Statement of Barnum Ore
Year Ending Nov. 30-96.

		On hand at mine Nov. 30-95			4693 Tons
		Excess from Stock Pile			137
	Ex	Cliffs Shaft as Barnum (Memo. Shipments)			133
		Cl. Bess. " " " "	191 Tons		
Nov	19	" " " Kaliyuga	299		
Dec	1	" " " Pioneer	351		
	4	" " " Kaliyuga	445		1286
					6249
		Shipped to Cleveland	221 Tons		
		" " Ashtabula		5281	5502 Tons
Nov	20	Barnum as Cleve Bess Fontana	240		
Dec	5	" " " " "	195		
		" " " (Memo. Shipments)	121		556
		" Ex. " Cl. Shaft " "	191		191
					6249

Statement of
Barnum Ore
Year Ending Nov 30-96

Statement of Cliffs Shaft Ore for Year ending Nov. 30-96

Date		Particulars			Tons		Tons
		On hand at Mine Nov 30-95				151144	Tons
		Barnum as Cr. Cl. Shaft (Memo. Shipments)				191	
		Scotch as Cr. Cl. Shaft. " "		275	Tons		
June	20	" " " " " Pioneer		112			
Nov.	22	" " " " " "		558		945	
						152280	
		Coarse Cl. Shaft to Elk Rapids	✓	763	Tons		
		" " " " Sandusky	✓	7374			
		" " " " Cleveland		17370		25507	Tons
		Crushed " " " Elk Rapids	✓	11065			
		" " " " Pioneer Furnace	✓	6145			
		" " " " Spg. Lake I. Co.	✓	894			
		" " " " Toledo	✓	1337			
		" " " " Sandusky	✓	1499			
		" " " " Cleveland		17772			
		" " " " Ashtabula	✓	9133		47845	
May	16	" " " as Scotch Forest City		198			
Aug	8	" " " " " Planet		388		586	
		" " " " Barnum (Memo. Ship.)				133	
		On hand at Escanaba Nov 30-96					
		Crushed Cl. Shaft				2564	
		On hand at Mine Nov. 30-96.				75645	
						152280	

Statement of
Cliffs Shaft Ore
Year Ending Nov 30-96

[illegible] Shaft

	At Mines			At Marquette			Lake Erie		
	Tons	Price	Amount	Tons	Price	Amount	Tons	Price	Amount
1895 Dec.	3078 810	1.75	5386 13				1708 1580	2.475	4229 03
							265 1870	3.15	837 37
Jan.							203 980	3.15	640 82
Feby							293 2050	3.15	925 83
							331 1400	3.15	1045 04
							534 740	2.475	1322 47
Mar							2554 1840	2.475	6323 17
Apl.							43 1380	2.475	105 94
							25 1900	3.00	77 54
May	1416 1020	1.60	2266 32	198 1080	1.55	307 65	2452 1220	2.425	5947 38
June	3008 540	1.60	4813 17				1488 2080	2.50	3722 32
	1239 700	1.55	1920 93				4799 590	2.425	11638 23
July	2273 1740	1.60	3638 03				7093 1980	2.425	17202 65
	84 1490	1.55	131 23						
Aug.	3748 1720	1.60	5998 01	383 1200	1.55	[illegible]	1324	2.40	3177 60
	1134 450	1.55	1758 01				233 330	2.425	565 38
Sept.	1607 2150	1.55	2492 34						
Oct	894 240	1.40	1251 75						
	709 50	1.40	992 63						
Nov.	671 1310	1.40	940 21				1714 690	2.50	4285 97
	18366 [illegible]	1.58	[illegible]	581 40	1.55	909 88	15068 770	2.475	[illegible]
			✓			✓			✓
				44521 1830	average 2.084	92795.98			

Sales of Barnum

Date	at Mines			at Marquette			Lake Erie		
	Tons	Price	amount	Tons	Price	amount	Tons	Price	amount
Jan.							405 1650	2.75	1115 77
Feby.							398 1380	3.50	1395 15
Mar.							381 1310	3.50	1335 54
April							328 1630	2.75	904 00
							156 660	3.45	539 23
May	121 380	1.70	205 99				198 630	3.45	684 08
June							264 1640	3.45	913 31
July							114 1640	2.75	315 51
							143 630	3.45	494 33
Aug.							97 1770	3.45	337 45
							187 520	2.75	514 88
							103 1580	3.50	362 96
~~Sept.~~ Oct.							63 830	2.75	174 26
Nov.				434 488 1740	1.65	717 38 806 48	303 1780	2.75	835 43
							30 1300	2.75	84 09
							100 450	3.50	350 70
	121 380	average 1.70	205 99	434 488 1740	average 1.65	717 38 806 48	3248 1480	average 3.159	10 356 69

Recapitulation

3834 3888	1360	average 2.924	11 280 06 11 369 16

Sale of Salisbury

	at mine				at Escanaba + Marquette				at Lake Erie			
	Tons		Price	Amount	Tons		Price	Amount	Tons		Price	Amount
Dec	1065	880	1.50	1598 08					1030	2150	2.10	2165 02
Jan.	2200	460	1.50	3300 30					283	1860	2.60	737 95
									2138	1740	2.10	4491 43
Feby									1195	1050	2.60	3108 21
May	5067	120	1.00	5067 02					4834	1790	2.00	9669 59
	2992	1970	1.35	4040 38								
89 320 / 11143	3714	710	1.30	4828 61								
	89	320		111 43								
June	6129	1930	1.30	8022 86					2886	410	2.00	5772 36
July	3990	1170	1.30	5187 67	Escanaba 576	600	1.85	1066 09	126	1860	2.00	253 66
												26198 ✓✓
Aug	4066	2180	1.30	5287 06	Marquette 2780	1940	1.65	4588 42				
Sept.	11142	2190	1.30	14485 80								
	295	240	1.00	295 10								
Oct	12877	1990	1.30	16741 18	Escanaba 786	150	1.85	1454 22				
~~Nov.~~	47	1370	.73	34 76								
Nov.	422	1870	1.30	549 67	Marquette 1194	2140	1.65	1971 67				
					341	1560	1.35	461 29				
	53924	1080	average 1.285	69327 06 ✓	M 4317	1160	1.626	7021 38 ✓	12496	1900	2.096	26198 22 ✓
					E 1362	750	1.85	2520 31 ✓				

Recapitulation

72101 410 1.457 105066 97

Sales of Salisbury Bess.

Date	at Marquette Tons	Price	amount	at Mine Tons	Price	amount	at Lake Erie Tons	Price	amount
Dec.							11676 910	2.70	31526 28
Jan.							1936 760	2.70	5228 11
Feby							1923 1380	2.50	4809 04
Mar							1684 1140	2.50	4211 26
Apl							27 1520	2.60	71 96
							1671 360	2.50	4177 90
							3473 1030	2.70	9378 34
May							739 140	2.60	1921 56
							657 820	2.50	1643 41
							12222 520	2.70	33002 02
June							2668 2230	2.70	72063 0
July	117 2230	1.75	20650						
Aug	59 1840	2.85	17049						
Sept							1336 810	2.70	3608 17
Oct				198 980	2.63	52189			
				174 990	1.30	22677			
Nov							35		101 50
	58 390		3601	372 1970 58 390	average 2.008	74866 3601	29017 420	average 2.659	77183 85
				314 1580	2.264	71265 ✓			✓

Recapitulation

29331	2000	2.655	77896 50

Sales of ~~Rubicky~~ Salisbury Silica

	at Mine			at Marquette & Escanaba			at Lake Erie		
	Tons	Price	amount	Tons	Price	Amount	Tons	Price	amount
Dec.	621 560	.65	40381				1551 1060	1.75	271507
	548 910	.75	41130				2567 420	2.50	641796
Jany	441 110	.75	33078						
	1023 2130	.65	665532						
Frby	1410 1150	.75	105788						
				m.					
May				748 730	1.05	78575	1226 1170	2.00	245305
				E.					
				1136 1860	1.40	159156	331 1760	2.00	66357
							2150 1100	2.15	462355
				m.					
June	700 130	.90	63005	407 1420	1.20	48916	31 60	2.00	6205
							628 2080	2.15	135219
	16 1260	.90	1491	E					
July	516 2130	.65	33601	336 830	1.15	38682	205 1480	1.90	39100
				908 250	1.40	127135	1261 1210	2.15	271231
				m.					
Aug	293 1830	.65	19098	409 450	.95	38874			
				307 860	.95	29201			
	788 1850	.90	70990						
Sept.							244 770	1.60	39575
Oct.	878 150	.65	57074						
Nov.	5426 1490	1.60	[illegible]				5426 1490	1.60	868266
	512 1620	.65	33327				1752 1720	1.75	306734
	7752 390		565516	m. 1124 490	1.04	116991 ✓			
	7752 390	.729	565516	1244 1080	1.332	165817 ✓	137 1470	2.00	27531
			✓				16792 1480	1.924	3135876
									✓

(over)

Recapitulation

26413 1200 @ $1.508 $39,842.00

Sales of Litchfield

	At Escanaba						At Marquette						At Lake Erie					
	Tons		Price	amount			Tons		Price	amount			Tons		Price	amount		
Mar													2029	30	2.20	4	463	82
Apl													823	1220	2.20	1	811	49
May	89	320	1.25	111	43								443	1930	2.20		976	49
													1364	1540	2.00	2	729	38
July							1147	2230	1.75	2	06	50	1519	370	2.20	3	342	16
Oct													2796	800	2.20	6	152	04
Nov							311	1010	1.35	4	20	46						
	89	320	1.25	111	43		429	1000	1.459	6	26	96	8976	1410	2.171	19	475	68
	174	990	1.30	226	77		* 85	670		11	5	34						
	* 85	670		115	34		344	330	1.531	51	162						✓	
											✓							

Recapitulation

	9495	490	2.128	20	214 07
At Mine	174	990	1.30		226 77
	9320	1740	average 2.144	19	987 30

Sales of Litchfield

	at Escanaba						at Marquette						at Lake Erie					
	Tons		Price	amount			Tons		Price	amount			Tons		Price	amount		
Mar													2029	30	2.20	4	463	82
Apl													823	1220	2.20	1	811	99
May	89	320	1.25	111	43								443	1930	2.20		976	49
													1364	1540	2.00	2	729	38
July							117	2230	1.75	206	50		1519	370	2.20	3	342	16
Oct													2796	800	2.20	6	152	04
Nov							311	1010	1.35	420	46							
	89	320	1.25	111	43		429	1000	1.459	626	96		8976	1410	2.171	19	475	68
	174	990	1.30	226	77		* 85	670		115	34							
	* 85	670		115	34		344	330	1.531	511	62						✓	
										✓								

Recapitulation

	9495	490	2.128	20	214 04
At Mine	174	990	1.30		226 77
	9320	1740	2.144 average	19	987 30

Sales of Foster

	At Mine			At Escanaba			At Lake Erie		
				Tons	Price	amount	Tons	Price	amount
July				7971950	1.52	121276			
Aug	3033 1460	1.00	303365						
Sept	867 1900	1.00	86784						
Oct	1712 920	1.00	171240	1216 730	1.52	184881			
Nov	849 700	1.00	84931						
	26 580	.48	1260						
	16 360	1.00	1616						
		avrage			avrage				
	6473 720	1.00	645964	2014 440	1.52	306157			

Recapitulation

	avrage	
8487 1160	1.122	952121

Sale of Foster Silica

	at Mine			at Escanaba			at Lake Erie		
	Tons	Price	amount	Tons	Price	amount	Tons	Price	amount
Dec							579 940	1.65	956 04
Jan							321 1460	1.65	530 79
Feby							497 1920	1.65	821 46
Mar							305 1500	1.65	504 35
Apl							100 500	1.65	165 36
May							249 1240	1.65	411 76
June							72 2020	1.65	120 28
							2127 620	1.65	3509 94
July				924 2190	1.20	1109 97			
Oct.				1711 1610	1.00	1711 71			
Nov	26 580	.48	1260						
	16 360	1.00	1616						
	10 220		356	1081 610	1.00	1081 27			
				3717 2170	1.049	3902 95			
	10 220		356	3717 2170	avrage 1.049	3902 95	2127 620	avrage 1.65	3509 94
				10 220		356			
				3707 1950	1.049	3906 51			

Recapitulation

		avrage	
5835	330	1.271	7416 48
10	220		3 6
5825	110	1.271	7420 02

Iron Cliffs Co.

Report of Accidents, Underground and Surface for Year Ending November 30th 1896.

Minor Accidents	Cliffs Shaft Underground Cases	Days Lost	Amount	Surface Cases	Days Lost	Amount	Total Cases	Days Lost	Amount	Salisbury Underground Cases	Days Lost	Amount	Surface Cases	Days Lost	Amount	Total Cases	Days Lost	Amount	Foster Underground Cases	Days Lost	Amount	Surface Cases	Days Lost	Amount	Total Cases	Days Lost	Amount	Grand Total Underground Cases	Days Lost	Amount	Surface Cases	Days Lost	Amount	Total Cases	Days Lost	Amount	Per Cent of Each Class of Injuries
Fingers				3	111	73 96	3	111	73 96	9	268	215 60	1	35	23 32	10	303	238 92										9	268	215 60	4	146	97 28	13	414	312 88	.434
Hands																																					
Arms																			1	38	25 34	1	38	25 34							1	38	25 34	1	38	25 34	.033
Feet				1	15	12 50	1	15	12 50	2	53	42 67				2	53	42 67										2	53	42 67	1	15	12 50	3	68	55 17	.100
Legs										2	201	165 64	1	10	6 66	3	211	172 30										2	201	165 64	1	10	6 66	3	211	172 30	.100
Body				1	16	11 32	1	16	11 32	4	89	70 99	1	10	8 32	5	99	79 31	1	13	8 66				1	13	8 66	5	102	79 65	2	26	19 64	7	128	99 29	.233
Eyes										1	8	6 66				1	8	6 66	1	64	53 34				1	64	53 34	2	72	60 00				2	72	60 00	.067
Head																			1	5	4 16				1	5	4 16	1	5	4 16				1	5	4 16	.033
Total Minor Accidents				5	142	97 78	5	142	97 78	18	619	501 56	3	55	38 30	21	674	539 86	3	82	66 16	1	38	25 34	4	120	91 50	21	701	567 72	9	235	161 42	30	936	729 14	1.000
Fatal Accidents										2		1008 50				2		1008 50										2		1008 50				2		1008 50	
Total Minor & Fatal Accidents Payments in 1896 for accidents of 1895.				5	142	97 78	5	142	97 78	20	619	1510 06	3	55	38 30	23	674	1548 36	3	82	66 16	1	38	25 34	4	120	91 50	23	701	1576 22	9	235	161 42	32	936	1737 64	
										Artificial Arm.						1		80 00																1		80 00	
Grand Total.				5	142	97 78	5	142	97 78	20	619	1510 06	3	55	38 30	24	674	1628 36	3	82	66 16	1	38	25 34	4	120	91 50	23	701	1576 22	9	235	161 42	33	936	1817 64	

Recapitulation from Accident Report for Year Ending November 30th 1896.	Cliffs Shaft	Salisbury Mine	Foster Mine	Total I. C. Co.
Men Employed Underground	0	110	29	139
Minor Accidents per Ammum per 1000 Men Underground	0	163	103	151
Fatal " " " 1000 " "	0	18	0	14
Men Employed on Surface.	28	48	21	97
Minor Accidents per Ammum per 1000 Men, Surface	178	63	48	93
Fatal " " " " 1000 " "	0	0	0	0
Total Men Employed Underground and Surface	28	158	50	236
Minor Accidents per Ammum per 1000 Men Underground & Surface	178	133	80	127
Fatal " " " " 1000 " " " "	0	13	0	8
Number of Days paid Men from Benefit Fund	142	674	120	936
Coverage per Day	68 6/7	80 1/2	76 1/4	77 9/10
Total Amount paid during year	97.78	1628.36	91.50	1817.64

Statement showing amount paid from Benefit and Suspense Funds: Number of Accidents and Days lost from January 1st 1891. Also Credits to Benefit and Suspense Accounts November 30th 1896.

	Cliffs Shaft Cases	Days Lost	Amt. Paid	Salisbury Cases	Days Lost	Amt. Paid	Foster Cases	Days Lost	Amt. Paid	Total Cases	Days Lost	Amt. Paid
Jany 1st 1891 to Nov. 30-1892	51	1827	1384 52	44	1563	1167 54				95	3390	2552 06
Dec. 1st 1892 " Nov. 30-1893	29	763	617 56	22	449	282 52				51	1212	344 308
Dec. 1st 1893 " Nov. 30-1894	6	401	84 76	34	1822	1438 22				40	2223	2285 86
Dec. 1st 1894 " Nov. 30-1895	6	280	72 87	28	1589	248 108				34	1869	320 986
Dec. 1st 1895 " Nov. 30-1896	5	142	97 78	24	674	1628 36	4	120	91 50	33	936	1817 64
Total	97	3413	3676 28	152	6097	9540 72	4	120	91 50	253	9630	13308 50
Credit to Benefit Fund			432 41		Dr.	91 11		Cr.	86 92		Cr.	428 22
Credit to Suspense Fund			432 41		Dr.	167 65		Cr.	86 92		Cr.	351 68

Note "Benefit Fund" Amount Contributed by Employees.
Note "Suspense Fund" Amount Contributed by Iron Cliffs Co.

C. I. M. Co and I. C. Co.

Reports of Accidents

for the Year Ending

Nov 30th 1896.

8

IRON CLIFFS COMPANY.
Land Department.
NEGAUNEE, - MICH.

Statement "Greenhouse Expenses" %/ for year ending, November 30. 1896.

Advertising		65 20	
Telephone & Telegraph		48 56	
Freight & Express		16 93	
Water & Ice		74 00	
Light		21 22	
Wrapping Paper		14 74	
Drayage		6 75	
Street Car delivery tickets		7 30	
Bone fertilizer		5 18	
Painting Roof & Stack		10 52	
Repairing Boiler		10 18	
Glass		7 42	
Stationery & Printing		4 16	
Miscellaneous. — Such as, matches, twine, lime, nails Repairing sprinklers, etc. etc,		32 75	
Labor & material putting up shelves, firing, hot beds hot bed sash etc.		60 61	335 52

IRON CLIFFS COMPANY.

Land Dep't

NEGAUNEE, - MICH.

Statement - "Greenhouse Expenses"

Year ending Nov 30. 1896

IRON CLIFFS COMPANY,
Land Department.
NEGAUNEE, - MICH.

Comparative Statement of "General Expense" &c for years ending November 30th 1895 & 1896.

			1895	1896
Printing & Stationery			109 32	148.08
Telephones & Telegraph			49 37	60 90
Traveling Expenses				69 02
Fuel & Light			231 82	13 68
Water & Ice			31 00	23 42
Livery				8 00
Postage			107 50	77 77
Freight & Express			11 87	12 53
Exchange			18 10	13 60
Legal			10 00	82 00
Papers & Periodicals			27 00	5 50
Petty office Expense			12 71	19 98
Clerk				1 87
Janitor			11 50	29 22
			620 19	565 57
Less amt charged to C.C.I.Co. for 1895 -		206.73		
" " " C.I.M.Co " " -		206.73		
" " " I.C. Co (P.T. Dept) "		103.37	516 83	
" " " C-C.I.Co for Dec, Jan & Feb 1896 -		60.53		
" " " C-I.M.Co " "		70.53		131 06
			103 36	434 51
	Salaries &c			2049 14

IRON CLIFFS COMPANY.

NEGAUNEE, - MICH.

Statement - "General Expense" %
for ending Nov 30. 1896

IRON CLIFFS COMPANY.
Land Dept
NEGAUNEE, - MICH.

Statement of Salaries paid, and Cost of Perquisites allowed Employes, year ending Nov 30. 1896

	Danl Redfern Land Agent	G. E. O'Connor Book-keeper.
Salary	1500 00	637 50
Rent	630 00	0 00
Repairs etc on house	0 00	0 00
Horse & Carriage	0 00	0 00
Maintaining same	0 00	0 00
Choreman	0 00	0 00
Lights	0 00	0 00
Fuel	0 00	0 00
Water	0 00	0 00
Ice	0 00	0 00

R.C.M.

Would it not be a
better form to have law office
expenses on one sheet, showing items
subdivided by columns into the
various companies

IRON CLIFFS COMPANY,

NEGAUNEE, - MICH.

Statement — Salaries paid & Perquisites allowed.

Year ending, Nov 30/96

IRON CLIFFS COMPANY.
Land Department
NEGAUNEE, - MICH.

Statement "Expense, Timber Lands", for year ending November 30. 1896.

Labor & expenses looking lands, estimating timber, running lines, establishing lost corners, & obtaining topography & entering same on plat book	382 23	
Labor & expenses of trespass signs, in stopping trespass	82 11	
Taxes for 1895,	2284 76	2749 10

IRON CLIFFS COMPANY.

NEGAUNEE, - MICH.

Statement "Expense: Timber Lands"

Year ending, Nov 30. 1896.

IRON CLIFFS COMPANY.

Land Dep't

NEGAUNEE, - MICH.

Statement, Expense: "Lands" for year ending Nov 30. 1896.

Labor, running lines, looking up topography and entering same on Plat book,		193.32	
Labor, and material building wire fence around furnace location		57.53	
Adolore Polican, looking after property at Teich Mt,		27.50	
Iron monuments for section corners,		8.15	
Taxes for 1895.	45.38.76		
Highway & Bridge tax Ishpg Tp, for 1894, paid in 1896,	181.76		
Taxes on leased farms, abandoned, & Charged to Lands,	28.40	473.92	501.42

IRON CLIFFS COMPANY.

NEGAUNEE, - MICH.

Statement - "Expense; Lands"

Year ending Nov 30/96.

IRON CLIFFS COMPANY,
Land Dept
NEGAUNEE, MICH.

Statement, "Timber Sales," for year ending November 30. 1896

Sold to	On	Cords Wood Hard	Cords Wood Soft	Cedar Ties	Cedar Posts	Cedar Poles	Pine Ft	Price		Amount
John Demars	NW of SE¼ Sec 13-47-27								Patch of timber	45 00
Thos Buzzo	NW¼ of " 23-47-27		18					50¢		9 00
John Demars	SE of NW¼ " 13-47-27								"	26 00
Fred Yetrorkie	" 32-48-26								"	22 50
J. C. Kirkpatrick	N ½ of NW¼ " 34-47-26									
	NE of NE¼ " 33-47-26									
	S ½ " NE¼ " 33-47-26									
	S ½ " " 33-47-26						277,932	4 00		1111 72
Thomas LaBranch	" 11-47-23								"	10 00
Emanuel Nelson	NW¼ of SW¼ " 34-48-26								"	40 00
Edw Nichols	N ½ " NE¼ " 19-48-31									
	SE¼ " NE¼ " 19-48-31									
	All " " 13-48-32								"	60 00
John Demars	SW¼ " NW¼ " 27-47-26							25	14 M Shingle bolts 3 50	
					800			½	4 00	
			100					10	10 00	
		450						45	180 00	
			5					50	2 50	200 00
Thomas Heckla	NE of NW¼ " 28-47-26				500			½¢	2 50	
							12,000	3 00	36 00	
				300				4	12 00	
		600						50	300 00	
			120					10	12 00	
			5					50	2 50	
								25	40 M Shingles 10 00	375 00
Clarence E Biek	As per Conveyance						336,000 Dry	1 00	336 00	
							330,323	3 00	990 97	
							1,868,000	7.32	13673 03	15000 00
M. Perron	"						309,000	5 00	1545 00	
					90,000			½¢	450 00	
				39,000				4¢	1560 00	
						5815		35¢	2035 00	
						6500		12½¢	810 00	6400 00
Wm Bassford							40,000	5 00	200 00	
					7500			½¢	37 50	
				3000				4¢	120 00	
		210						20	42 00	
			2005					10	200 50	600 00
E. R. Kelsey	Secs 1-13 & 15 = 39-25 & 27-39-23								711,000 ft Elm @ $1.54 7	1100 00
	Carried for'd	1260	[illegible]	42300	98800	12315	3,173,255			2499[illegible]

Sold to	On	Cord Wood Hard	Cord Wood Soft	Cedar Ties	Cedar Posts	Cedar Poles	Pine Feet	Price		Amount
	Brokford	1260	2253	42300	98800	12315	3.173.255			24999 22
J.A. Hodgkins	Sec 35-48-26								Patch.	55 00
P.S.O.F. Ry	E½ of SW¼ Sec 1-47-26			12300				4¢	492 00	
						800		35¢	280 00	
		25						25¢	6 00	
			220					10	22 00	800 00
C.C.I. Co	Sec 30-39-23	4347¼						10	434 72	
	" 1-39-25	3285⅞						"	328 62	763 34
	Total	8918⅛	2473	54600	98800	13115	3.173.255			26617 56

Recapitulation

Hardwood		
450 Cords @ 40¢ per cord Stumpage	180 00	
600 " @ 50¢ " "	300 00	
210 " @ 20¢ " "	42 00	
25 " @ 25¢ " "	6 00	
7633⅛ " @ 10¢ " "	763 34	
Total 8918⅛ " Total	1291 34	Ave price per cord Hardwood $.144
Softwood		
28 Cords @ 50¢ per cord Stumpage	14 00	
2445 " @ 10¢ " "	244 50	
2473 " Total	258 50	
Average price per cord soft wood	1..	$.104
Cedar		
54600 Ties @ 4¢ each Stumpage	2184 00	
98800 Posts @ ½¢ " "	494 00	
6615 Telegraph poles 35¢ " "	2315 00	
6500 " " @ 12½¢ " "	810 00	
	5803 00	
Elm 711.000 Ft @ $1.547 per M	1100 00	
Pine		
277.932 Ft @ 4.00 per M Stumpage	1111 72	
342.323 " @ 3.00 " "	1026 97	
336.000 " @ 1.00 " " Dead pine	336 00	
349.000 " @ 5.00 " "	1745 00	
1.868.000 " @ 7.32 " "	13673 03	
3.173.255 " Total	17892 72	
Average price per M stumpage		$5.637

Iron Cliffs Co.

Timber Sales

Week ending Nov 30th 1896

No 8

IRON CLIFFS COMPANY, Land Dept

Statement: - "Sales Farm Lands" during year ending Nov 30. 1896

			Acres - Per Acre
Narcisse Allaire	- SE 1/4 of NE 1/4, Sec 24-47-27	200 00	40 - 5 00
Louis Tondolo	- NE 1/4 of NE 1/4, " 15-42-23	160 00	40 - 4 00
P. C. Peterson	- NE 1/4 of SW 1/4, " 2-47-26	225 00	40 - 5 625
Friborg & Heglund	- SW 1/4 of SE 1/4 " 13-47-27	250 00	40 - 6 25
		835 00	160 - Avg $5 218

IRON CLIFFS COMPANY.

NEGAUNEE, - MICH.

Statement.- "Sales Farm Lands"

Year ending Nov 30/96

IRON CLIFFS COMPANY.

NEGAUNEE, - MICH.

Statement.- "Sales Farm Lands"

Year ending Nov 30/96

IRON CLIFFS COMPANY.

Statement of Unsold Ore. Year Ending November 30, '96

	CLIFFSSHAFT	BARNUM	OLD MINE BARNUM .	FITCH	SALISBURY BESSEMER.	SALISBURY	LITCHFIELD	SALISBURY SILICA	FOSTER	FOSTER SILICA.	TOTAL.
Unsold ore on hand, November 30th, 1895	111,932	18,736	353	8,361	4,086	oversold 12,662	oversold 10,652	oversold 279		oversold 164	119,711
Produced in 1896		137			33,073	67,078	11,101	22,070	13,980	3,727	151,166
Purchased	946	1,286			853	6,544	1,654	9,336			20,619
Over-runs	1,396			13		60	234	298		91	2,092
Transferred from other grades	191	133				362	734		16	26	1,462
Cancelled orders of 1895	15,000					1,384				73	16,457
	129,465	20292	353	8,374	38,012	62,766	3,071	31,425	13,996	3,753	311,507
Sales in 1896	195,317	17,853		1,646	258	59,337	1,676	24,165	8,477	3,718	312,447
Mined in Dec. '95 but shipped as in November '95					635			512			1,147
1% deducted from cargoes	555	56			399	124	117	225			1,476
Shortages					1,739		639		24	19	2,421
Transferred to other grades	133	191			733		479		26	16	1,578
Unsold ore on hand November 30, 1896.	oversold 66,540	2,192	353	6,728	34,248	3,305	160	6,523	5,469		oversold 7,562
	129,465	20,292	353	8,374	38,012	62,766	3,071	31,425	13,996	3,753	311,507

IRON CLIFFS COMPANY.

Statement of Unsold Ore. Year Ending November 30, '96

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	129,465	20,292	353	8,374	38,012	62,766	3,071	31,425	13,996	3,753	311,507

The loss incurred during the past year is due principally to the fact that the Salisbury mine has not been able to sell its Bessemer ore, owing to the great stagnation in the market, and this is the only grade produced by the mine which ordinarily nets a profit.

Furthermore, the constant settling and caving of the ground at this mine has greatly increased the cost per ton, and therefore prevented us from making a profit on the non-Bessemer grades which were freely sold at the current market price.

A location for the new shaft has now been practically decided upon and the work of sinking same will be vigorously prosecuted during this year. The total cost of this work will be in the neighborhood of $60,000.00, and will necessarily more than absorb all profits which the mine may be able to make during the current year.

The Foster mine has been ~~open~~ reopened and though the quality of its ore is inferior and the quantity small, yet it makes a cheap exploration and may develop more ore in that district where it is situated. It was last closed down on July 1, 1893, pumping was started April 16, 1896, and the bottom was reached June 19th. The water was 313 feet deep. Hoisting commenced July 2nd.

We are greatly reducing the quantity of ore at the Cliffs Shaft Mine and hope to have the stock pile all cleaned up by the close of this year. There is nothing in the present outlook to justify the starting up of this mine. Some little money has been spent for exploration and some desultory work has been done on options granted by the Company, but nothing of value has thus far been found.

The outlook for the current year is unfavorable. There is a large surplus of ore on hand at Lake Erie ports and the present condition of the iron and steel markets indicates that extremely low prices will prevail for all kinds of iron ore during 1897.

Respectfully submitted,

WM. G. MATHER,

President.

Cleveland, O., February 10, 1896.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANNUAL REPORT

OF THE

CLEVELAND CLIFFS IRON COMPANY

PIONEER FURNACE

DEPARTMENT

1896.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

INDEX TO REPORT.

To Mr. W. G. Mather, President.,

Cleveland, Ohio.

Dear Sir:-

I herewith submit report covering New Construction and Operation of the Pioneer Furnace Department, Cleveland-Cliffs Iron Co., for the year ending November 30th, 1896.

NEW CONSTRUCTION.

With the commencement of January 1896 the bulk of the construction work for the new furnace was practically completed. Many items and details however, of more or less importance remained to be done, chief among which were the finishing touches to water piping, steam pipe covering, blowing engines and machinery and the proper drying out of the furnace flues and stoves. The furnace could have been put in blast sooner than it was had it not been for the delay in completing the chemical plant. This was not ready for operation until March 13th., we were therefore unable to fire our kilns until that date, and of course could not start our furnace until we had gotten them around. The furnace was put in blast April 16th, and from that date New Construction practically stopped although this account was not closed out until November 30th 1896.

The following tables and detail statements show how the money has been expended; our original estimate increased by authorized additions is brought down to November 30th, 1896. The overruns are also shown and treated in detail. The showing is a bad one and I frankly admit that we might have exercised more care in preparing these estimates. We should have absolutely determined upon the site of the furnace

and revised our estimates accordingly. In my report for 1895 I have explained in detail the causes for all of these overruns and to do so again would be a vain repetition. I will only take up a few items bearing on this question. If you will refer to the detailed statement of overruns on the furnace you will note that actual overruns applied to the furnace proper show that Furnace Stoves,Piping &c. overran $1178.64., Steam and Water Piping $1439.02.,Engine and Pump House $530.39.,Water Tank $748.89.,Foundations $3212.31.,Painting Engine House Roof and Water Tank $220.66,making a total of $7329.91. Assuming that the furnace cost with authorized additions,including those of 1896,$8213.01. The actual overrun on Construction of the Furnace proper will be 8 & 3-10 per cent which is not bad on a job of that magnitude. The remaining items which go to make up the increased cost come more properly under the head of "Not included in original estimate" I will only call your attention to a few of these,the first being an item of general expense for $11565.99, The charges making up this item cover a period of 20 months and are chiefly made up of salaries for myself and clerks,traveling expenses,office telephone and telegraph bills,bill from Cleveland,Ohio, office and sundry small charges from the Iron Cliffs Co. In other words the general expenses covering the operation of a large plant for nearly two years. The next is an item of $3020.00 for machinery purchased from the Iron Cliffs Co. Then an item of $1778.07 for Stock House flooring. Firing to dry stoves furnace and flues $2086.68.,Electric Lighting Plant $1087.30.,Plans and Specifications $8761.86.,Pig iron track on dock $1529.17. None of these items could well be considered in the original estimate. We had no means of knowing what our general

expense account would be,neither could we tell what value the appraisers would put on the old machinery and electric lighting plant. The plans and specifications were greatly increased for reasons for which you are already familiar. The pig iron yard tracks were also an unknown quantity and it was impossible to tell at the outset what would have been the best plan to adopt for handling our pig iron., while the cost of our yard system may appear large, it is rapidly paying for itself as shown by the cost of loading and handling pig iron as compared with other furnaces. It was also impossible to estimate the cost of drying out furnace stoves and flues. This heavy item was due to the completion of our plant just about the beginning of severe weather. We had an immense amount of green brick work,dripping with water,which had to be dried out and kept from freezing. To do this required a large amount of fuel and labor and must be put down to climatic conditions. The cost of filling the Cast House with sand could not well be estimated upon as all depended upon the location of the furnace. We were compelled to bring this sand 12 miles,whereas had the furnace been located at Negaunee or Marquette the Cast House could have been filled with Horses and Carts at much less expense. The other items making up this overrun are small and explain themselves. The item of $906.07 for Barn Boss House should have gone in with tenement houses. The overrun on Barn,Office and Managers Residence includes out-house and wood shed built for Barn Boss's house,storm windows and calcimining Managers Residence,fencing,grading and putting muck on Managers lot &c. The overruns on buildings on island was caused by our having

to double the size of the car shop to make room for two cars so that the men could be protected from the weather and complete the repairs in time. The item of Laboratory should be more properly charged to Equipment as it consisted of tables desk,fume chamber &c. which is really equipment. The item of whitewashing kilns really belong to operating. The large overrun on repairs to machinery has already been explained. I merely mention these facts in explanation and not to excuse myself. Coming down to the chemical plant the total overrun amounted to $10,009.82. Just how these overruns occurred is shown in detail statement. I offer no further explanation regarding them,than those you are already familiar with. Will only say that I was absolutely ignorant of this business at the time of going into it and did the best I could.

Before closing this portion of my reportI would ask you to be as lenient as possible regarding these overruns. Both the furnace and chemical plant are first class. The furnace compares favorably with anything of its class and the chemical plant is far ahead of any I have seen,and I can consistently state that no money has been needlessly wasted in their construction,and the company have received full value in return for the money expended.

COMPARISON OF REVISED ESTIMATES AND ACTUAL COST OF COMPLETED PLANT.

Revised Estimate-Jan'y.1895, with authorized increases as per page 3, report of 1895.	To Cost.	Actual Cost Nov.31'96.	Over-run.
Furnace - - -	86915.00	130009.72	41796.71
40 Kilns - -	20000.00	20794.89	794.89
Saw Mill - - -	10000.00	2167.15	
Chemical Plant - -	34110.45	46987.36	10009.82
Tracks & Trestles - -	21895.43	22895.50	1000.07
Barn Office and Managers Residence	10000.00	10891.79	891.79
Supply Houses & Founders "	6000.00	6697.54	697.54
Filling around Buildings & Kilns	4488.23	8140.64	3652.41
Repairing, Mov'g.& Erec't.Mach'y.	3000.00	5902.63	2902.63
Totals	196409.11	254487.22	61745.86
Authorized increases 1896,			
Furnace 1298.01			
Chemical Plant 2867.09			
Total: - -	4165.10		
Extra Expenditures.			
Rented Houses 12789.84			
Parsons Ry. &c., 7677.98			
Total - -	20467.82	20467.82	
Grand Total:- -	221042.03	274955.04	61745.86
Less amt.exp'd.acc't.Saw Mill	7832.85		
	213209.18	274955.04	61745.86

DETAIL STATEMENT OF 1896 AUTHORIZED ADDITION.

Furnace.

Pipe Covering - -	615.92	
Pyrometer - - -	682.09	
Total:-		1298.01

Chemical Plant.

Steel Still & Installing - -	628.83	
Burcey Pans - -	284.70	
Acetate Plant - - -	1255.04	
Pipe Covering - -	325.30	
Shipping Tank & Installing -	273.98	
Steam Traps (18) - -	139.24	
Total:-		2867.09

DETAIL OVERRUN ON FURNACE.

Furnace Stoves, Piping &c.,	1178.64
Steam and Water Piping	1439.02
Engine and Pump House	530.39
Water Tank	748.89
Foundation	3212.31
Surveying Site	193.40
Plans & Specifications	8761.86
Paving	503.01
Fire Insurance	118.75
Clearing Site	274.88
Rebuilding Feed Pump Foundation	71.10
Firing to dry Stack and Stoves	2086.68
Pig Iron Track on Dock	1529.17
Dry House	47.65
Machinery	3020.00
Appraisment	56.20
Electric Light Plant	1087.30
Painting Engine House Roof and Water Tank	220.66
Stock House Bulkheads	190.11
Stock House Floor	1778.07
Barn Boss House	906.07
Laboratory	398.64
Scale Construction	505.63
Well	283.39
Cast House Filling	1055.11
Furnace & Escanaba Telephone Line	232.17
Cleaning Up	824.85
General Expense	11565.99
R. R. Survey to C. & N. W. Ry.	470.80
	43340.74
Less Credit Iron Building..... 374.76	
Less Credit Rep.Mach'y to Equip't. 1169.27	
Less Total Credits	1544.03
	41796.71

DETAIL OVERRUN ON CHEMICAL PLANT.

Boiler Firing & Testing Plant	821.45
Builders Insurance	143.11
Water Supply	1467.88
Alcohol Building	38.83
Alcohol and Boiler House Foundation	434.37
Boiler House	31.90
Piping	1238.67
Smoke Main	716.28
Fans & Pulleys	533.59
Pumps	391.19
Boiler Setting & Piping same	1605.98
Refining Column Installing	340.55
Refining Column Matthes expenses	247.01
Plans &c.	170.28
Chimneys and Connections	34.87
Temporary Steam Power	44.55
Tanks & Stills	1175.12
Engine and Foundation	214.67
Pump Foundation	59.40
Condensers	300.12
	$10009,82
Of this overrun	1541.00
is account of increase price of material over bids as per page 33 report of 1895.	
	$ 8468.82

DETAIL ACCOUNT OF MISCELLANEOUS OVERRUNS.

KILNS.

Plans - - - -	50.00	
Colliers Shanty & Lime House - -	165.62	
Charcoal Tramway between Kilns- -	710.08	
Whitewashing Kilns - - -	204.18	
		1129.88
Actual underrun over estimate on 40 Kilns - -		334.99
		794.89

TRACKS & TRESTLES.

Overrun over estimate - - -	409.20	
Extra Rail not used now on hand -	590,87	
		1000.07

Barn, Office and Managers Residence - - - 891.79

Supply Houses and Founders Residence

Car Shop - - - -	298.90	
Laboratory - - -	398.64	
		697.54

Filling Around Buildings - - - - 3652.41
Page 13 last years report.

Repairing Machinery - - - - 2902.63
Page 17 last years report.

FURNACE OPERATING.

The following explanations and tables cover the operation of the Pioneer Furnace for the year ending November30th,1896.

Commenced filling furnace 7 A.M. April 15th,1896.

Furnace Lighted 3 P.M. April 16th,1896.

Blowing Engine started 3:23 P.M. April 16th,1896.

Gas under Boilers and Stoves 4:50 P.M. April 16th,1896,

First run of Cinder 4 A.M. April 17th,1896.

First cast of iron 9:15 A.M. April 17th,1896.

Furnace ran 229 & 13-24 days.

Total time delayed in 1896, 163 & 47-60 hours.

Average delay per day 42 & 8-10 minutes.

Average tons of iron made per hour 4 & 34-100 tons.

Total number of casts for the year 905.

Average tons per cast 26 & 4-10.

Average tons per day 104 & 1-10.

Average burden for year 1896, Ore 2915 lbs.

" " " " " Limestone 207 lbs.

" " " " " Charcoal 1200 lbs.

Total Average burden for year 1896, 4322 lbs.

Total number full charges for year 34675

" " blank " " " 41

" " charges " " 34716

Average number charges per day 151 & 3-10.

Average Heat of Stove No. 1 for 1896	1301°
Average heat of Stove No. 2 for 1896	1299°
Average Steam Pressure " "	100 lbs
Average Blast Pressure " "	6 & 46-100 lbs.
Average revolutions of Engines "	38 & 7-10.

Detailed Statement of Delays.

	Hrs.	Min.
Casting	120,	7
Repairing Engines	1,	35
Cleaning Blow Pipes	12,	40
General Repairs	2,	20
Stopping Notch	,	40
Putting in Blow Pipes	5,	25
Changing Engines	,	20
Repairing Hoist	4,	20
Repairing Stack	12,	
Cleaning Gas Flues	2,	20
Repairing Stove Valves	1,	
Repairing Bronze Plates	1,	
Total stoppages	163,	47

1896. [illegible]

Cm. Company island June 22/96.

Started Furnace Apl 16/96

Original estimate of complete cost

A. F. attention to the comparative cheapness each wk. ore bought & handle from crop with other furnaces.

Cost of putting [illegible] Marquis lot & fencing & grading 10 $

P. 8. Extra coal stored to in Inventory

Checked down aug 76 to make [illegible]

P. 20. Has the variation in quality of liquor been due to green wood

---

P. 24. Thinks can get to 2500 # acetate but not more, before he amounts confidently on 3000

P. 25. Recommends an incandescent 100 light plant $ 25 + 175. for wiring and installing total [illegible]

P. 30 trying to make contract for coal @ 5 1/4

P. 44 & 45, on cord wood & Hoovier lot copy in mem book

P. 47 selling price 39300!

Ask A. F. the cost of [illegible] stocks (see inventory) about 64.

Post Chair
Shults with Mr. A. F. [illegible]
Annual Report for 1896.

[illegible] Annual Report p. [illegible]

[illegible] Work –

amount obtained from sections or subdivisions accompanied [illegible]

Howe's estimate, also Ford & Fletch, etc. take into [illegible]

in comparing the quantity of [illegible] timber estimated by Howe [illegible]

Est's Gladstone kilns Consumption 140 cords daily –

Intends to make Contract for packing kilns (keeping careful records of [illegible]

present cost 13.6 c per cord

P. 38. One farmer has 300 acres cut for [illegible]

Cost of [illegible] ~~[illegible]~~ ~~[illegible]~~ [illegible] & Nos. fee [illegible]

P. 45. [illegible] of key for Cooks branch (letter 70)

& Comparison on P. 3. of furnace cost from ~~Complete~~ it up to date, adding any additional explanations & those in [illegible] that he may [illegible]

Saw Mill business

Acetate plant business

Average [illegible] of wood covered by [illegible] contract & what he estimates [illegible] actually [illegible]

Contractors

Map showing chopping positions

There was produced during the year 23896 Tons of Pig Iron of which 20399 tons was regular Pioneer Non-Bessemer., 3497 tons was Pioneer Special Bessemer. The following table is a detail statement of percentages and different grades produced.

PIG IRON MADE

Grade.	Tons Non-Bess	Per Cent.	Tons Bessemer.	Per Cent.	Total Tons.	Per Cent.
No. 1.	5334	26.1	209	6	5543	23.2
No. 2.	7646	37.5	2952	84.4	10598	44.3
No. 3.	5137	25.1	103	2.9	5240	21.9
No. 4.	1140	5.6	136	3.9	1276	5.3
No. 5.	542	2.7	87	2.5	629	2.7
No. 6.	539	2.7	10	.3	549	2.3
Spotted	59	.3			59	.3
Castings	2				2	
Total,	20399	100	3497	100	23896	100

There was consumed during the year the following amounts of materials:-

Grade of Ore.	Actual Tons Used.	Overrun.	Total Charges	%Ore Used.	%Over run.
Non Bessemer.					
Lake	20451. 413	174.2080	20626. 253	53.2	.8
Lake Silica	2388.1189		2388.1189	6.2	
Salisbury	6004. 10	95. 946	6099. 956	15.7	1.6
Sals.Silica	2399.2170	142. 811	2542. 741	6.8	5.9
Cliffs Shaft	5704.1494	159.1600	5864. 854	15.1	2.8
Foster	39.1782		39.1782	.1	
Hemlock	1121.2160	22. 940	1144. 860	2.9	.2
Total Non Bess.	38110. 258	594.1897	38704.2155	100	1.6
Bessemer.					
Lake Bessemer	2075. 930	.1372	2076. 62	32.9	
Lake Silica	622.1353		622.1353	9.8	
Toledo	2523.1930	72.1731	2596.1471	41.	2.9
Section 16	1011.1750	22.1214	1034.724	16.3	2.3
Total Bessemer:	6233.1483	95.2127	6329.1370	100	1.5
Grand Total	**44343.1741**	**690.1784**	**45034.1285**		
Limestone	3199.2204	8. 102	3208. 66		.3
Charcoal	2082960 bu.		2082960 bu.		

There was shipped during the year 14800 tons Non Bessemer and 3478 tons of Bessemer Pig Iron making the total shipped 18278 tons, leaving on hand at the close of the year 19 tons of Bessemer and 5599 tons of Non Bessemer, making a total of 5618 tons on hand at the close of the year.

The average cost of loading the pig iron on cars for the year was 5 & 8-10 cts per ton., the average cost of loading vessels was 11 & 4-10 cts. The cost of loading vessels was run up unnecessarily through our being obliged to load two vessels not at all suited to the conditions prevailing at our dock.

The average ore yield of Non Bessemer ore for the year based on furnace charges was 52 & 7-10 per cent iron. The bushels of coal per ton of Non Bessemer iron for the year was 87 & 46-100. The average ore yield of Bessemer ore for the year was 55 & 2-10 per cent iron. Bushels of coal per ton of Bessemer Iron for the year was 85 & 4-10.

The cost of NonBessemer Ores per ton of iron used during 1896 was as follows:-

Ore.	Price per Ton Ore.	Cost per Ton Iron.
Lake	1.720	1.728
Lake Silica	1.417	.166
Salisbury	1.960	.577
Salisbury Silica	1.311	.155
Foster	1.516	.003
Cliffs Shaft	2.128	.597
Hemlock	1.770	.097
	1.759	3.323

The cost of Bessemer Ores per ton of iron used during 1896 was as follows:-

Ore.	Price per Ton Ore.	Cost per Ton Iron.
Lake Silica	1.416	.252
Lake Bessemer	3.584	2.128
Toledo	3.286	2.372
Section 16	3.503	1.014
	3.234	5.766

There was consumed during the year 2082960 bushels of charcoal, at an average cost delivered at the furnace of 5.49cts per bushel Of the above quantity 1784280 bushels was used in producing the Non Bessemer iron and 298680 bushels was used in producing the Bessemer.

The Non Bessemer iron produced cost $10.82 per ton; the Bessemer $12.85., the average cost of both kinds of iron being $11.12 per ton. This includes loading charges, sinking fund and Cleveland Ohio office expenses.

FURNACE ORE MIXTURE.

I desire to call special attention to the low yield in iron of the non bessemer ore mixture through the furnace. Referring to the figures already given it will be noted that the non bessemer ores averaged 52.7 per cent through the furnace. This is a very low yield when we consider the fact that we are using Lake Superior Ores, and when our mixture is compared with that of other furnaces. As a basis of comparison I will state that the ore mixture of the Ashland furnace,based on furnace yield was 58 per cent for the year 1895, with a fuel consumption of 86 bushels per ton of iron as compared with our fuel consumption of 87.4 bushels. I will admit that our non bessemer iron had to stand the filling of the furnace and the

light burden incidental to the blowing in, whereas the Ashland furnace had been running a much longer time which would naturally decrease the average fuel consumption. In spite of this fact however our ore mixture is too low for economical working. To show what can be done with a richer mixture I would refer you to our work covering the period of Bessemer iron production. With an ore mixture through the furnace of 55.2 per cent the fuel consumption per ton of iron was 85.4 bushels. When you take into consideration that we were held down strictly to low grade iron,and that we made 90.4 per cent of 1 and 2 it will be readily seen what can be done with a richer mixture. As further proof to the above I would refer you to the work done by the furnace during the month of October. During that period our average mixture through the furnace was 54.1 per cent iron.,our fuel consumption being 82.6 bushels. During that time we made the ordinary percentages of non bessemer iron,although 57 per cent was 1 & 2. In view of these facts I would strongly recommend that an effort be made to improve our ore mixture,unless the management have especially strong reasons for desiring to use inferior ores. It may be well to note that this low ore yield was partially due to our lack of proper stock house facilities., the bulk of the ore being exposed to the weather at all times of the year,and having taken up an immense amount of moisture from heavy rains in the early spring and later fall.

RESUMÉ OF FURNACE OPERATIONS.

In this connection I would state that the blowing in and sub - sequent operation and work of the furnace has been satisfactory to your Manager. When you consider the fact that the plant was a new and untried one we have gotten on very smoothly,and with the exception of one serious accident I have nothing to note which would not come under the head of ordinary furnace practice. The accident referred to was the killing of one of our keepers and helpers by the breaking out of the furnace between one of the rows of bosh plates. An accident of this sort is likely to occur at any time and no warning was given that would have enabled us to avoid it. The total delay caused by this stoppage was but 12 hours.

Our machinery has worked well and given us but little trouble, as you will note by referring to table showing causes for stoppages. After deducting the necessary time lost for casting,and the accident above referred to,the remaining time lost cuts compartively small figure,and is a remarkable showing for a new and untried plant. Another remarkable fact in this connection is that we have not lost a single tuyere or cooler since starting the furnace. Experience has shown that we are slightly short of boiler capacity when we are compelled to lay off a boiler for cleaning purposes. This defect will be remedied we hope by the introduction of the condenser early in January 1897. I would strongly recommend during the coming year the extension of our stock house. This is entirely too small for our present needs. We were fully aware of this fact when it was built but its present size was determined for reasons of economy.

The general equipment is in first class condition,and the condition of the furnace so far as we can see is all that could be expected considering the length of time it has been in blast. Unless something unforseen should happen its life should considerably exceed a years steady running.

Acting under instructions from the management the furnace was checked down August 26th and run much under her capacity from that date until the end of the year. This accounts for the apparent small daily output of pig iron.

It was decided to charge pig iron with 10c per ton to establish a fund to cover bettements and repairs. At the close of the year this amounted to $2500.80. An additional amount of 50 cents per ton was set aside to sink off plant. At the close of the year this amounted to$11,836.80, and these items aggregating 60 cents to appear in our cost of pig iron.

The total credits from the entire sinking fund,from all departments, amounted for the year $25,072.14, reducing the total outlay from $274,955.04 to $249,882,90.

OPERTATION OF THE CLEVELAND-CLIFFS IRON COMPANY'S CHEMICAL PLANT FOR THE YEAR 1896.

We began firing our furnace kilns March 13th,1896. They were fired in blocks of two with a couple of days interval between,to avoid crowding the chemical works too much at the start. The plant was started March 15th and operated for the remainder of that month and for 20 days in April. The April stoppage was made necessary by reason of our having to wait until the furnace emptied a sufficient number of kilns to enable us to go on with regular firing. For the sake of easy comparison I have considered March and April as one month. In the tables following,which give a detail statement of the working of this plant, our yield of pyroligneous acid for the month of March was 248054 gallons;of alcohol 3530 gallons. For April we made 343026 gallons of pyroligneous acid; of alcohol 4174 gallons. These figures added together correspond with those of the table for March and April.

During the month of June one of the stillmen lost 1260 gallons of 95 per cent alcohol. For the sake of comparison,to enable us to obtain the yield and percentage of loss, this amount was added to the June output. This changes the output of the year ending Dec. 31st by just that amount. The actual make being 68633 gallons of 95 per cent alcohol. For the sake of more accurate figures and comparisons I have brought the work of the chemical plant down to January 1st 1897.

The plant started off very nicely and considering our absolute ignorance of this business no very costly mistakes developed. It

was found by actual practice that our water supply in the alcohol house was insufficient. This was remedied by making an additional connection with the condenser pump. The most serious defect developed was a shortage of still capacity in the fractional department. It was found that when running full, our fractional stills were unable to take care of the primary output, and we were compelled to dump liquor from the fractionals carrying from 3 to 5 per cent of alcohol. I at once recommended an increase in the number of fractional stills, and the addition of Burcey pans to the fractionals we already had in place. We begun to feel the effect of these changes in September, and the changes were completed, with the exception of one still and one set of Burcey pans, in November. The wisdom of these changes have been demonstrated as we have brought down the loss for those two months from 23 & 1-2 to 11 & 35-100 per cent. We had never approached these results before, with the exception of the work done in March and April. The good work obtained at that time was solely due to the fact that the plant ran slowly and did not have the number of gallons of liquor to take care of that it had to in later months. We completed these changes during the last week of December., the final set of Burcey pans being put in place Dec.31st. It may be that some of our good work is due to colder water for condensation purposes. This can only be determined by comparison with next summer's output. Our changes have undoubtedly helped us as a dump from our fractional stills is now absolutely free from alcohol. The refining apparatus put in has fully met our expectations, although it has been proved that it would not have been suited for the work as planned by Messrs. Matthes & Chute, their idea being to introduce

the green liquor directly into the refining column. Your manager protested against this and practical results demonstrated that the column as constructed was not suitable for that class of work.

The condition of the plant is first class and we are in much better shape to do good work than the day we started. The chief improvements for the year are two fractional stills, equipped with Burcey separators, and 4 sets of Burcey Separators fitted to the original fractionals. In addition to this considerable work has been done which would tend to reduce labor to a minimum and aid in the smooth working of the plant. We have also added a 4500 gallon galvanized storage tank which materially aids us in separating and sorting our liquor. With one exception, to be taken up hereafter, so far as I can see now we will be under the necessity of making no further expenditure over and above what is required for actual maintenance. The details of the operation of this plant are fully shown in tables accompanying this report, but in addition would state that we received the smoke from 26481 cords of wood. The total output of alcohol based on actual yield was 69893 gallons, giving an average actual yield of 2 & 64-100 gallons of 95 per cent alcohol to the cord of wood. $4698.74 was sunk off during the past year. The average cost of alcohol for the year, including sinking fund, was 31 & 3-10 cents

While many valuable results have been obtained from the Laboratory we are still only on the threshold of investigation. The work is being constantly carried on and I hope with the end of the present year to give you much additional data. We are taking steps to determine the number gallons of tar obtained daily and are in corre-

spondence with parties as to its demand and market value. We are also investigating the advisability of going into the production of acetic acid and other materials obtainable in the form of by-products. These investigations are not far enough advanced to warrant any more being said of them in this report. I will state that the subject is a most interesting one and that I firmly believe that from time to time we can greatly increase the profits from this branch of the business at a comparitively small outlay .

In the second table accompanying this report the theoretical yield of alcohol per cord of wood for the months of April to August inclusive are based on a theoretical yield which is an average of the months from which we have reliable analytical results. Our investigation has shown that the yield of liquor varies unaccountably in quantity and richness. This was exemplified during the month of December. While we obtained considerably more liquor than we did in November it was not so rich in alcohol, nor the yield so great per cord of wood. Our kilns also worked badly this month., the gas was much poorer than usual; what the cause of these ireegularities are we are yet unable to state. Neither can we get information from other works in the business. They all seem to be working more or less by a rule of thumb, and from what I have been able to find out, our investigations lead our contemporaries in the business. I have also found out that the working of the chemical plant effects more or less the yield from the kilns., the tendency being on the part of the chemical man to hold on to the kilns too long to enable him to obtain a better supply of gases for fuel purposes at the chemical plant. This

Table Showing yield of Pyroligneous Acid and Alcohol during year 1896 and comparison with theoretical results obtained in the Laboratory.

	Pyroligneous Acid.			Gallons of 95 per cent Alcohol.			
Month.	Alcohol Percent.	Yield Gallons.	Gals. per Cord.	Laboratory Yield.	Actual Yield.	Gals. Lost.	Percent Lost.
Mar. & Apr.	1.56	591080	219	9243	7704	1539	16.6
May,	1.52	678810	224	10362	7764	2598	25.0
June	1.47	650760	232	9621	6309	3312	34.4
July	1.45	658920	236	9545	7231	2314	24.3
August	1.40	672486	244	9446	5846	3600	38.1
September	1.38	746130	246	10353	7904	2449	23.8
October	1.66	755820	227	11918	9102	2816	23.5
November	1.33	695742	234	10106	8961	1145	11.3
December	1.44	711246	229	10242	9072	1170	11.4
Average of Last 3 Mos.	1.48	721269	230	10755	9045	1710	15.4
Grand Avg.	1.46	684555	233	10093	7761	2332	22.1
Totals:-		6160994		90836	69893	20943	

Table showing theoretical yield of 95 per cent Alcohol per cord of wood as compared with actual practice.

		Gallons per Cord.			
Month.	Cords of Wood.	Laboratory Yield.	Actual Yield.	Gallons per Cord Lost.	Percent Lost.
Mar.& Apr.	2695		2.85	.577	16.6
May	3021		2.57	.857	25.0
June	2805	3.430	2.24	1.187	34.4
July	2783		2.59	.859	24.3
August	2754		2.12	1.304	38.1
September	3021	3.470	2.61	.817	23.8
October	3328	3.580	2.73	.830	23.5
November	2968	3.405	3.02	.386	11.3
December	3106	3.297	2.92	.377	11.4
Average of Last 3 Mos.	3134	3.427	2.89	.531	15.4
Grand Avg.	2942	3.427	2.63+	.799	22.1
Totals:-	26481				

undoubtedly had a good deal to do with the low yield in coal from our kilns last month. It is very hard to know just where to draw the line in this direction but we hope to obtain light by fuller experience in operating.

ACETATE PLANT.

During the past summer it occurred to me that if we were able to evaporate the dump from the fractional stills we should obtain gray acetate of lime. Analysis was made of this dump and it was found to contain from 6 to 9 oz. of gray acetate of lime per gallon. By the way of explanation I might say that the difference between brown and gray acetate of lime depends on the percentage of acetate of lime in the material. Brown acetate running from 68 to 70 per cent of acetate of lime and gray acetate from 80 per cent upwards. The ordinary commercial ranging from 80 to 85 per cent. To make gray acetate of lime it is necessary to separate the tar by means of distillation. This necessitates the use of very expensive copper stills. By evaporating the liquor from our fractionals we do away with this tar distillation,although we of course do not obtain a liquor as rich in acetic acid as we would had the total bulk been thrown over and neutralized. I concluded that whatever we got from the fractional dumps would be a clear gain to us,as otherwise this liquor would have gone into the swamp. You will understand that it was necessary to neutralize it to get out the alcohol. The next drawback which confronted me was the expensive steam boiler plant

and jacketed pans necessary to evaporate the liquor. The item of steam alone has always been the heaviest in the cost of the acetate. From all the data I can gather, amounts to about 1-2c per pound. It occurred to me that we could substitute the exhaust steam from our pump and engine, passing the same through a system of manifolds in wooden boxes, in lieu of a steam boiler and jacketed pans. Experiments were made with this end in view and were satisfactory. As a result we are to-day making acetate with a large fuel item entirely eliminated from the cost sheet. The plant as it stands at present consists of a building 28 X 60 ft, a brick drying floor with wrought iron top 40 X 10 ft., 3 evaporating pans with manifolds, No 1 being 15 ft X 5 ft 7", 36 inches deep., No. 2 the same size., No 3 or sugaring pan 15 X 5 ft 7" by 18"., two settling tanks each 16 X 6 X 6ft with the necessary pipe connections to the evaporators. The total cost of the plant was $1255.04. Had this plant been built on the old lines it would cost a trifle over $5000.00. As previously stated we depend entirely upon ~~ex~~ exhaust steam for evaporation and up to the present time the plant has worked very successfully. Operations were begun Oct. 31st, 1896. For the month of November we produced 58441 lbs of acetate, being an average of 1885 lbs per day. The material produced showed 85 & 1-10 per cent acetate of lime., the cost including sacking was .0034 .0033 per pound. For the month of December we did not do so well., the daily output averaging but 1507 lbs. This was due to 3 causes., short supply of liquor owing to changing fractional stills, secondly the liquor varied a great deal in the percentage of acetate carried, thirdly the plant was shut down a day making some necessary changes in piping. For the month of January to date

we have averaged 2120 lbs daily. I expect to still further increase this in the near future, in fact will not be satisfied until the out put averages 2500 lbs per day, which is the maximum amount we can produce regularly with our present evaporating capacity. The plant has run long enough to demonstrate the fact that it will add quite a little to our profits in the chemical department. Whatever we get is velvet and the original outlay was not great. I expect to be able to give you fuller data regarding acetate of lime and its by-products in the near future.

RESUME OF CHEMICAL PLANT.

Referring to the cost of alcohol for the preceeding year two heavy items appear., first being fuel and the second fire insurance. The item of fuel can not well be avoided and I do not see how we can reduce it much over the year just ended. We could make reduction by holding on to the kilns but in this case the yield of coal suffers and we have already had a bitter experience in this line. I introduced home made blowers last fall which enabled us to burn our charcoal braize under the chemical boilers. This affected a saving of close on to 1,1-2c per gallon., I do not see what more I can do in this line. The next heavy item is insurance. We have our plant insured for $25000. The rate is outrageously high being 5 1-2 per cent. I do not consider the risk a bad one and would recommend that we carry our own insurance. If we did this we would save 1 & 6-10 cts per gallon on alcohol produced. The greatest risk, and it is a great one, we are liable to from fire at the chemical

plant, is from our arc lights. We have taken all the precautions we possibly can, but the risk still remains. The plant should be lighted with incandescent lights and in my judgment this can not be done too quickly. For all purposes, connected with the chemical plant, kilns and office we would require a hundred light machine. We have been trying to get track of a second hand one but so far without success. We could however purchase a new one of the most modern type for $225.00., the cost of installing and wiring with lamps would be about $175.00 making a total outlay of $400.00 In addition to doing away with the great risk of fire we could save the coal oil which is now used in the stock house and kilns, which would be a saving of about 3 bbls or $15.00 per month. We could also do away with enough arc lights to enable us to properly light our dock so that we could load vessels at night which we have not been able to do heretofore.

Referring finally to the comparisons in the second table you will note that by taking the average of the months of November and December, which were the only ones in which we really began to feel the effects of our improvements. The yield of alcohol per cord, theoretically, was 3 & 35-100 gallons., in other words this is the maximum we could expect under the conditions prevailing. We actually obtained for the same period of time 2 & 95-100 gallons to the cord, showing a loss of 4-10 of a gallon to the cord. This loss occurred after the liquor was in the alcohol house and therefore lies between the primaries and refining column. We are now following out investigations which we hope will show us the loss between the primaries and fractionals.

As soon as this is determined we will try and trace it further, and hope finally to locate it and place it where it belongs. When we feel the full benefit of our improvements we may be able to reduce this still more. If our data appears incomplete to you I trust you will understand the difficulties we had to encounter and our ignorance of the business and can assure you that we are now working on a definite line and will be able in the near future to give you much fuller explanation on all matters pertaining to the process.

FREIGHT ON CHARCOAL.

Ford River.	Freight paid	Cost per Bush.
Freight on C. & N. W. R. R. from location to Larch	864.22	.0056
Freight on Soo from Larch to Furnace	322.50	.0020
Total freight	1186.72	.0076

Outside Jobbers.

Freight on C.& N.W.R.R. from various places to Larch	3033.79	.0076
Freight on Soo from Larch to Furnace	842.50	.0021
Total freight on coal over C.& N.W.	3876.29	.0097
Coal over Soo Line only	2094.95	.0042
Total coal received from outside jobbers	5971.24	.0063

	No.Bu.
Bushels of coal over C. & N.W.R.R. from Ford River	156560
" " " " " " Various Places	399512
" over the Soo Line only	490578
Total bushels from outside sources:-.....	1046650

CHARCOAL SUPPLY.

Our charcoal supply is obtained from our Pioneer Furnace Kilns, the Ford River and Felch locations, leased from the Iron Cliffs Co., and jobbers on the line of the C. & N. W. and Soo railways. By reference to my last annual report you will note we began early in the seaon of 1895 and 1896 to make contracts for charcoal which would be wanted for the starting of the furnace in April, outside of our own ability to produce. Our own resources at that time were as follows:-

Pioneer kilns at furnace per month	140,000 bu.
Ford River Kilns	24,000 bu.
Antoine Deloria's kilns on Soo road	10,000 bu.
Total:-	174,000 bu.

These figures were at that time necessarily some what speculative but have since been verrified by facts. We saw the necessity of providing ourselves with a supply from outside sources of not less than 82,000 bu. per month, assuming the furnace would produce 100 tons of iron daily. Knowing the irresponsibility of coal jobbers we made verbal contracts with outside locations, which based on their own statements aggregated a capacity of 149,000 bu. per month. We have since had reason to congratulate ourselves that we made as liberal allowance as we did. After putting the furnace in blast she demonstrated her ability to produce from 125 to 130 tons daily with economy. The demand for coal was therefore correspondingly increased In the early months of the summer we had no resources on the Soo road outside of Deloria at Isabella. , With the exception of the Wisconsin Land and Lumber Co. of Hermansville and Geo. Deloughary at Eustis.

Later we were obliged to discontinue taking coal from the former on account of his poor quality,it being made entirely from hardwood slabs. We gave up the other Soo point because of the unreliability of the jobber.,this threw us entirely on the C. & N. W. road for our outside coal supply. We put in operation many old locations which had not shipped coal for months and in some cases two or three years., the result was that before getting them started on coal from their new burning we had to take a lot of inferior stuff,and if we protected ourselves from loss it was by the most rigid inspection and docking. At one time we were receiving coal from 14 locations on the C. & N. W. road. Fortunately for us the inactivity in other lines made it possible for jobbers to get wood cut in the summer. We never had less than 25 cars of coal on our furnace track and never were obliged to check the furnace for want of fuel. We have paid from the first 5 1-2 cents per bu. for outside coal F.O.B. Cars. By referring to table showing freight on charcoal you will note that the average freight on coal over the C & N. W. averages 76-100 of a cent per bu. The arbitrary from Larch to the furnace is 21-100 of a cent,making the total freight on coal from the C. & N. W. from outside jobbers 97-100 of a cent. This rate added to our cost of 5 1-2 cents would make the C. & N. W. coal cost us F.O.B. furnace .0647c. By referring to the same table you will note that the freight on coal over the Soo line averaged.0042c. This added to our contract price of 5 1-2c makes the total cost of coal from jobbers on the Soo line F. O. B. furnace .0592c, or a difference in favor of coal from Soo sources of .0056c. This great difference in price made it very desirable to get all the coal possible from the

Soo line. In May we were approached by the Weston Furnace Co. with an offer to sell us coal made from wood they had on hand. The temptation to accept this offer was great,and had we not placed ourselves under moral obligations to shippers on the C. & N.W.,before we were aware of this sowrce of supply we could have obtained nearly a years run from these people. We addopted a middle course,contracted to take from them from 2 to 2 1-2 cars per day,permitted those jobbers on the C. & N. W. to drop out who were indifferent or unable to continue., made a thorough canvass along the line of the wood which jobbers had gotten out on our account,and sent such men enough cars to enable them to pay their debts and keep in favor with them. About the 1st of December we heard rumors that the Weston Furnace Co. would go into blast this coming spring. This has been verrified and they desire to terminate their contract with us the 1st of May next. This will necessitate our going back to the Northwestern for practically all our outside coal supply.

We are trying to make contracts with this end in view and will offer 5 1-4 cents per bu. for coal F.O.B. cars.

COAL REQUIREMENTS FOR 1897.

Our resources for the coming year are as follows,based on a conservative estimate:-

Pioneer Furnace Kilns per month	140,000 bu.
Ford River Kilns	24,000 bu.
Felch Mountain Kilns	20,000 bu.
Antoine Deloria's Kilns, (Soo road)	10,000 bu.
Total:-.....	194,000 bu.

It became necessary for us to know what ideas the management entertained regarding this years output. After a consultation with the President we were instructed by him to arrange for a coal supply which would enable us to produce not over 100 tons per day for the year 1897. Making this the basis for our calculations we will go over the line and endeavor to obtain 72,600 bu. monthly at 5 1-4c. If we succeed in doing as well as we did last year at our own kilns and locations, so far as the cost of coal is concerned, the average price of next years coal from all sources will be .0532c. I believe we will be able to reduce this years cost at our own locations, and if we can succeed in establishing a 1-4c reduction we will effect a saving of .0017c per bu. over last years price of .0549c. '97 .05u4

PIONEER FURNACE KILNS.

We commenced firing these kilns the 13th of March. They were fired very slowly on account of the chemical plant. After a round had been burned we were shut down for some days waiting for the furnace to start up and empty enough kilns to admit of regular firing. We were handicapped all last year by new bottoms. I am informed by persons who have had experience in this line that it takes fully a year to get the bottoms in good shape. There is also quite a nice point to determine as to just how long these kilns shall be held to give the largest yield per cord and the best results at the chemical works. The longer the kilns are held the lower the yield in coal per cord, while on the other hand we get better fuel results in the shape of gas at the chemical plant. It would be hardly fair to

take the past years work as an average of what can be expected of these kilns. With better bottoms and more uniform working we should obtain better results. Owing to the irregularity of working in March and April, referred to above, I have left these months out in my comparisons and only considered the months from May to November inclusive. The details of the kiln report to follow, however, take in the work for the entire year, with the single exception of the item "Time for turning Kilns". These figures are based on the work done from May to November inclusive. You will note the time required to turn a kiln averaged 21 & 4-100 days, whereas had we turned these kilns once and a half a month, as we should have done, the average time would have been but 20 & 2-10 days. In other words we obtained 398 kilns where we should have had 428, showing a loss of 30 kilns. We had great trouble cooling down our kilns in the months of July and August., also in the month of December were held back by bad weather, it being impossible to get the men to work on some days. I also think we have been holding on to the kilns too long for the last 2 or 3 months. Through this change I hope to increase our yield of coal per cord and increase the number of kilns per month. Our kilns are filled by contract, the contractor being paid $8.25 per kiln. For this price he was required to handle 60 cords of wood and brands and keep his yard and trestles clean, removing all dirt bark &c. The kilns are emptied by the furnace coal forkers. For further details please note carefully the following detail statement. The average cost of coal from these kilns for the year was .0467 which includes $1211.00 sunk off during the past year, amounting to 1-8c per bu.

KILN REPORT YEAR ENDING NOVEMBER 30th, 1896.

Pioneer Furnace Kilns.

No. Kilns fired during year	450
" " emptied " "	419
Cords of Wood filled during year	24107,16-32
" " " burned " "	22012, 8-32
Balance in Kilns	2095, 8-32
Inventory November 30th,1896	2241
Overrun	146

Total bushels coal made during year	1,009,167
Average bushels per kiln	2,408
" " " cord	46.1
" time for turning kilns	21.04 days.

Average cords of wood in 40 kilns	61.9	First filling.
" " " Brands 40 "	none	
Average cords in 410 Kilns	52.4	
" brands " 410 "	7.6	

Packing	.0038
Kiln Tending	.0008
Taking out Braize	.0003
Whitewashing	.0006
Total,filling burning and emptying	.0055

I am getting up some figures showing the percentage of braize obtained from coal received from outside sources as compared with that received from our own kilns,and will submit you figures covering this point in about a month as it will take that long to make anything like accurate determinations.

As an interesting comparison I give herewith the yield of coal per cord of wood from a neighboring furnace working under exactly similar conditions to ours. This average covers a period of time running from Dec'95 to Nov'96 inclusive. The average yield was 46 & 77-100 bu.as compared with 46 & 1-10 bu.from our kilns,showing a difference of 67-100 of a bu. This comparison is not such a bad one when it is born in mind that the first two months of our run was irregular and the bottoms still in poor condition.

FORD RIVER LOCATION.

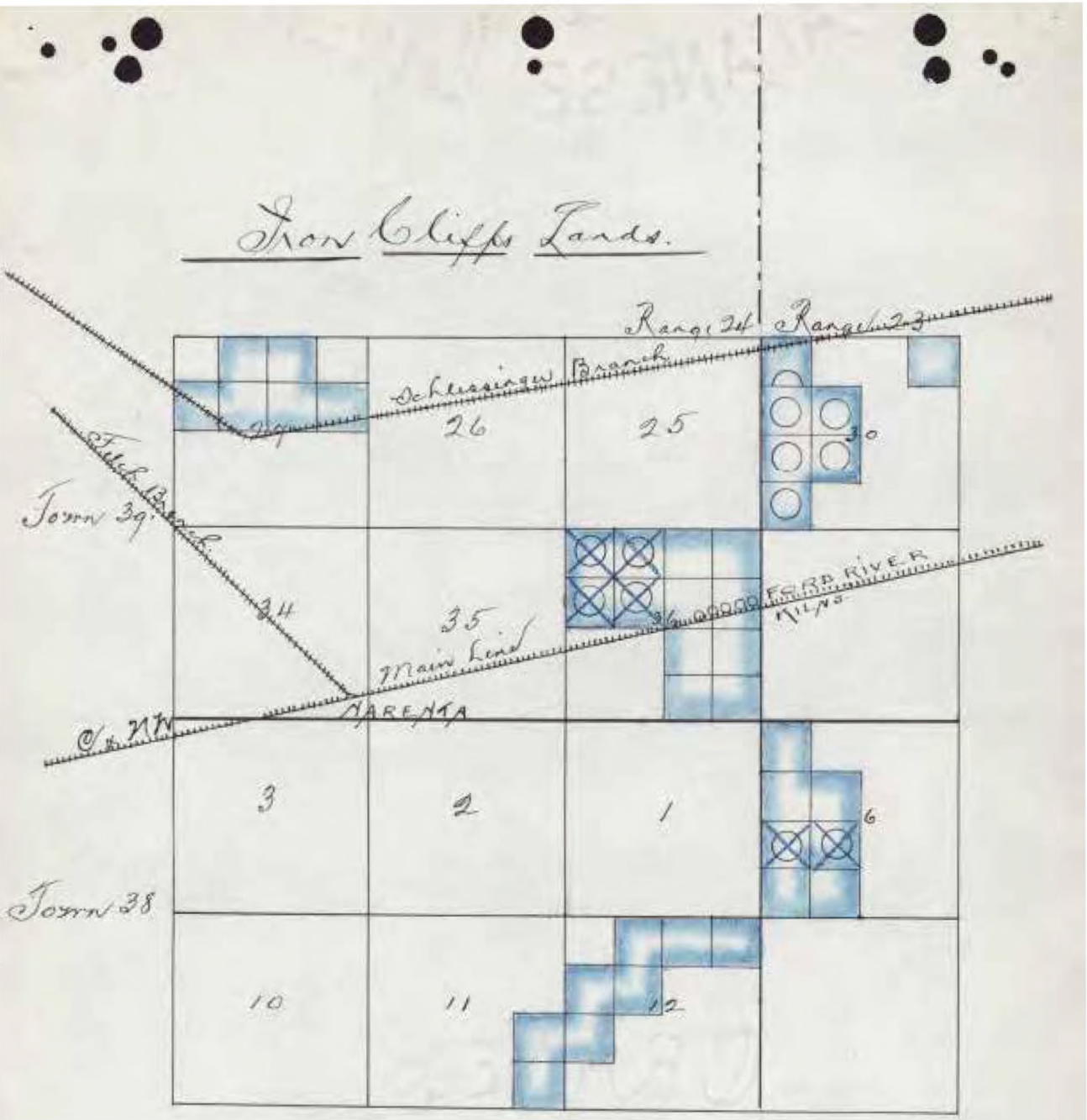
In November 1895 we commenced stocking the banking ground of this location, having let a contract for 4000 cords of wood at $1.30 per cord delivered on the bank. Finding that neighboring farmers were desirous of furnishing wood at the same price we obtained from them 1400 cords, making a total of 5743 & 2-8 cords. In April 1896 we let a Contract to Cyr Bros., they being the lowest bidders, to take this wood as it stood on the bank, haul pack and burn it and deliver the coal into cars for 1-1-2c per bu. The condition of the kilns were much the same as those at Felch. We so arranged it that the contractor did all the labor of repairing, we furnishing the lime and cement. The company were obliged, however, to purchase plank for the repair of the bridge. Our contractors at this point have a reputation of keeping this location in the nicest shape of any kiln outfit in the Northern Peninsula. The houses are all nicely pointed and whitewashed and in perfect repair. The kiln site is kept free from accumulations and unsightly rubbish. The whole place presents the appearance of neatness and thrift., every building on the location is occupied by an employee of the contractor and rents are paid regular to the company amounting to $16.50 monthly. Under the contract above referred to we commenced shipping coal from Ford River the middle of April 1896 and have since continued to run the plant to its fullest capacity. It has produced an average of 24010 bushels of coal monthly, with a maximum of 29300 bu. and an average yield of 45 & 8-10 bu. per cord of wood. The total product to December 1st is 156560 bu. We believe this monthly output for the plant was never reached before. None of the coal jobbers of whom

we purchase, will agree to give as large an output from plants of the same capacity. The amount of wood used by this batteryis in the neighborhood of 500 cords per month; as we had on the bank December 1st 1896, 2300 cords, we may expect that the old wood will last until about the middle of April 1897. Wood cut last year on Iron Cliffs Land came from Sec.(30) Town.39 Range 23. To square up the remaining wood land on this despription we are now cutting about 300 cords to be delivered on the kiln bank at $1.25 per cord. We have undertaken this winter to stock the plant with 5000 cords of wood and have thus far made verbal contracts with farmers to get 4250 cords. If the season for hauling is favorable we shall secure the requisite amount from outside parties, and only cut the 300 cords on company's lands above referred to.

This season will demonstrate our ability to buy wood from farmers for these kilns and thereby prolong the life of a plant by reserving the lands belonging to the Iron Cliffs Co. We pay the Iron Cliffs Co. a rental of 1-4c per bu. for the use of these kilns and taxes amounting to about $60.00 per year, which amount is included in the average cost of coal for the year which was .0481 plus.0076 for freight making the total cost at furnace .0557. For further information see plat and detail statement following:-

FORD RIVER KILN REPORT YEAR ENDING NOV. 30th, 1896.

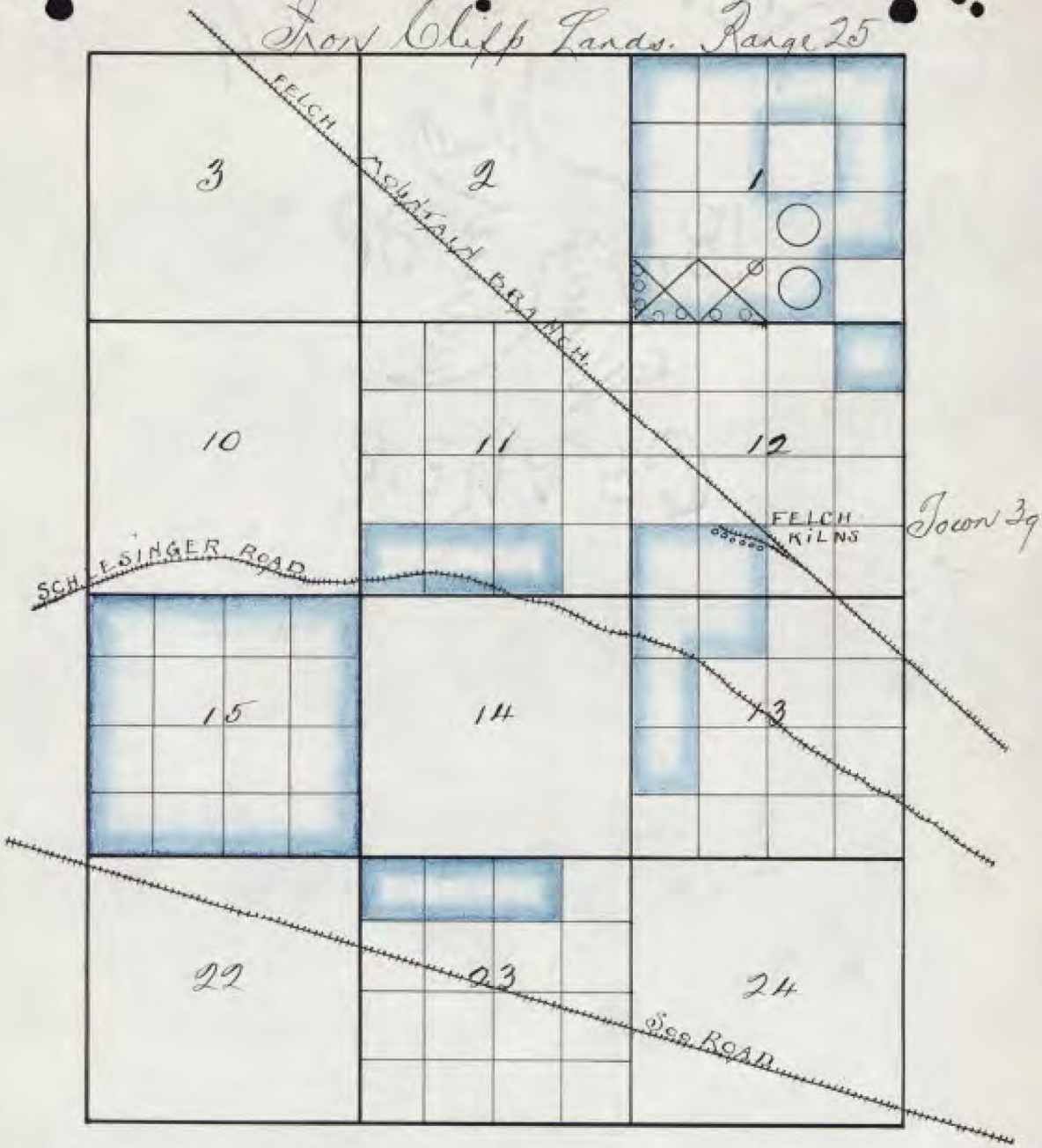
No. Kilns filled during year	81
No. Kilns emptied during year	81
Cords Wood filled during year	3418,2-8
Cords Wood burnt during year	3418,2-8
Total No. Bu. coaled during year	156560
Average bush. per Kiln	1933
Average bush per cord	45,8
Average cords per Kiln	42
Average cords Brands per Kiln	4



FELCH MOUNTAIN LOCATION.

In November 1895 we commenced stocking this location. At the close of the hauling season we had 4020 & 1-8 cords on the bank., 3286 of this was obtained from Iron Cliffs Lands., 734 1-8 cords we received from farmers. This battery of kilns is much less favorably located for securing wood than is Ford River,and wood can only be hauled to these kilns in the winter when swamp roads can be used. For this reason we have deemed it best not to operate this location until May 1st 1897 as the stock of wood now on hand will keep the kilns going until January 1st 1898 when new wood will begin to come in

These kilns had suffered from disuse,were badly spalled on the outside and were depreciating rapidly. They were thoroughly repaired in the summer of 1896,all the buildings on the location have had their windows covered with boards and the doors fastened. When needed the houses will require little outlay on windows and doors. The largest expense for putting the location into commission will be the partial renewal of the bridge. This job will also be operated under contract. The lands from which we cut wood for these kilns during the past winter are as follows. Sec.(1) Town.(39) Range 25 West. The South 1-2 of the South West 1-4 had been sold by the Iron Cliffs Co. At the time we took hold of this property the latter description had been cut by them with the exception of 15 acres in the North east corner and a fringe of timber nearly around the entire despription. We removed this and cleared up the property. The balance of our operations were confined to the West half of the South East 1-4 of this section. Future operations will commence where we left off. For further resources see plat accompanying. We have no estimates in this office of the timber supposed to be on these lands.



○ Cut over '75-'76 not sold. ___

○○ Sold & Cut '75-'76. ___ . ___ . ___

Felch Mountain Kilns

and

Lands adjacent to Same

Madstone Jany 5th '77.

PARSONS WOOD JOB.

Note:-Refer to the plats accompanying this report.

At the time of making my last annual report we had been operating this job for about a year, had built a camp with a capacity for taking care of 50 men,built and had in operation a railroad 131 stations long (about 2 1-2 miles),extending from the main line of the Soo road,from a point two miles West of Cooks,diagonally across our sections (13) & (18)and terminating about the middle of the South side of Sec.(7) as shown on the accompanying plat. We had made all the timber fit for cord wood on Sec.(13) into wood,which amounted to :-

Split Wood	11.487 4-8 Cords.
Round Wood	3.597 2-8 Cords.
Total:-	15.084 6-8 Cords.

and we had also been chopping during October and November '95 on Sec. (18) and made thereon 1870 7-8 Cords,or had chopped since the first of our operations 16955 5-8 Cords.

Sec. (13) is the worst section of the entire group of about 13 [illegible] in this tract,and we are fortunate in having operated it to as good advantage as we have. Much of this section is hemlock groves and swamp,and on the North half of the section is an old burning involving about 200 acres of what was at one time fine timbered land.

Our reason for making a certain amount of Round Kiln Wood (we use only split wood for the Pioneer Kilns),was that there was much ill favored timber in and around this burning,which was too good to waste, and could not be split. Our plan and final disposition of this round wood will be shown further on in this report. Taking Sec. (13) as a whole,it only yielded an average of 23,5-10 cords to the acre,whereas:

had it been an average section its yield would have been doubled.

As above stated: operations on Sec.(18) began on the 1st of October'95. We were then getting our wood chopped at 60c per cord and made every effort to maintain this price,but it was not sufficient to secure men to produce the large amount of wood which was necessary to have cut in advance of the time for starting the furnace in the following Spring. We were obliged to advance the price of chopping to 70c per cord. This price brought plenty of men,and we ran a large force,at one time amounting to 270. . We finsihed cutting over this section about the middle of April following.

This section was almost uniformly good,with the exception of a little swamp,and some small burnings.. When we first cut over the section we marked the best maple trees which seemed fit for logs and allowed them to stand. Irrespective of the wood afterwards obtained from these marked trees,we secured from this section 28000 cords of wood,and later made from the reserved trees 1700 cords or

a total for the section of ---------- 29700 cords an average yield per acre of 46,4-10 cords.

On a separate sheet will be shown a comparison of the results obtained with the estimates made by an experienced land looker,and a careful test recently made by us of the equivalent of cords and thousand of feet board measure of maple logs.

We continued chopping at 70c through the winter and spring, reducing our force as we deemed it safe to do so,and in July'96 having secured wood enough to make us safe,we reduced the price of chopping to 60c and have since been able to maintain that price.

We next cut over the S.E.1-4 of Sec.(12),from which we obtained 7000 cords,and then began on Sec.(7),which is still the base of our chopping operations. Sec.(12)gave a yield of 43,7-10 cords per acre, and the portion of Sec.(7) which we have already cut indicates a yield of 47 cords to the acre.

We have cut,up to the 1st of Dec'96	63.932 5-8	Cords
We have shipped from Parsons to Dec.1st'96	26.739	"
Leaving a balance on the ground Dec.1st'96	37.192 5/8	"

We ship from Parsons about 3100 cords per month,and it will be seen that we had on the 1st of Dec'96 just about enough wood to last us one year if we did not cut any more.

During the summer months we kept even 30 men to protect us from fire and make wood. On Novvember 4th we increased this force to 50 who are making averages of 40 cords per month to the man,or about 2000 cords per month. From the above it will be seen that if we continue to run this force for a year,we shall have some wood on hand which is 8 months old on Dec.1st'97,or wood enough to run us 8 months longer if we stop cutting at that time,which is not probable.

We have never yet failed to get out the amount of wood which we undertook to make,and experience shows that our estimates of what was wanted have been correct.

In November '95 we made a contract with Caron & Rough for the hauling and loading onto cars,of the wood above described. They shipped us wood enough to fill our kilns and put about 3500 cords in our furnace yard,to provide against failure to get regular supply of wood on account of bad roads,or irregular train service. Our experience has proved the wisdom of this action,and the old wood which has been taken from the yard will be replaced this winter by green wood

from shippers along the line of the Soo. Our contract price with Caron & Rough is 55 cts per cord. Their contract is accompanied with a bond for $1000. This contract was let on competitive bids ranging fnom 50 cents to $1.00 per cord. There were eight bidders., Joseph Demars of Negaunee bid 50 cents., He was utterly irresponsible. The next lowest bidders were Caron & Rough whose bid was 55 cents. The contract was therefore awarded to them.

On examination of the plat of the territory from which this wood is to be hauled it would seem that it would be comparitively easy to furnish on cars a given amount of wood for every week day in the year. After an experience of one year however it is easy to see that the contractor has many items of expense connected with the work which could scarcely anticipated, some of which are the following Our contractor has lost during the year 7 horses,although he always buys good stock and feeds liberally. There is a month in the fall and another in the spring when wood roads become so muddy that they are almost impassable. The only way in which an operator ca n prwide against this trouble is to bank large quantities of wodd along the line of the spur during the winter months,and re-hnadle from the banks during the period of bad roads. It is impossible to ascertain what it is costing the contractor to do this work. He pays all his labor and bills promptly and shows no disposition to quit the job. From this I would gather that he is making some money. He claims that his profits do not exceed 5 cents per cord and we do not think he is very far out in this statement. An examination of the accompanying plat will best explain the distance which this wood has to be hauled,though the apparent distance is often

lengthened by conditions of hill,valley,swamps and grades. We estimate that the average haul for the territory now being operated is 3-4 of a mile.

The plat will show that the present terminus of Russells Spur is on the South line and near the center of Sec.(7). It was estimated that on the 1st of December 1897 the woud will have all been hauled from that territory included within the blue line,and that the chopping of the timber on the entire Sec. (7) will have been completed the 1st of September previous. It will also be seen that choppers living at camp No.1 will have to walk about 2 miles when working on the corners of Sec.(7). For this reason it is proposed to move camp to the East side of Sec.(8) near the line of the proposed extension of the spur.

At the new location it will be necessary to put in an expensive well. We shall undertake to pay for this in water rates from tenants It will also be a valuable accessory to the land when it is offered for sale. Further consideration will show that the wood to be cut on Sec'(7) (probably 18000 cords) will only keep the contractor going until early in the spring of 1898,when he must have the use of the extension. He would be greatly benefited by having it sooner. No survey except Mr. Redfern's original one has been made of this extension. It is impossible at this writing to estimate the cost of such extension,but the lay of the land makes it probable that the road will be built for very much less money per mile than that already constructed.

Copy

At the time Mr. Howie made his estimation on the Parsons Tract we had been operating Section 16 about 3 months. Mr. Reffern determined to introduce into the blanks in this Section the actual amount of wood obtained as per measurement, which was 15,084 & 6-8 cords. This shows an average of 23 & 5-10 cords per acre.

SEC. (18)--(41)--(17)

Howie estimated for this section:- CORD-WOOD		18.250 Cds
We actually obtained (first cutting)	28.000 cds.	
and cut log trees into wood, making	1.700 cds.	
	-------	29.700 Cds
	Apparent overrun ----------	11.450 Cds

Now Howie estimated Hardwood (Maple	1.360 M	
" " " (Birch)	211 M	

	1.571 M	

If the apparent overrun of 11.450 cords of wood be divided among 1.571 M. Hardwood (Birch & Maple) it will call for an equivalent of 7 & 28-100 cords of wood to the M. feet of logs, which of course is absurd.

Again if the overrun of wood be divided among the thousands of feet of Maple alone, it will call for an equivalent of 8 & 62-100 Cds. of wood to the M. feet of logs, which is still more unreasonable.

In practice, we have cut all the maple of this section and made birch into cord wood, which would not make the high grade birch logs, and obtained 29,700 cords of wood, which shows 46 & 4-10 cords of wood to the acre, which any good estimator of hardwood lands would say is undoubtedly correct.

Another method of comparison is given, based on the following data. 8 trees were selected which was supposed to be an average of the trees on the tract. They yielded 20 logs, which scaled 2668 feet of lumber. From these 20 logs we obtained 6 & 12-100 cords of body wood, or 2 & 29-100 cords to the M feet, board measure. From the branches we obtained 5 & 37-100 cords or 2 cords to the M, making a total of 4 & 29-100 cords from trees reserved for board measure. According to Howies estimate we should have obtained from the 1.571 M. ft., 6740 cords of wood. As a matter of fact we obtained 1700. This would show an apparent loss of 5040 cords, or looking at it in another way, we did not leave as many trees for lumber as Howie considered suitable for that purpose. Our experience showed however that we left all that were good for anything. After reducing Howies lumber estimates to cord wood, according to the above data, we find that he estimated cord

wood - - - - - -	13250 Cds.
Cord wood obtained from logs & branches should have been	6740 Cds.
Total:-	24990 Cds
We actually obtained - - - -	29700 Cds.
Showing an overrun of estimate, not incl'd birch standing	4710 Cds.

or 18 & 8-10 per cent. Experience has shown that Howie underestimated his cord wood and overestimated his lumber, but that in any event his estimates are conservative and will in all probability overrun for the entire tract so far as cord wood is concerned. If the above data is worth considering, Howies estimate reduced to all cord wood is 39.04 as against our actual yield of 46.4 cords per acre, a difference of 7 & 36-100 cords.

It was decided to charge against Parsons Wood 10 cents per cord to cover cost of Railway Extensions, Camps &c. At the close of the year this fund had amounted to $6,393.23. The average cost of wood per cord for the year, including sinking fund, was 81 & 8-10 cents

SALE OF TIMBER ON PARSONS TRACT.

Heretofore we have left standing the Elm, Basswood and best Birch. The time had come for it to be sold on that portion of the tract we had cut over, as the timber was being blown down in large quantities from time to time. We have therefore sold to the Buckeye Stave Co. all the merchantable standing or down Elm on Sec. (13)--(18)--(12) and (7), amounting according to the estimates to nearly 2,000,000 feet. The Buckeye Co. are operating this timber themselves and we receive therefore a stumpage of $1.62 1-2 per M. At this writing they are shipping freely and we expect they will remve the whole amount during the period of sleighing.

We have sold to A. F. Underwood of Menominee all the basswood on the above described sections at $7.00 per M delivered on cars at Gladstone. We have got a contract for the cutting, skidding and loading this timber on to cars at $3.25 per M. feet. Our freight rate will not exceed $1.00 per M, which would make the logs net us $4.25 per M in Gladstone, leaving a net profit of $2.75 per M

Thus far we have been unable to get any offers for the birch, we will therefore be compelled to let it stand for the present.

The estimates on the Pine for the sections referred to call for 395,000 feet., fearing that it may suffer from fires we are asking bids for it and have two or three responsible parties nearly ready to ...

make us an offer. If we do not get what we consider an outside price we shall hold it and take our chances of having to make a forced sale in the future.

LIFE OF THE PARSONS TRACT.

The experience of the past seven months shows that we are shipping and using from the Parsons Job at the rate of 106 cords per day or for the year 38,690 cords. The entire tract of Parsons lands represents 13 sections or 8,360 acres. Our experience of more than 2 years warrants us in estimating a yield for the entire Tract of 45 cords to the acre. We may therefore safely expect to get from the whole tract 376,200 cords of wood. From the above we deduce the fact that if we continue to operate the job at the rate we have been doing this tract will keep the furnace running 9 years and 9 mnths, or until the 1st of January 1906.

ROUND WOOD ON SECTION 16.

We have deemed it best to coal the round wood on Section 13 at Cooks. We have entered into a contract with the Weston Furnace Co. to fill, burn and load this coal at 1 & 56-100 cents per bushel. It will cost us 80 cents per cord to haul this wood to the kilns. This would make our coal cost us a trifle less than we are buying from outside parties. This is the best arrangement we can make as we could not handle this large unsplit wood at our furnace kilns to any advantage.