit of product produced. The method used to calculate machine depreciation costs should reflect the firm’s view of a machine’s value over its useful life. Accelerated depreciation methods are often used for full advantage of tax savings in the early years of a machine’s life. Straight-line depreciation assumes a constant decrease in value over the life of a machine; it is the simplest and generally accepted method used to estimate equipment cost per unit of time (6). In this circular, the straight-line method was used to calculate depreciation.

Data required to calculate depreciation cost are purchase price, useful life, and salvage value. Purchase prices of the machines listed in this publication were gathered from dealers and manufacturers during the early winter of 1987. These prices were the list prices (F.O.B.) for the machines equipped with either the standard level or most common level of features and options. Tire and track values were included in the depreciation basis. Table 1 contains useful life estimates by machine type as found in Cabbage (2), Hypes and Stuart (3), and Miyata (6). However, for the purpose of standardization in this circular salvage value was assigned as 20 percent of the purchase price for all machines.

Interest Costs

Interest is defined as the rental amount charged by a lender for the use of money (8). Interest expenses, as explained by Matthews (5),

³Stuart, Bill. An unpublished paper presented at the VPI & SU Cost Analysis and Evaluation Seminar, November 15-17, 1977.

TABLE 1. MACHINE LIFE, SALVAGE VALUE, UTILIZATION, AND REPAIR AND MAINTENANCE ESTIMATORS

	Machine category/description	Life (years)	Salvage value ¹	Utilization ²	Repair and maintenance ³
1	Chainsaw	1	20	50	700 ⁴
2	Tree shear, without carrier	5	50	60	100
3a	Feller-buncher, small, rubber-tired	3	20	65	100
3b	Feller-buncher, medium-large, rubber-tired	4	20	65	100
3c	Feller-buncher, large, tracked, boom	5	15	60	75
4a	Cable skidder, less than 80 horsepower	4	20	65	75
4b	Cable skidder, medium, 80-100 horsepower	4	20	65	90
4c	Cable skidder, medium, 101-120 horsepower	5	15	60	90
4d	Cable skidder, more than 120 horsepower . .	5	10	60	90
5a	Grapple skidder, 70-90 horsepower	4	20	65	90
5b	Grapple skidder, more than 91 horsepower	5	25	60	90
6	Grapple skidder, large, tracked, bunk	5	15	65	100
7	Forwarder, shortwood	4	20	65	100
8a	Slasher/loader, multi-stem	4	0	65	35
8b	Delimber, iron gate	5	20	90	65
9	Harvester, combine	4	20	65	110
10a	Loader, bigstick	5	10	65	90
10b	Loader, small, hydraulic	5	30	65	90
10c	Loader, medium, hydraulic	5	30	65	90
11a	Chipper, small-medium, 12-18 inches	5	20	75	100
11b	Chipper, large, over 22 inches	5	20	75	100
12a	Crawler tractor, less than 100 horsepower . .	5	20	25	100
12b	Crawler tractor, 101-200 horsepower	5	20	60	100
12c	Crawler tractor, more than 201 horsepower	5	20	60	100

¹ Percent of purchase price.

² Percent of scheduled machine hours.

³ Percent of annual depreciation.

⁴ Includes fuel and oil costs.

Source: Cabbage (2), Hypes and Stuart (3), Miyata (6), Warren (9), and authors.

are included in machine rates to avoid unrealistic comparisons between machines with different initial costs. Machine purchases are charged the amount which the funds would have earned had these been invested elsewhere, such as in bonds or a savings account.

An interest rate is used to determine the interest cost in machine rate calculations. This rate should equal the rate charged by the lending institution for borrowed purchases, or a firm's alternative investment rate for cash purchases. For the calculations in this circular, a 12 percent annual percentage rate (APR) was used. This value was based on a survey of equipment dealers and lending institutions. Once the interest rate has been determined, it is charged to the average yearly investment (AYI) amount for the machine. AYI is also referred to in the literature as "average value of yearly investment" (AVI) (6) and "average annual investment" (AAI) (9). The AYI is a value which represents the lifetime average of the investment cost of a machine. The formula for calculating AYI may be found in the machine rate worksheet, table 2.

TABLE 2. MACHINE RATE WORKSHEET

Machine description: _____

1. *Input data*
 - Purchase price, (P) = _____ dollars
 - Machine horsepower rating, (hp) = _____ horsepower
 - Machine life, (n) = _____ years
 - Salvage value, percent of purchase price, (rv%) = _____ percent
 - Utilization rate, (ut%) = _____ percent
 - Repair and maintenance, percent of depreciation, (rm%) = _____ percent
 - Interest rate, (in%) = _____ percent
 - Insurance and tax rate, (it%) = _____ percent
 - Fuel consumption rate, (fcr) = _____ gallons per horsepower hour
 - Fuel cost per gallon (fcg) = _____ dollars per gallon
 - Lube and oil, percent of fuel cost, (lo%) = _____ percent
 - Operator wage and benefit rate, (WB) = _____ dollars per hour
 - Scheduled machine hours, (SMH) = _____ hours per year
2. *Calculations*
 - Salvage value, (S) = (P*rv%) = _____ dollars
 - Annual depreciation, (AD) = [(P - S)/n] = _____ dollars
 - Average yearly investment, (AYI) = [(((P - S)*(n + 1))/2n) + S] = _____ dollars
 - Productive machine hours, (PMH) = (SMH*ut%) = _____ hours/year
3. *Ownership costs*
 - Interest cost, (IN) = (in%*AYI) = _____ dollars per year
 - Insurance and tax cost, (IT) = (it%*AYI) = _____ dollars per year
 - Yearly ownership cost, (YF\$) = (AD + IN + IT) = _____ dollars per year
 - Ownership cost per SMH, (F\$SMH) = (YF\$/SMH) = _____ dollars per hour
 - Ownership cost per PMH, (F\$PMH) = (YF\$/PMH) = _____ dollars per hour
4. *Operating costs*
 - Fuel cost, (F) = (hp*fcr*fcg) = _____ dollars per hour
 - Lube cost, (L) = (F*lo%) = _____ dollars per hour
 - Repair and maintenance cost, (RM) = (AD*rm%/PMH) = _____ dollars per hour
 - Operator labor and benefit cost, (WB/ut%) = _____ dollars per hour
 - Operating cost per PMH, (V\$PMH) = [F + L + RM + (WB/ut%)] = _____ dollars per hour
 - Operating cost per SMH, (V\$SMH) = (V\$PMH*ut%) = _____ dollars per hour
5. *Total machine costs*
 - Total cost per SMH, (T\$SMH) = (F\$SMH + V\$SMH) = _____ dollars per hour
 - Total cost per PMH, (T\$PMH) = (F\$PMH + V\$PMH) = _____ dollars per hour

Insurance Costs

The cost of liability and comprehensive insurance coverage varies depending on the location and size of a woods operation. Generally, the more pieces of equipment insured, the lower the premium cost per machine. Rates obtained from agents in the Auburn, Alabama, area range from 3¼ to 5 percent of the replacement cost for a piece of machinery, but have been generally increasing since the survey was completed. In this report, a yearly insurance cost was based on a percentage of the purchase price, table 3, as taken from Werblow and Cubbage (10).

TABLE 3. INSURANCE RATES

Equipment	Percent of purchase price
Skidder	5.0
Rubber-tired feller buncher	4.5
Tracked feller buncher	3.5
Whole-tree chipper	2.0
Dozer-crawlers	2.0
Loaders and slashers	1.5

Source: Werblow and Cabbage (10)

Tax Costs

Taxes are costs paid to the local government based on the assessed value of the machine. License and highway use fees are included in this cost category. Since in-woods equipment is not usually subject to tax collection, no tax costs were used in this analysis.

Operating Costs

Operating costs, also known as variable costs, occur solely due to the operation of a machine. The magnitude of these costs is directly proportional to the time the machine operates. Operating costs are subject to greater management control than are ownership costs. Operating cost items consist of fuel, lubrication, repair and maintenance, and labor and benefits. Generally, labor costs are paid during scheduled machine hours, while the remaining operating costs are incurred over productive machine hours.

Fuel Costs

The fuel consumption rate for a machine is mainly a function of the machine's horsepower rating; however, transmission type, machine type, and machine use also influence fuel consumption. To obtain fuel cost per productive hour, the gallon-per-hour fuel consumption rate is multiplied by the fuel price per gallon. Fuel consumption was determined using consumption rates, table 4, from Plummer and Stokes (7); fuel costs were based on a local oil price survey.

Lubrication Costs

Lube costs include the cost of engine oil, hydraulic oil, and other lubricants. This cost is usually determined as a percentage of fuel costs, since the factors which determine fuel consumption (horsepower, transmission type, machine type, and machine use) also determine the amount of lubricants used. A rate of 36.8 percent of hourly fuel cost was used to determine lube costs. This rate was calculated from Plummer and Stokes (7) and costs were based on a local price survey.

TABLE 4. FUEL CONSUMPTION BY MACHINE TYPE AND TRANSMISSION TYPE

Machine category/description	Fuel consumption		
	Transmission		
	Standard	All	Powershift
	(<i>gal/hp-hr</i>)		
1 Chainsaw		0.0*	
2 Tree shear, without carrier		0.0	
3a Feller buncher, small, rubber tire		0.02633	
3b Feller buncher, medium to large, rubber tire		0.02633	
3c Feller buncher, large, tracked, boom		0.02633	
4a Cable skidder, small, to 70 horsepower	0.02917		0.02800
4b Cable skidder, medium, 80 to 100 horsepower	0.02917		0.02800
4c Cable skidder, medium, 110 to 120 horsepower	0.02917		0.02800
5a Grapple skidder, 70 to 90 horsepower	0.02917		0.02800
5b Grapple skidder, 100 horsepower up	0.02917		0.02800
6 Grapple skidder, large, tracked, bunk	0.02917		0.02800
7 Forwarder, shortwood		0.02488	
8a Slasher/loader, multi-stem		0.03104	
8b Delimber, iron gate		0.0	
9 Harvesters, combine		0.02917	
10a Loader, bigstick		0.02166	
10b Loader, small, hydraulic		0.02166	
10c Loader, medium, hydraulic		0.02166	
11a Chipper, small to medium, 12 to 18 inches		0.02292	
11b Chipper, large, 22 inches up		0.02292	
12a Dozer-crawler, to 100 horsepower		0.03932	
12b Dozer-crawler, 110 to 200 horsepower		0.03932	
12c Dozer-crawler, 210 horsepower up		0.03932	

*Fuel cost included in repair and maintenance cost.

Sources: Plummer and Stokes (7), and Stokes.

Repair and Maintenance

Repair and maintenance are the most unpredictable of all machine costs. These costs are influenced by operating conditions, operator skill, repair and maintenance strategy, and machine quality. The repair and maintenance component includes the cost of preventive maintenance parts and labor, repair parts and labor, and, in this study, tire (or track) replacement costs.

Repair and maintenance hourly costs can be taken from historic records or estimated as a percentage of hourly depreciation costs. For this circular, a percentage of hourly depreciation was used. This calculation results in an average cost over the useful life of a machine. Percentage rates were obtained from Cabbage (2) and Warren (9). Table 1 lists these values by machine type.

Labor and Benefit Costs

Wages and benefits were not included in this study because of the wide range of rates paid by different employers and varying geographic locations. Labor costs generally occur during scheduled machine hours and may be added directly to the total machine cost per SMH value for each machine listed. Labor is often paid on a piece

rate, which can be added directly to the costs per unit of production or converted to an approximate hourly rate for machine rate calculations. Dividing the labor cost per SMH by the utilization rate gives the equivalent labor cost per PMH, which may be added to the total machine cost per productive hour.

CAUTIONS IN USING MACHINE RATES

The simplicity of the machine rate lends itself to a wide user audience. Explicit assumptions must be made to use this approach, however, and these assumptions are not necessarily the same for all users. The total hours of machine life, salvage value, cost of interest, taxes, and depreciation, and the cost of maintenance and repairs are variable, which are based on equipment operating conditions and philosophies and current economic conditions. In addition, neither the time value of money nor the income tax impact is considered in a machine rate analysis, but only an average machine cost per hour is calculated.

MICROCOMPUTER SPREAD-SHEET ANALYSIS

To reduce the work required to keep updated machine rates for the one hundred plus machines being studied, a microcomputer spread-sheet program was used. Spread-sheet software is essentially an electronic pencil, paper, and calculator. The viewing screen becomes a worksheet which is organized by rows and columns forming a grid of cells or blocks. Either an alpha-numeric label, a numeric value, or a formula may be entered into each of these cells. The result of any calculation is automatically displayed in the cell that contained a formula. This electronic worksheet also has a recalculation capability that makes computing current machine costs a simple matter of entering updated numerical values. The new results will be automatically computed and displayed in the appropriate formula blocks.

To calculate and store the machine rate information for this circular, a microcomputer was used with a Lotus 1-2-3 spreadsheet software package. Machine cost input variables and formulas were entered across the worksheet columns in the order in which these are listed in the machine rate worksheet, table 2. Each individual machine's description and cost data were entered in the appropriate column on a worksheet row. Combined with the appropriate formula, the software package calculated and displayed the cost analysis results on the worksheet.

Most small computers and spread-sheet programs can be used to construct a machine rate information file. This may be accomplished by entering the variables and formulas listed in table 2 and by providing the necessary cost data in the corresponding worksheet cells.

RESULTS

The appendices of this report contain the machine rate results for the forest harvesting machines selected for analysis. The machines are organized by category and manufacturer. Other information includes descriptive features such as mobility type, attachment type, attachment size, engine horsepower, transmission type, and tire size. The data entries for each machine were obtained from tables 1, 3, and 4 in this report, and surveyed cost information from equipment dealers. Calculations were performed using the formulas found in table 2. Results are expressed as both a cost per SMH and PMH basis for fixed cost, operating cost, and total machine cost.

Basic input data for specific harvesting machines are shown in Appendix A. Purchase prices shown were current as of late 1987. Input parameters, such as machine life, repair and maintenance rates, and specific fuel usage rates by machine are shown in Appendix B. Appendix C contains additional operating parameters and calculated annual costs for each machine. Hourly operating and total costs based on both scheduled and productive machine hours are exhibited in Appendix D.

When using the machine rate figures presented, the reader must realize that machine life and purchase price are the most influential factors affecting machine costs. A 1-year change in machine life estimation results in a drastic change in the average yearly investment and annual depreciation, which changes all the costs determined by these values. Purchase price, while less influential than useful life, also causes the values of the annual yearly investment, annual depreciation, and maintenance and repair to change. If an individual manager experiences different machine life durations, or pays significantly different prices for a machine listed here, appropriate corrections should be made to obtain an hourly cost to reflect that manager's local conditions. Also, these costs are based on standardized assumptions and may not reflect actual costs of a particular machine in a specific operation. There are many factors, such as down payments and different financing plans, local fuel costs, and a range of maintenance procedures, that may affect these costs. However, using these standard methods, relative comparisons can be made between harvesting equipment types.

As stated in the operating costs portion of this publication, labor rates have not been included in the calculation of the machine rates presented in the appendices. Labor and benefit costs are locally variable and would therefore be misleading. Once a desired area of operation has been determined, machine operator labor costs, ex-

pressed on an hourly basis, may be added directly to the operating cost per SMH.

SUMMARY

Machine rate calculations provide a method of comparing the economics of specified machines using generalized cost data. The machine rate method considers both the fixed costs of ownership and the variable costs of operation in determining an average hourly machine cost. Labor costs were not included because of their high variability. Estimates for each cost component were made from the best available sources.

Microcomputers and spreadsheet programs provide managers and researchers with an efficient means of frequently updating equipment cost estimates. Hourly cost estimates, coupled with hourly production estimates, can allow managers to make economic comparisons between timber harvesting equipment alternatives.

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Appendix A. Basic Input Data for Specific Harvesting Machines

Machine number	Machine make	Model number	Machine type	Classification	Mobility	Attachments type	Attach. size	Rated HP	Trans type	Tire/Trk size	Purchase price	Dol.
1	CAT	508	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	95	PS	23.1x26	75,770	
2	CAT	508	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	95	PS	23.1x26	86,890	
3	CAT	518	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	120	PS	23.1x26	85,900	
4	CAT	518	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	130	PS	23.1x26	106,760	
5	CAT	528	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	175	PS	24.5X32	123,580	
6	CAT	528	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	175	PS	24.5X32	151,000	
7	VME	665-D	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	130	PS	18.4X34	66,825	
8	VME	665-DGS	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	130	PS	23.1X26	81,705	
9	VME	666-D	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	152	PS	23.1X26	75,290	
10	VME	666-DGS	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	152	PS	23.1X26	92,175	
11	VME	667-D	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	177	PS	23.1X26	87,140	
12	VME	667-DGS	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	177	PS	24.5X32	109,625	
13	VME	668-D	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	225	PS	30.5X32	119,890	
14	VME	668-DGS	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	225	PS	30.5X32	146,080	
15	FRK	105	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	77	STD	18.4X26	50,950	
16	FRK	105	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	77	PS	23.1X26	64,750	
17	FRK	142	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	121	STD	23.1X26	56,200	
18	FRK	170	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	121	STD	23.1X26	63,500	
19	FRK	170	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	121	STD	23.1X26	84,000	
20	FRK	170-T	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	154	PS	23.1X26	71,500	
21	FRK	170-T	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	154	PS	23.1X26	86,500	
22	FRK	405	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	104	STD	23.1X26	61,500	
23	FRK	405	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	104	PS	23.1X26	65,900	
24	FRK	405	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	104	PS	23.1X26	77,000	
25	JD	440-D	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	80	STD	18.4X26	58,155	
26	JD	540-D	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	100	PS	23.1X26	66,241	
27	JD	548-D	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	100	PS	23.1X26	74,090	
28	JD	640-D	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	120	PS	24.5X32	74,306	
29	JD	648-D	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	120	PS	24.5X32	85,046	
30	JD	740-A	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	152	PS	30.5X32	108,254	
31	JD	740-A	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	152	PS	30.5X32	139,768	
32	LOGHOG	546	SKIDDER	FRONTAXLE	RTIRE	GRABS	NA	60	STD	18.4X30	26,000	
33	LOGHOG	760	SKIDDER	FRONTAXLE	RTIRE	GRPL	NA	96	STD	23.1X30	38,000	
34	TJ	225-A	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	92	STD	16.9X30	59,500	
35	TJ	230-A	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	100	STD	18.4X34	64,000	
36	TJ	240-A	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	125	STD	18.4X34	70,000	
37	TJ	350-A	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	132	PS	23.1X26	74,500	
38	TJ	350-A	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	132	PS	23.1X26	90,000	
39	TJ	380-A	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	136	PS	23.1X26	79,000	
40	TJ	380-A	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	148	PS	23.1X26	97,000	
41	TJ	450-A	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	177	PS	23.1X26	85,000	
42	TJ	450-A	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	177	PS	23.1X26	103,000	
43	TREEFM	C5D	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	100	STD	18.4X26	56,305	
44	TREEFM	C6D	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	127	STD	23.1X26	67,740	
45	TREEFM	C7T	SKIDDER	ARTICULATED	RTIRE	CABLE	NA	175	PS	23.1X26	79,620	
46	TREEFM	C7D	SKIDDER	ARTICULATED	RTIRE	GRPL	NA	136	PS	23.1X26	98,835	
47	GAFNER	4510	FORWARDER	ARTICULATED	RTIRE	KNUCBM	NA	62	STD	18.4X26	56,000	
48	GAFNER	5010	FORWARDER	ARTICULATED	RTIRE	KNUCBM	NA	82	STD	18.4X26	59,500	

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Appendix A. Continued.

Machine number	Machine make	Model number	Machine type	Classification	Mobility	Attachments type	Attach. size	Rated HP	Trans type	Tire/Trk size	Purchase price	DoI.
49	GAFNER	5010	FORWARDER	ARTICULATED	RT IRE	KNUCBM	NA	102	PS	23.1X26	67,000	
50	GAFNER	5510	FORWARDER	ARTICULATED	RT IRE	KNUCBM	NA	82	STD	23.1X26	76,000	
51	GAFNER	5510	FORWARDER	ARTICULATED	RT IRE	KNUCBM	NA	102	PS	23.1X26	83,500	
52	TREEFM	C5D	FORWARDER	ARTICULATED	RT IRE	KNUCBM	NA	100	STD	23.1X26	82,880	
53	TREEFM	C6D	FORWARDER	ARTICULATED	RT IRE	KNUCBM	NA	127	STD	23.1X26	98,260	
54	BARKO	775	FB	ARTICULATED	RT IRE	SHEAR	20"	185	HS	23.1X26	128,000	
55	BELL	MODEL T	FB	TRICYCLE	RT IRE	SAW	24"	66	HS	18.4X26	45,000	
56	BELL	SUPERT	FB	TRICYCLE	RT IRE	SAW	24"	70	HS	23.1X26	55,000	
57	BOBCAT	1080-C	FB	SKIDSTEER	TRACK	SHEAR	16"	94	HS	NA	69,400	
58	BOBCAT	1213	FB	SKIDSTEER	TRACK	SHEAR	13"	62	HS	NA	49,000	
59	CAT	217	FB	TRACK	TRACK	SAW	20"	125	HYD	NA	19,840	
60	CAT	227	FB	TRACK	TRACK	SHEAR	20"	250	HYD	NA	255,120	
61	CAT	518	FB	ARTICULATED	RT IRE	SHEAR	20"	130	PS	23.1X26	145,150	
62	DC	70D	FB	TRACK	TRACK	SHEAR	16"	55	HYD	NA	97,500	
63	DC	490D	FB	TRACK	TRACK	SHEAR	20"	75	HYD	NA	133,000	
64	FRK	105	FB	ARTICULATED	RT IRE	SHEAR	16"	77	PS	23.1X26	73,500	
65	FRK	405	FB	ARTICULATED	RT IRE	SHEAR	16"	104	PS	23.1X26	81,200	
66	FRK	170	FB	ARTICULATED	RT IRE	SHEAR	20"	121	PS	23.1X26	100,000	
67	HYDROAX	111C	FB	ARTICULATED	RT IRE	SHEAR	14"	85	HS	23.1X26	66,000	
68	HYDROAX	121	FB	TRICYCLE	RT IRE	SHEAR	14"	102	HS	23.1X26	72,155	
69	HYDROAX	311B	FB	ARTICULATED	RT IRE	SHEAR	16"	102	HS	23.1X26	87,336	
70	HYDROAX	411B II	FB	ARTICULATED	RT IRE	SHEAR	16"	126	HS	23.1X26	102,000	
71	HYDROAX	511B	FB	ARTICULATED	RT IRE	SHEAR	20"	152	HS	23.1X26	111,000	
72	HYDROAX	611B II	FB	ARTICULATED	RT IRE	SHEAR	20"	185	HS	23.1X26	121,000	
73	HYDROAX	6200	FB	ARTICULATED	RT IRE	SHEAR	16"	165	HS	30.5X32	165,000	
74	MORBK	MARK5	FB	TRICYCLE	RT IRE	SHEAR	14"	67	HS	23.1X26	64,500	
75	MORBK	SUPERB	FB	TRICYCLE	RT IRE	SHEAR	20"	116	HS	23.1X26	89,500	
76	TJ TIMBCO	2515	FB	TRACK	TRACK	SHEAR	15"	177	PS	21.7"	157,069	
77	TJ TIMBCO	2518	FB	TRACK	TRACK	SHEAR	18"	177	HS	23.6"	169,306	
78	TJ TIMBCO	2520	FB	TRACK	TRACK	SHEAR	20"	177	HS	23.6"	197,533	
79	BARKO	145-B	LOADER	17520LB	TRUCK	KNUCBM	NA	71	NA	NA	51,000	
80	BARKO	160-A	LOADER	20000LB	TRUCK	KNUCBM	NA	74	NA	NA	62,000	
81	BARKO	275	LOADER	32100LB	TRUCK	KNUCBM	NA	100	NA	NA	85,000	
82	BARKO	350	LOADER	41000LB	ARTCAR	KNUCBM	NA	167	NA	NA	165,000	
83	BARKO	450-CLP	LOADER	56000LB	ARTCAR	KNUCBM	NA	184	NA	NA	310,000	
84	BARKO	550	LOADER	72000LB	ARTCAR	KNUCBM	NA	296	NA	NA	380,000	
85	BLACKBEAR	MX-230	LOADER	21984LB	TRUCK	KNUCBM	NA	155	NA	NA	52,600	
86	HOOD	6000	LOADER	5200LB	TRUCK	KNUCBM	NA	65	NA	NA	14,169	
87	HOOD	7000	LOADER	7500LB	TRUCK	KNUCBM	NA	65	NA	NA	15,250	
88	HOOD	8000	LOADER	11000LB	TRUCK	KNUCBM	NA	65	NA	NA	17,932	
89	HOOD	12000	LOADER	12500LB	TRUCK	KNUCBM	NA	115	NA	NA	36,047	
90	HOOD	20000	LOADER	20000LB	TRUCK	KNUCBM	NA	115	NA	NA	46,335	
91	HOOD	DIXIE SP	LOADER	20000LB	TRUCK	KNUCBM	NA	115	NA	NA	46,986	
92	HOOD	24000	LOADER	24000LB	TRUCK	KNUCBM	NA	115	NA	NA	50,486	
93	HOOD	S182	LOADER	17500LB	TRUCK	KNUCBM	NA	115	NA	NA	41,750	
94	HUSKY	XL-70	LOADER	6800LB	TRUCK	KNUCBM	NA	65	NA	NA	16,805	
95	HUSKY	XL-120	LOADER	9000LB	TRUCK	KNUCBM	NA	65	NA	NA	18,159	
96	HUSKY	XL-170	LOADER	15787LB	TRUCK	KNUCBM	NA	65	NA	NA	39,488	

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Appendix A. Continued.

Machine number	Machine make	Model number	Machine type	Classification	Mobility	Attachments type	Attach. size	Rated HP	Trans type	Tire/Trk size	Purchase price	Dol.
97	HUSKY	XL-175	LOADER	17926LB	TRUCK	KNUCBM	NA	65	NA	NA	43,024	
98	HUSKY	XL-235	LOADER	21689LB	TRUCK	KNUCBM	NA	65	NA	NA	53,174	
99	HUSKY	XL-335	LOADER	32100LB	TRUCK	KNUCBM	NA	90	NA	NA	74,610	
100	LOGHOG	XTR820	LOADER	8452LB	TRUCK	KNUCBM	NA	65	NA	NA	20,330	
101	LOGHOG	XTR850	LOADER	18174LB	TRUCK	KNUCBM	NA	95	NA	NA	43,940	
102	LOGHOG	XTR870	LOADER	24014LB	TRUCK	KNUCBM	NA	74	NA	NA	47,250	
103	LOGHOG	Z-160	LOADER	10200LB	TRUCK	KNUCBM	NA	74	NA	NA	27,810	
104	LOGHOG	Z-200	LOADER	13900LB	TRUCK	KNUCBM	NA	74	NA	NA	33,260	
105	LUCKY	1400	LOADER	19000LB	TRUCK	KNUCBM	NA	110	NA	NA	39,125	
106	LUCKY	L-1020	LOADER	20450LB	TRUCK	KNUCBM	NA	110	NA	NA	59,062	
107	LUCKY	L-820B VM	LOADER	21900LB	TRUCK	KNUCBM	NA	110	NA	NA	53,125	
108	LUCKY	L-1030	LOADER	32445LB	TRUCK	KNUCBM	NA	152	NA	NA	83,906	
109	LUCKY	L-238 VM	LOADER	23800LB	TRUCK	KNUCBM	NA	142	NA	NA	65,156	
110	MORBARK	1000	LOADER	20000LB	TRUCK	KNUCBM	NA	101	NA	NA	40,000	
111	PRENTICE	F90	LOADER	7599LB	TRUCK	KNUCBM	NA	65	NA	NA	16,446	
112	PRENTICE	120	LOADER	10370LB	TRUCK	KNUCBM	NA	65	NA	NA	21,022	
113	PRENTICE	150	LOADER	14850LB	TRUCK	KNUCBM	NA	65	NA	NA	25,188	
114	PRENTICE	180	LOADER	17552LB	TRUCK	KNUCBM	NA	77	NA	NA	48,359	
115	PRENTICE	210-C	LOADER	20372LB	TRUCK	KNUCBM	NA	94	NA	NA	58,147	
116	PRENTICE	410-B	LOADER	32341LB	TRUCK	KNUCBM	NA	142	NA	NA	79,372	
117	CAT	D4HCS	CRAWLER	TRACK	TRACK	CABLE	NA	90	PS	23"	104,955	
118	CAT	D4HCS	CRAWLER	TRACK	TRACK	GRAPPLE	NA	90	PS	23"	145,145	
119	CAT	D4HCS	CRAWLER	TRACK	TRACK	DRUMBAR	NA	90	PS	23"	117,257	
120	CAT	D5HCS	CRAWLER	TRACK	TRACK	CABLE	NA	120	PS	26"	148,196	
121	CAT	D5HCS	CRAWLER	TRACK	TRACK	GRAPPLE	NA	120	PS	26"	190,096	
122	MORBARK	20	CHIPPER	20 INCH	NA	KNUCBM	NA	400	NA	NA	142,850	
123	MORBARK	22 RXL	CHIPPER	22 INCH	NA	SLIDEBOOM	NA	600	NA	NA	240,700	
124	MORBARK	23	CHIPPER	23 INCH	NA	KNUCBM	NA	650	NA	NA	242,250	
125	MORBARK	27	CHIPPER	27 INCH	NA	SLIDEBOOM	NA	600	NA	NA	249,200	
126	MORBARK	30	CHIPPER	30 INCH	NA	KNUCBM	NA	800	NA	NA	235,000	
127	MORBARK	37	CHIPPER	37 INCH	NA	KNUCBM	NA	1200	NA	NA	350,000	
128	TRELAN	21L	CHIPPER	21 INCH	NA	KNUCBM	NA	400	NA	NA	150,000	
129	TRELAN	23L	CHIPPER	23 INCH	NA	KNUCBM	NA	750	NA	NA	193,000	
130	TRELAN	232	CHIPPER	23 INCH	NA	KNUCBM	NA	500	NA	NA	125,000	
131	TRELAN	23	CHIPPER	23 INCH	NA	KNUCBM	NA	700	NA	NA	150,000	
132	TRELAN	26L	CHIPPER	26 INCH	NA	KNUCBM	NA	750	NA	NA	240,000	

1/ CAT = Caterpillar VME = VME America FRK = Franklin JD = John Deere TJ = Timberjack TREEFM = Tree Farmer
MORBK = Morbark

Appendix B. Operational Parameters for Specific Harvesting Machines

Machine number	Machine make	Model number	Machine type	Life (yr.)	Salvage value	Util.	R & M rate	Interest rate	I&T rate	Fuel use rate	Fuel \$/gal	Lube and oil rate
1	CAT	508	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02800	1.00	0.3677
2	CAT	508	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02800	1.00	0.3677
3	CAT	518	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
4	CAT	518	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
5	CAT	528	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
6	CAT	528	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
7	VME	665-D	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
8	VME	665-DGS	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
9	VME	666-D	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
10	VME	666-DGS	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
11	VME	667-D	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
12	VME	667-DGS	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
13	VME	668-D	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
14	VME	668-DGS	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
15	FRK	105	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02917	1.00	0.3677
16	FRK	105	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02800	1.00	0.3677
17	FRK	142	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02917	1.00	0.3677
18	FRK	170	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02917	1.00	0.3677
19	FRK	170	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02917	1.00	0.3677
20	FRK	170-T	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
21	FRK	170-T	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
22	FRK	405	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02917	1.00	0.3677
23	FRK	405	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02800	1.00	0.3677
24	FRK	405	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
25	JD	440-D	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02917	1.00	0.3677
26	JD	540-D	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02800	1.00	0.3677
27	JD	548-D	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
28	JD	640-D	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
29	JD	648-D	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
30	JD	740-A	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
31	JD	740-A	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
32	LOGHOG	546	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02917	1.00	0.3677
33	LOGHOG	760	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02917	1.00	0.3677
34	TJ	225-A	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02917	1.00	0.3677
35	TJ	230-A	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02917	1.00	0.3677
36	TJ	240-A	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02917	1.00	0.3677
37	TJ	350-A	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
38	TJ	350-A	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
39	TJ	380-A	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
40	TJ	380-A	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
41	TJ	450-A	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
42	TJ	450-A	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
43	TREEFM	C5D	SKIDDER	5	0.2	0.65	0.90	0.12	0.05	0.02917	1.00	0.3677
44	TREEFM	C6D	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02917	1.00	0.3677
45	TREEFM	C7T	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
46	TREEFM	C7D	SKIDDER	5	0.2	0.60	0.90	0.12	0.05	0.02800	1.00	0.3677
47	GAFNER	4510	FORWARDER	5	0.2	0.65	1.00	0.12	0.015	0.02488	1.00	0.3677
48	GAFNER	5010	FORWARDER	5	0.2	0.65	1.00	0.12	0.015	0.02488	1.00	0.3677

CONTINUED

ppendix B. Continued

Machine number	Machine make	Model number	Machine type	Life (yr)	Salvage value	Util.	R & M rate	Interest rate	I&T rate	Fuel use rate	Fuel \$/gal.	Lube and oil rate
49	GAFNER	5010	FORWARDER	5	0.2	0.60	1.00	0.12	0.015	0.02488	1.00	0.3677
50	GAFNER	5510	FORWARDER	5	0.2	0.65	1.00	0.12	0.015	0.02488	1.00	0.3677
51	GAFNER	5510	FORWARDER	5	0.2	0.65	1.00	0.12	0.015	0.02488	1.00	0.3677
52	TREEFM	C5D	FORWARDER	5	0.2	0.65	1.00	0.12	0.015	0.02488	1.00	0.3677
53	TREEFM	C6D	FORWARDER	5	0.2	0.65	1.00	0.12	0.015	0.02488	1.00	0.3677
54	BARKO	775	FB	5	0.2	0.65	1.00	0.12	0.045	0.02633	1.00	0.3677
55	BELL	MODELT	FB	5	0.2	0.65	0.90	0.12	0.045	0.02633	1.00	0.3677
56	BELL	SUPERT	FB	5	0.2	0.65	0.90	0.12	0.045	0.02633	1.00	0.3677
57	BOBCAT	1080-C	FB	5	0.2	0.65	0.90	0.12	0.045	0.02633	1.00	0.3677
58	BOBCAT	1213	FB	5	0.2	0.65	0.90	0.12	0.045	0.02633	1.00	0.3677
59	CAT	217	FB	5	0.2	0.60	0.75	0.12	0.035	0.02633	1.00	0.3677
60	CAT	227	FB	5	0.2	0.60	0.75	0.12	0.035	0.02633	1.00	0.3677
61	CAT	518	FB	5	0.2	0.65	1.00	0.12	0.045	0.02633	1.00	0.3677
62	DC	700	FB	5	0.2	0.65	1.00	0.12	0.035	0.02633	1.00	0.3677
63	DC	4900	FB	5	0.2	0.65	1.00	0.12	0.035	0.02633	1.00	0.3677
64	FRK	105	FB	5	0.2	0.65	1.00	0.12	0.045	0.02633	1.00	0.3677
65	FRK	405	FB	5	0.2	0.65	1.00	0.12	0.045	0.02633	1.00	0.3677
66	FRK	170	FB	5	0.2	0.65	1.00	0.12	0.045	0.02633	1.00	0.3677
67	HYDROAX	111C	FB	5	0.2	0.65	1.00	0.12	0.045	0.02633	1.00	0.3677
68	HYDROAX	121	FB	5	0.2	0.75	0.75	0.12	0.045	0.02633	1.00	0.3677
69	HYDROAX	311B	FB	5	0.2	0.65	1.00	0.12	0.045	0.02633	1.00	0.3677
70	HYDROAX	411B II	FB	5	0.2	0.65	1.00	0.12	0.045	0.02633	1.00	0.3677
71	HYDROAX	511B	FB	5	0.2	0.65	1.00	0.12	0.045	0.02633	1.00	0.3677
72	HYDROAX	611B II	FB	5	0.2	0.65	1.00	0.12	0.045	0.02633	1.00	0.3677
73	HYDROAX	6200	FB	5	0.2	0.65	1.00	0.12	0.045	0.02633	1.00	0.3677
74	MORBK	MARK5	FB	5	0.2	0.60	0.90	0.12	0.045	0.02633	1.00	0.3677
75	MORBK	SUPERB	FB	5	0.2	0.60	0.90	0.12	0.045	0.02633	1.00	0.3677
76	TJ TIMBCO	2515	FB	4	0.2	0.60	0.75	0.12	0.035	0.02633	1.00	0.3677
77	TJ TIMBCO	2518	FB	4	0.2	0.60	0.75	0.12	0.035	0.02633	1.00	0.3677
78	TJ TIMBCO	2520	FB	4	0.2	0.60	0.75	0.12	0.035	0.02633	1.00	0.3677
79	BARKO	145-B	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
80	BARKO	160-A	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
81	BARKO	275	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
82	BARKO	350	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
83	BARKO	450-CLP	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
84	BARKO	550	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
85	BLACKBEAR	MX-230	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
86	HOOD	6000	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
87	HOOD	7000	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
88	HOOD	8000	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
89	HOOD	12000	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
90	HOOD	20000	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
91	HOOD	DIXIE SP	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
92	HOOD	24000	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
93	HOOD	S182	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
94	HUSKY	XL-70	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
95	HUSKY	XL-120	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
96	HUSKY	XL-170	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677

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Appendix B. Continued

Machine number	Machine make	Model number	Machine type	Life (yr)	Salvage value	Util.	R & M rate	Interest rate	I&T rate	Fuel use rate	Fuel \$/gal.	Lube and oil rate
97	HUSKY	XL-175	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
98	HUSKY	XL-235	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
99	HUSKY	XL-335	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
100	LOGHOG	XTR820	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
101	LOGHOG	XTR850	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
102	LOGHOG	XTR870	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
103	LOGHOG	Z-160	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
104	LOGHOG	Z-200	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
105	LUCKY	1400	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
106	LUCKY	L-1020	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
107	LUCKY	L-820B VM	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
108	LUCKY	L-1030	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
109	LUCKY	L-238 VM	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
110	MORBARK	1000	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
111	PRENTICE	F90	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
112	PRENTICE	120	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
113	PRENTICE	150	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
114	PRENTICE	180	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
115	PRENTICE	210-C	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
116	PRENTICE	410-B	LOADER	5	0.2	0.65	0.90	0.12	0.015	0.02166	1.00	0.3677
117	CAT	D4HCS	CRAWLER	5	0.2	0.60	1.00	0.12	0.02	0.03932	1.00	0.3677
118	CAT	D4HCS	CRAWLER	5	0.2	0.60	1.00	0.12	0.02	0.03932	1.00	0.3677
119	CAT	D4HCS	CRAWLER	5	0.2	0.60	1.00	0.12	0.02	0.03932	1.00	0.3677
120	CAT	DSHCS	CRAWLER	5	0.2	0.60	1.00	0.12	0.02	0.03932	1.00	0.3677
121	CAT	DSHCS	CRAWLER	5	0.2	0.60	1.00	0.12	0.02	0.03932	1.00	0.3677
122	MORBARK	20	CHIPPER	5	0.2	0.75	1.00	0.12	0.02	0.02292	1.00	0.3677
123	MORBARK	22 RXL	CHIPPER	5	0.2	0.75	1.00	0.12	0.02	0.02292	1.00	0.3677
124	MORBARK	23	CHIPPER	5	0.2	0.75	1.00	0.12	0.02	0.02292	1.00	0.3677
125	MORBARK	27	CHIPPER	5	0.2	0.75	1.00	0.12	0.02	0.02292	1.00	0.3677
126	MORBARK	30	CHIPPER	5	0.2	0.75	1.00	0.12	0.02	0.02292	1.00	0.3677
127	MORBARK	37	CHIPPER	5	0.2	0.75	1.00	0.12	0.02	0.02292	1.00	0.3677
128	TRELAN	21L	CHIPPER	5	0.2	0.75	1.00	0.12	0.02	0.02292	1.00	0.3677
129	TRELAN	23L	CHIPPER	5	0.2	0.75	1.00	0.12	0.02	0.02292	1.00	0.3677
130	TRELAN	232	CHIPPER	5	0.2	0.75	1.00	0.12	0.02	0.02292	1.00	0.3677
131	TRELAN	23	CHIPPER	5	0.2	0.75	1.00	0.12	0.02	0.02292	1.00	0.3677
132	TRELAN	26L	CHIPPER	5	0.2	0.75	1.00	0.12	0.02	0.02292	1.00	0.3677

Appendix C. Parameters and Annual Costs for Specific Harvesting Machines

Machine number	Machine make	Model number	Machine type	Scheduled hr./yr.	Prod. hr./yr.	Salvage value	Annual deprec.	Average year inv.	Interest cost/yr.	Ins. cost/yr.	Fixed cost/yr.
						Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
1	CAT	508	SK IDDER	2000	1300	15,154	12,123	51,524	6,183	3,789	22,095
2	CAT	508	SK IDDER	2000	1300	17,378	13,902	59,085	7,090	4,345	25,337
3	CAT	518	SK IDDER	2000	1200	17,180	13,744	58,412	7,009	4,295	25,048
4	CAT	518	SK IDDER	2000	1200	21,352	17,082	72,597	8,712	5,338	31,131
5	CAT	528	SK IDDER	2000	1200	24,716	19,773	84,034	10,084	6,179	36,036
6	CAT	528	SK IDDER	2000	1200	30,200	24,160	102,680	12,322	7,550	44,032
7	VME	665-D	SK IDDER	2000	1200	13,365	10,692	45,441	5,453	3,341	19,486
8	VME	665-DGS	SK IDDER	2000	1200	16,341	13,073	55,559	6,667	4,085	23,825
9	VME	666-D	SK IDDER	2000	1200	15,058	12,046	51,197	6,144	3,765	21,955
10	VME	666-DGS	SK IDDER	2000	1200	18,435	14,748	62,679	7,521	4,609	26,878
11	VME	667-D	SK IDDER	2000	1200	17,428	13,942	59,255	7,111	4,357	25,410
12	VME	667-DGS	SK IDDER	2000	1200	21,925	17,540	74,545	8,945	5,481	31,967
13	VME	668-D	SK IDDER	2000	1200	23,978	19,182	81,525	9,783	5,995	34,960
14	VME	668-DGS	SK IDDER	2000	1200	29,216	23,373	99,334	11,920	7,304	42,597
15	FRK	105	SK IDDER	2000	1300	10,190	8,152	34,646	4,158	2,548	14,857
16	FRK	105	SK IDDER	2000	1300	12,950	10,360	44,030	5,284	3,238	18,881
17	FRK	142	SK IDDER	2000	1200	11,240	8,992	38,216	4,586	2,810	16,388
18	FRK	170	SK IDDER	2000	1200	12,700	10,160	43,180	5,182	3,175	18,517
19	FRK	170	SK IDDER	2000	1200	16,800	13,440	57,120	6,854	4,200	24,494
20	FRK	170-T	SK IDDER	2000	1200	14,300	11,440	48,620	5,834	3,575	20,849
21	FRK	170-T	SK IDDER	2000	1200	17,300	13,840	58,820	7,058	4,325	25,223
22	FRK	405	SK IDDER	2000	1300	12,300	9,840	41,820	5,018	3,075	17,933
23	FRK	405	SK IDDER	2000	1300	13,180	10,544	44,812	5,377	3,295	19,216
24	FRK	405	SK IDDER	2000	1200	15,400	12,320	52,360	6,283	3,850	22,453
25	JD	440-D	SK IDDER	2000	1300	11,631	9,305	39,545	4,745	2,908	16,958
26	JD	540-D	SK IDDER	2000	1300	13,248	10,599	45,044	5,405	3,312	19,316
27	JD	548-D	SK IDDER	2000	1200	14,818	11,854	50,381	6,046	3,705	21,605
28	JD	640-D	SK IDDER	2000	1200	14,861	11,889	50,528	6,063	3,715	21,668
29	JD	648-D	SK IDDER	2000	1200	17,009	13,607	57,831	6,940	4,252	24,799
30	JD	740-A	SK IDDER	2000	1200	21,651	17,321	73,613	8,834	5,413	31,567
31	JD	740-A	SK IDDER	2000	1200	27,954	22,363	95,042	11,405	6,988	40,756
32	LOGHOG	546	SK IDDER	2000	1300	5,200	4,160	17,680	2,122	1,300	7,582
33	LOGHOG	760	SK IDDER	2000	1200	7,600	6,080	25,840	3,101	1,900	11,081
34	TJ	225-A	SK IDDER	2000	1300	11,900	9,520	40,460	4,855	2,975	17,350
35	TJ	230-A	SK IDDER	2000	1300	12,800	10,240	43,520	5,222	3,200	18,662
36	TJ	240-A	SK IDDER	2000	1200	14,000	11,200	47,600	5,712	3,500	20,412
37	TJ	350-A	SK IDDER	2000	1200	14,900	11,920	50,660	6,079	3,725	21,724
38	TJ	350-A	SK IDDER	2000	1200	18,000	14,400	61,200	7,344	4,500	26,244
39	TJ	380-A	SK IDDER	2000	1200	15,800	12,640	53,720	6,446	3,950	23,036
40	TJ	380-A	SK IDDER	2000	1200	19,400	15,520	65,960	7,915	4,850	28,285
41	TJ	450-A	SK IDDER	2000	1200	17,000	13,600	57,800	6,936	4,250	24,786
42	TJ	450-A	SK IDDER	2000	1200	20,600	16,480	70,040	8,405	5,150	30,035
43	TREEFM	C50	SK IDDER	2000	1300	11,261	9,009	38,287	4,594	2,815	16,419
44	TREEFM	C6D	SK IDDER	2000	1200	13,548	10,838	46,063	5,528	3,387	19,753
45	TREEFM	C7T	SK IDDER	2000	1200	15,924	12,739	54,142	6,497	3,981	23,217
46	TREEFM	C70	SK IDDER	2000	1200	19,767	15,814	67,208	8,065	4,942	28,820
47	GAFNER	4510	FORWARDER	2000	1300	11,200	8,960	38,080	4,570	840	14,370
48	GAFNER	5010	FORWARDER	2000	1300	11,900	9,520	40,460	4,855	893	15,268

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Appendix C. Continued

Machine number	Machine make	Model number	Machine type	Scheduled hr./yr.	Prod. hr./yr.	Salvage value	Annual deprec.	Average year inv.	Interest cost/yr.	Ins. cost/yr.	Fixed cost/yr.
				Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
49	GAFNER	5010	FORWARDER	2000	1200	13,400	10,720	45,560	5,467	1,005	17,192
50	GAFNER	5510	FORWARDER	2000	1300	15,200	12,160	51,680	6,202	1,140	19,502
51	GAFNER	5510	FORWARDER	2000	1300	16,700	13,360	56,780	6,814	1,253	21,426
52	TREEFM	C5D	FORWARDER	2000	1300	16,576	13,261	56,358	6,763	1,243	21,267
53	TREEFM	C6D	FORWARDER	2000	1300	19,652	15,722	66,817	8,018	1,474	25,214
54	BARKO	775	FB	2000	1300	25,600	20,480	87,040	10,445	5,760	36,685
55	BELL	MODEL T	FB	2000	1300	9,000	7,200	30,600	3,672	2,025	12,897
56	BELL	SUPERT	FB	2000	1300	11,000	8,800	37,400	4,488	2,475	15,763
57	BOBCAT	1080-C	FB	2000	1300	13,880	11,104	47,192	5,663	3,123	19,890
58	BOBCAT	1213	FB	2000	1300	9,800	7,840	33,320	3,998	2,205	14,043
59	CAT	217	FB	2000	1200	43,968	35,174	149,491	17,939	7,694	60,808
60	CAT	227	FB	2000	1200	51,024	40,819	173,482	20,818	8,929	70,586
61	CAT	518	FB	2000	1300	29,030	23,224	98,702	11,844	6,532	41,600
62	DC	700	FB	2000	1300	19,500	15,600	66,300	7,956	3,413	26,969
63	DC	4900	FB	2000	1300	26,600	21,280	90,440	10,853	4,655	36,788
64	FRK	105	FB	2000	1300	14,700	11,760	49,980	5,998	3,308	21,065
65	FRK	405	FB	2000	1300	16,240	12,992	55,216	6,626	3,654	23,272
66	FRK	170	FB	2000	1300	20,000	16,000	68,000	8,160	4,500	28,680
67	HYDROAX	111C	FB	2000	1300	13,200	10,560	44,880	5,386	2,970	18,916
68	HYDROAX	121	FB	2000	1500	14,431	11,545	49,065	5,888	3,247	20,680
69	HYDROAX	311B	FB	2000	1300	17,467	13,974	59,388	7,127	3,930	25,030
70	HYDROAX	411B II	FB	2000	1300	20,400	16,320	69,360	8,323	4,590	29,233
71	HYDROAX	511B	FB	2000	1300	22,200	17,760	75,480	9,058	4,995	31,813
72	HYDROAX	611B II	FB	2000	1300	24,200	19,360	82,280	9,874	5,445	34,679
73	HYDROAX	6200	FB	2000	1300	33,000	26,400	112,200	13,464	7,425	47,289
74	MORBK	MARK5	FB	2000	1200	12,900	10,320	43,860	5,263	2,903	18,486
75	MORBK	SUPERB	FB	2000	1200	17,900	14,320	60,860	7,303	4,028	25,651
76	TJ TIMCO	2515	FB	2000	1200	31,414	31,414	109,948	13,194	5,497	50,105
77	TJ TIMCO	2518	FB	2000	1200	33,861	33,861	118,514	14,222	5,926	54,009
78	TJ TIMCO	2520	FB	2000	1200	39,507	39,507	138,273	16,593	6,914	63,013
79	BARKO	145-B	LOADER	2000	1300	10,200	8,160	34,680	4,162	765	13,087
80	BARKO	160-A	LOADER	2000	1300	12,400	9,920	42,160	5,059	930	15,909
81	BARKO	275	LOADER	2000	1300	17,000	13,600	57,800	6,936	1,275	21,811
82	BARKO	350	LOADER	2000	1300	33,000	26,400	112,200	13,464	2,475	42,339
83	BARKO	450-CLP	LOADER	2000	1300	62,000	49,600	210,800	25,296	4,650	79,546
84	BARKO	550	LOADER	2000	1300	76,000	60,800	258,400	31,008	5,700	97,508
85	BLACKBEAR	MX-230	LOADER	2000	1300	10,520	8,416	35,768	4,292	789	13,497
86	HOOD	6000	LOADER	2000	1300	2,834	2,267	9,635	1,156	213	3,636
87	HOOD	7000	LOADER	2000	1300	3,050	2,440	10,370	1,244	229	3,913
88	HOOD	8000	LOADER	2000	1300	3,586	2,869	12,194	1,463	269	4,601
89	HOOD	12000	LOADER	2000	1300	7,209	5,768	24,512	2,941	541	9,250
90	HOOD	20000	LOADER	2000	1300	9,267	7,414	31,508	3,781	695	11,890
91	HOOD	DIXIE SP	LOADER	2000	1300	9,397	7,518	31,950	3,834	705	12,057
92	HOOD	24000	LOADER	2000	1300	10,097	8,078	34,330	4,120	757	12,955
93	HOOD	S182	LOADER	2000	1300	8,350	6,680	28,390	3,407	626	10,713
94	HUSKY	XL-70	LOADER	2000	1300	3,361	2,689	11,427	1,371	252	4,312
95	HUSKY	XL-120	LOADER	2000	1300	3,632	2,905	12,348	1,482	272	4,660
96	HUSKY	XL-170	LOADER	2000	1300	7,898	6,318	26,852	3,222	592	10,133

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Appendix C. Continued

Machine number	Machine make	Model number	Machine type	Scheduled hr./yr.	Prod. hr./yr.	Salvage	Annual	Average	Interest	Ins.	Fixed
						value	deprec.	year	cost/yr.	cost/yr.	cost/yr.
						Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
97	HUSKY	XL-175	LOADER	2000	1300	8,605	6,884	29,256	3,511	645	11,040
98	HUSKY	XL-235	LOADER	2000	1300	10,635	8,508	36,158	4,339	798	13,644
99	HUSKY	XL-335	LOADER	2000	1300	14,922	11,938	50,735	6,088	1,119	19,145
100	LOGHOG	XTR820	LOADER	2000	1300	4,066	3,253	13,824	1,659	305	5,217
101	LOGHOG	XTR850	LOADER	2000	1300	8,788	7,030	29,879	3,586	659	11,275
102	LOGHOG	XTR870	LOADER	2000	1300	9,450	7,560	32,130	3,856	709	12,124
103	LOGHOG	Z-160	LOADER	2000	1300	5,562	4,450	18,911	2,269	417	7,136
104	LOGHOG	Z-200	LOADER	2000	1300	6,652	5,322	22,617	2,714	499	8,535
105	LUCKY	1400	LOADER	2000	1300	7,825	6,260	26,605	3,193	587	10,039
106	LUCKY	L-1020	LOADER	2000	1300	11,812	9,450	40,162	4,819	886	15,155
107	LUCKY	L-820B VM	LOADER	2000	1300	10,625	8,500	36,125	4,335	797	13,632
108	LUCKY	L-1030	LOADER	2000	1300	16,781	13,425	57,056	6,847	1,259	21,530
109	LUCKY	L-238 VM	LOADER	2000	1300	13,031	10,425	44,306	5,317	977	16,719
110	MORBARK	1000	LOADER	2000	1300	8,000	6,400	27,200	3,264	600	10,264
111	PRENTICE	F90	LOADER	2000	1300	3,289	2,631	11,183	1,342	247	4,220
112	PRENTICE	120	LOADER	2000	1300	4,204	3,364	14,295	1,715	315	5,394
113	PRENTICE	150	LOADER	2000	1300	5,038	4,030	17,128	2,055	378	6,463
114	PRENTICE	180	LOADER	2000	1300	9,672	7,737	32,884	3,946	725	12,409
115	PRENTICE	210-C	LOADER	2000	1300	11,629	9,304	39,540	4,745	872	14,921
116	PRENTICE	410-B	LOADER	2000	1300	15,874	12,700	53,973	6,477	1,191	20,367
117	CAT	D4HCS	CRAWLER	2000	1200	20,991	16,793	71,369	8,564	2,099	27,456
118	CAT	D4HCS	CRAWLER	2000	1200	29,029	23,223	98,699	11,844	2,903	37,970
119	CAT	D4HCS	CRAWLER	2000	1200	23,451	18,761	79,735	9,568	2,345	30,674
120	CAT	D5HCS	CRAWLER	2000	1200	29,639	23,711	120,773	12,093	2,964	38,768
121	CAT	D5HCS	CRAWLER	2000	1200	38,019	30,415	129,265	15,512	3,802	49,729
122	MORBARK	20	CHIPPER	2000	1500	28,570	22,856	97,138	11,657	2,857	37,370
123	MORBARK	22 RXL	CHIPPER	2000	1500	48,140	38,512	163,678	19,641	4,814	62,967
124	MORBARK	23	CHIPPER	2000	1500	48,450	38,760	164,730	19,768	4,845	63,372
125	MORBARK	27	CHIPPER	2000	1500	49,840	39,872	169,456	20,335	4,984	65,191
126	MORBARK	30	CHIPPER	2000	1500	47,000	37,600	159,800	19,176	4,700	61,476
127	MORBARK	37	CHIPPER	2000	1500	70,000	56,000	238,000	28,560	7,000	91,560
128	TRELAN	21L	CHIPPER	2000	1500	30,000	24,000	102,000	12,240	3,000	39,240
129	TRELAN	23L	CHIPPER	2000	1500	38,600	30,880	131,240	15,749	3,860	50,489
130	TRELAN	232	CHIPPER	2000	1500	25,000	20,000	85,000	10,200	2,500	32,700
131	TRELAN	23	CHIPPER	2000	1500	30,000	24,000	102,000	12,240	3,000	39,240
132	TRELAN	26L	CHIPPER	2000	1500	48,000	38,400	163,200	19,584	4,800	62,784

Appendix D. Operating Costs for Specific Harvesting Machines

Machine no.	Machine make	Model no.	Machine type	Fixed cost/	Fixed cost/	Fuel cost/	Lube & oil cost/	R & M cost/	Oper. cost/	Oper. cost/	Total cost/	Total cost/
				SMH	PMH	PMH	PMH	PMH	PMH	SMH	SMH	PMH
				Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
1	CAT	508	SKIDDER	11.05	17.00	2.66	0.98	8.39	12.03	7.82	18.87	29.03
2	CAT	508	SKIDDER	12.67	19.49	2.66	0.98	9.62	13.26	8.62	21.29	32.75
3	CAT	518	SKIDDER	12.52	20.87	3.36	1.24	10.31	14.90	8.94	21.47	35.78
4	CAT	518	SKIDDER	15.57	25.94	3.64	1.34	12.81	17.79	10.67	26.24	43.73
5	CAT	528	SKIDDER	18.02	30.03	4.90	1.80	14.83	21.53	12.92	30.94	51.56
6	CAT	528	SKIDDER	22.02	36.69	4.90	1.80	18.12	24.82	14.89	36.91	61.51
7	VME	665-D	SKIDDER	9.74	16.24	3.64	1.34	8.02	13.00	7.80	17.54	29.24
8	VME	665-DGS	SKIDDER	11.91	19.85	3.64	1.34	9.80	14.78	8.87	20.78	34.64
9	VME	666-D	SKIDDER	10.98	18.30	4.26	1.56	9.03	14.86	8.91	19.89	33.15
10	VME	666-DGS	SKIDDER	13.44	22.40	4.26	1.56	11.06	16.88	10.13	23.57	39.28
11	VME	667-D	SKIDDER	12.71	21.18	4.96	1.82	10.46	17.24	10.34	23.05	38.41
12	VME	667-DGS	SKIDDER	15.98	26.64	4.96	1.82	13.16	19.93	11.96	27.94	46.57
13	VME	668-D	SKIDDER	17.48	29.13	6.30	2.32	14.39	23.00	13.80	31.28	52.14
14	VME	668-DGS	SKIDDER	21.30	35.50	6.30	2.32	17.53	26.15	15.69	36.99	61.64
15	FRK	105	SKIDDER	7.43	11.43	2.25	0.83	5.64	8.72	5.67	13.09	20.14
16	FRK	105	SKIDDER	9.44	14.52	2.16	0.79	7.17	10.12	6.58	16.02	24.64
17	FRK	142	SKIDDER	8.19	13.66	3.53	1.30	6.74	11.57	6.94	15.14	25.23
18	FRK	170	SKIDDER	9.26	15.43	3.53	1.31	7.62	12.46	7.47	16.73	27.89
19	FRK	170	SKIDDER	12.25	20.41	3.53	1.30	10.08	14.91	8.94	21.19	35.32
20	FRK	170-T	SKIDDER	10.42	17.37	4.31	1.59	8.58	14.48	8.69	19.11	31.85
21	FRK	170-T	SKIDDER	12.61	21.02	4.31	1.59	10.38	16.28	9.77	22.38	37.30
22	FRK	405	SKIDDER	8.97	13.79	3.03	1.12	6.81	10.96	7.12	16.09	24.76
23	FRK	405	SKIDDER	9.61	14.78	2.91	1.07	7.30	11.28	7.33	16.94	26.06
24	FRK	405	SKIDDER	11.23	18.71	2.91	1.07	9.24	13.22	7.93	19.16	31.93
25	JD	440-D	SKIDDER	8.48	13.04	2.33	0.86	6.44	9.63	6.26	14.74	22.68
26	JD	540-D	SKIDDER	9.66	14.86	2.80	1.03	7.34	11.17	7.26	16.92	26.03
27	JD	548-D	SKIDDER	10.80	18.00	2.80	1.03	8.89	12.72	7.63	18.43	30.72
28	JD	640-D	SKIDDER	10.83	18.06	3.36	1.24	8.92	13.51	8.11	18.94	31.57
29	JD	648-D	SKIDDER	12.40	20.67	3.36	1.24	10.21	14.80	8.88	21.28	35.47
30	JD	740-A	SKIDDER	15.78	26.31	4.26	1.56	12.99	18.81	11.29	27.07	45.12
31	JD	740-A	SKIDDER	20.38	33.96	4.26	1.56	16.77	22.59	13.56	33.93	56.56
32	LOGHOG	546	SKIDDER	3.79	5.83	1.74	0.64	2.88	5.25	3.41	7.21	11.09
33	LOGHOG	760	SKIDDER	5.54	9.23	2.80	1.03	4.56	8.39	5.03	10.57	17.62
34	TJ	225-A	SKIDDER	8.68	13.35	2.68	0.99	6.59	10.26	6.67	15.34	23.61
35	TJ	230-A	SKIDDER	9.33	14.36	2.92	1.07	7.09	11.08	7.20	16.53	25.43
36	TJ	240-A	SKIDDER	10.21	17.01	3.65	1.34	8.40	13.39	8.03	18.24	30.40
37	TJ	350-A	SKIDDER	10.86	18.10	3.70	1.36	8.94	14.00	8.40	19.26	32.10
38	TJ	350-A	SKIDDER	13.12	21.87	3.70	1.36	10.80	15.86	9.51	22.64	37.73
39	TJ	380-A	SKIDDER	11.52	19.20	3.81	1.40	9.48	14.69	8.81	20.33	33.89
40	TJ	380-A	SKIDDER	14.14	23.57	4.14	1.52	11.64	17.31	10.38	24.53	40.88
41	TJ	450-A	SKIDDER	12.39	20.66	4.96	1.82	10.20	16.98	10.19	22.58	37.63
42	TJ	450-A	SKIDDER	15.02	25.03	4.96	1.82	12.36	19.14	11.48	26.50	44.17
43	TREEFM	C50	SKIDDER	8.21	12.63	2.92	1.07	6.24	10.23	6.65	14.86	22.86
44	TREEFM	C80	SKIDDER	9.88	16.46	3.70	1.36	8.13	13.20	7.92	17.79	29.66
45	TREEFM	C77	SKIDDER	11.61	19.35	4.90	1.80	9.55	16.26	9.75	21.36	35.60
46	TREEFM	C70	SKIDDER	14.41	24.02	3.81	1.40	11.86	17.07	10.24	24.65	41.09
47	GAFNER	4510	FORWARDER	7.18	11.05	1.54	0.57	6.89	9.00	5.85	13.04	20.06
48	GAFNER	5010	FORWARDER	7.63	11.74	2.04	0.75	7.32	10.11	6.57	14.21	21.86

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Appendix D. Continued

Machine no.	Machine make	Model no.	Machine type	Fixed cost/	Fixed cost/	Fuel cost/	Lube & oil cost/	R & M cost/	Oper. cost/	Oper. cost/	Total cost/	Total cost/
				SMH	PMH	PMH	PMH	PMH	PMH	SMH	SMH	SMH
				Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
49	GAFNER	5010	FORWARDER	8.60	14.33	2.54	0.93	8.93	12.40	7.44	16.04	26.73
50	GAFNER	5510	FORWARDER	9.75	15.00	2.04	0.75	9.35	12.14	7.89	17.64	27.15
51	GAFNER	5510	FORWARDER	10.71	16.48	2.54	0.93	10.28	13.75	8.94	19.65	30.23
52	TREEFM	C5D	FORWARDER	10.63	16.36	2.49	0.91	10.20	13.60	8.84	19.48	29.96
53	TREEFM	C6D	FORWARDER	12.61	19.40	3.16	1.16	12.09	16.42	10.67	23.28	35.81
54	BARKO	775	FB	18.34	28.22	4.87	1.79	15.75	22.42	14.57	32.91	50.64
55	BELL	MODEL	FB	6.45	9.92	1.74	0.64	4.98	7.36	4.78	11.23	17.28
56	BELL	SUPERT	FB	7.88	12.13	1.84	0.68	6.09	8.61	5.60	13.48	20.74
57	BOBCAT	1080-C	FB	9.95	15.30	2.48	0.91	7.69	11.07	7.20	17.14	26.37
58	BOBCAT	1213	FB	7.02	10.80	1.63	0.60	5.43	7.66	4.98	12.00	18.46
59	CAT	217	FB	30.40	50.67	3.29	1.21	21.98	26.49	15.89	46.30	77.16
60	CAT	227	FB	35.28	58.81	6.58	2.42	25.51	34.51	20.71	55.99	93.32
61	CAT	518	FB	20.80	32.00	3.42	1.26	17.86	22.55	14.65	35.45	54.55
62	DC	70D	FB	13.48	20.75	1.45	0.53	12.00	13.98	9.09	22.57	34.73
63	DC	4900	FB	18.39	28.30	1.97	0.73	16.37	19.07	12.40	30.79	47.37
64	FRK	105	FB	10.53	16.20	2.03	0.75	9.05	11.82	7.68	18.21	28.02
65	FRK	405	FB	11.64	17.90	2.74	1.01	9.99	13.74	8.93	20.57	31.64
66	FRK	170	FB	14.33	22.05	3.19	1.18	12.31	16.67	10.84	25.17	38.72
67	HYDROAX	111C	FB	9.46	14.55	2.24	0.82	8.12	11.18	7.27	16.73	25.73
68	HYDROAX	121	FB	10.34	13.79	2.69	0.99	5.77	9.45	7.08	17.42	23.23
69	HYDROAX	311B	FB	12.52	19.25	2.69	0.99	10.75	4.42	9.37	21.89	33.68
70	HYDROAX	411B 11	FB	14.62	22.49	3.32	1.22	12.55	17.09	11.11	25.73	39.58
71	HYDROAX	511B	FB	15.91	24.47	4.00	1.47	13.66	19.14	12.44	28.34	43.61
72	HYDROAX	611B 11	FB	17.34	26.68	4.87	1.79	14.89	21.55	14.01	31.35	48.23
73	HYDROAX	6200	FB	23.64	36.38	4.34	1.60	20.31	26.25	17.06	40.71	62.63
74	MORBK	MARK5	FB	9.24	15.40	1.75	0.64	7.74	10.13	6.08	15.32	25.54
75	MORBK	SUPERB	FB	12.83	21.38	3.05	1.12	10.74	14.92	8.95	21.78	36.29
76	TJ TIMBCO	2515	FB	25.05	41.75	4.66	1.71	19.63	26.01	15.60	40.66	67.76
77	TJ TIMBCO	2518	FB	27.00	45.01	4.66	1.71	21.16	27.54	16.52	43.53	72.54
78	TJ TIMBCO	2520	FB	31.51	52.51	4.66	1.71	24.69	31.07	18.64	50.15	83.58
79	BARKO	145-B	LOADER	6.54	10.07	1.54	0.57	5.65	7.75	5.04	11.58	17.82
80	BARKO	160-A	LOADER	7.95	12.24	1.60	0.59	6.87	9.06	5.89	13.84	21.30
81	BARKO	275	LOADER	10.91	16.78	2.17	0.80	9.42	12.38	8.05	18.95	29.16
82	BARKO	350	LOADER	21.17	32.57	3.62	1.33	18.28	23.22	15.10	36.27	55.79
83	BARKO	450-CLP	LOADER	39.77	61.19	3.99	1.47	34.34	39.79	25.86	65.64	100.98
84	BARKO	550	LOADER	48.75	75.01	6.41	2.36	42.09	50.86	33.06	81.81	125.87
85	BLACKBEAR	MX-230	LOADER	6.75	10.38	3.36	1.23	5.83	10.42	6.77	13.52	20.80
86	HOOD	6000	LOADER	1.82	2.80	1.41	0.52	1.57	3.50	2.27	4.09	6.29
87	HOOD	7000	LOADER	1.96	3.01	1.41	0.52	1.69	3.61	2.35	4.31	6.62
88	HOOD	8000	LOADER	2.30	3.54	1.41	0.52	1.99	3.91	2.54	4.84	7.45
89	HOOD	12000	LOADER	4.62	7.12	2.49	0.92	3.99	7.40	4.81	9.43	14.51
90	HOOD	20000	LOADER	5.94	9.15	2.49	0.92	5.13	8.54	5.55	11.50	17.69
91	HOOD	DIXIE SP	LOADER	6.03	9.27	2.49	0.92	5.20	8.61	5.60	11.63	17.89
92	HOOD	24000	LOADER	6.48	9.97	2.49	0.92	5.59	9.00	5.85	12.33	18.96
93	HOOD	S182	LOADER	5.36	8.24	2.49	0.92	4.62	8.03	5.22	10.58	16.27
94	HUSKY	XL-70	LOADER	2.16	3.32	1.41	0.52	1.86	3.79	2.46	4.62	7.10
95	HUSKY	XL-120	LOADER	2.33	3.58	1.41	0.52	2.01	3.94	2.56	4.89	7.52
96	HUSKY	XL-170	LOADER	5.07	7.79	1.41	0.52	4.37	6.30	4.09	9.16	14.09

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Appendix D. Continued

Machine no.	Machine make	Model no.	Machine type	Fixed cost/ SMH	Fixed cost/ PMH	Fuel cost/ PMH	Lube & oil cost/ PMH	R & M cost/ PMH	Oper. cost/ PMH	Oper. cost/ SMH	Total cost/ SMH	Total cost/ PMH
				Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.	Dol.
97	HUSKY	XL-175	LOADER	5.52	8.49	1.41	0.52	4.77	6.69	4.35	9.87	15.18
98	HUSKY	XL-235	LOADER	6.82	10.50	1.41	0.52	5.89	7.82	5.08	11.90	18.31
99	HUSKY	XL-335	LOADER	9.57	14.73	1.95	0.72	8.26	10.93	7.10	16.68	25.66
100	LOGHOG	XTR820	LOADER	2.61	4.01	1.41	0.52	2.25	4.18	2.72	5.32	8.19
101	LOGHOG	XTR850	LOADER	5.64	8.67	2.06	0.76	4.87	7.68	4.99	10.63	16.35
102	LOGHOG	XTR870	LOADER	6.06	9.33	1.60	0.59	5.23	7.43	4.83	10.89	16.75
103	LOGHOG	Z-160	LOADER	3.57	5.49	1.60	0.59	3.08	5.27	3.43	7.00	10.76
104	LOGHOG	Z-200	LOADER	4.27	6.57	1.60	0.59	3.68	5.88	3.82	8.09	12.44
105	LUCKY	1400	LOADER	5.02	7.72	2.38	0.88	4.33	7.59	4.94	9.95	15.32
106	LUCKY	L-1020	LOADER	7.58	11.66	2.38	0.88	6.54	9.80	6.37	13.95	21.46
107	LUCKY	L-820B VM	LOADER	6.82	10.49	2.38	0.88	5.88	9.14	5.94	12.76	19.63
108	LUCKY	L-1030	LOADER	10.77	16.56	3.29	1.21	9.29	13.80	8.97	19.73	30.36
109	LUCKY	L-238 VM	LOADER	8.36	12.86	3.08	1.13	7.22	11.42	7.43	15.79	24.28
110	MORBARK	1000	LOADER	5.13	7.90	2.19	0.80	4.43	7.42	4.82	9.96	15.32
111	PRENTICE	F90	LOADER	2.11	3.25	1.41	0.52	1.82	3.75	2.44	4.55	6.99
112	PRENTICE	120	LOADER	2.70	4.15	1.41	0.52	2.33	4.25	2.77	5.46	8.40
113	PRENTICE	150	LOADER	3.23	4.97	1.41	0.52	2.79	4.72	3.07	6.30	9.69
114	PRENTICE	180	LOADER	6.20	9.55	1.67	0.61	5.36	7.64	4.96	11.17	17.18
115	PRENTICE	210-C	LOADER	7.46	11.48	2.04	0.75	6.44	9.23	6.00	13.46	20.70
116	PRENTICE	410-B	LOADER	10.18	15.67	3.08	1.13	8.79	13.00	8.45	18.63	28.67
117	CAT	D4HCS	CRAWLER	13.73	22.88	3.54	1.30	13.99	18.83	11.30	25.03	41.71
118	CAT	D4HCS	CRAWLER	18.98	31.64	3.54	1.30	19.35	24.19	14.52	33.50	55.83
119	CAT	D4HCS	CRAWLER	15.34	25.56	3.54	1.30	15.63	20.47	12.28	27.62	46.04
120	CAT	D5HCS	CRAWLER	19.38	32.31	4.72	1.73	19.76	26.21	15.73	35.11	58.52
121	CAT	D5HCS	CRAWLER	24.86	41.44	4.72	1.73	25.35	31.80	19.08	43.94	73.24
122	MORBARK	20	CHIPPER	18.68	24.91	9.17	3.37	15.24	27.78	20.83	39.52	52.69
123	MORBARK	22 RXL	CHIPPER	31.48	41.98	13.75	5.06	25.67	44.48	33.36	64.85	86.46
124	MORBARK	23	CHIPPER	31.69	42.25	14.90	5.48	25.84	46.22	34.66	66.35	88.46
125	MORBARK	27	CHIPPER	32.60	43.46	13.75	5.06	26.58	45.39	34.04	66.64	88.85
126	MORBARK	30	CHIPPER	30.74	40.98	18.34	6.74	25.07	50.14	37.61	68.35	91.13
127	MORBARK	37	CHIPPER	45.78	61.04	27.50	10.11	37.33	74.95	56.21	101.99	135.99
128	TRELAN	21L	CHIPPER	19.62	26.16	9.17	3.37	16.00	28.54	21.40	41.02	54.70
129	TRELAN	23L	CHIPPER	25.24	33.66	17.19	6.32	20.59	44.10	33.07	58.32	77.76
130	TRELAN	232	CHIPPER	16.35	21.80	11.46	4.21	13.33	29.01	21.76	38.11	50.81
131	TRELAN	23	CHIPPER	19.62	26.16	16.04	5.90	16.00	37.94	28.46	48.08	64.10
132	TRELAN	26L	CHIPPER	31.39	41.86	17.19	6.32	25.60	49.11	36.83	68.23	90.97