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IMPLEMENTING A SAFE, ECONOMICAL COIL STORAGE PROGRAM:

A TOTAL COST OF OWNERSHIP PERSPECTIVE

by:

Michael K. Baach, President
The Philpott Rubber Company

The Philpott Rubber Company
1010 Industrial Parkway North ● Brunswick ● Ohio● 44212
Phone: (330) 225-3344 ● Fax: (330) 225-1999
www.philpottrubber.com

Implementing a Safe, Economical Coil Storage Program: A Total Cost of Ownership Perspective

Michael K. Baach
The Philpott Rubber Company
Brunswick, Ohio

Abstract

This paper discusses the various elements that should be considered when selecting a storage system for steel coils. When one takes into account the impact of a properly designed system, substantial savings in an operator's Total Cost of Ownership (TCO) can be achieved.

The methodology, assumptions, rationale and results of a TCO economic evaluation are presented herein. The conclusions are that, by selecting a coil storage solution using current polymeric design, one can benefit from a net present value return on investment of more than 1,000:1 versus wood block systems over a 30-year design life.

Introduction

In today's highly-competitive global economy, it is essential that steel coil storage facility operators take advantage of all savings opportunities available to them. Prudent business professionals now look not only at the initial cost of a system, but also at what savings such an investment can make in reducing the Total Cost of Ownership (TCO) in their operation.

Formal TCO analysis was first developed in 1987[1] as a means of clearly and reasonably determining the true costs of owning and managing an operation or process. Initially used in the information technology market, it is now commonly applied in conducting life-cycle cost analyses for industrial applications.

When evaluating TCO, it is necessary to understand all costs associated with a given activity. In this paper, we will evaluate how proper selection of a steel coil storage system can not only improve safety and prevent damage to the steel coils[2], but also reduce the cost of other aspects of the storage operation.

TCO Financial Model Development

In interviews with numerous operators in the United States, we determined that a mean design life for a steel coil storage system is approximately 30-years. Input from these operators varied between 20 and 50 years.

In developing our TCO model, which compares a wood block coil storage system to a polymeric design, a common 30-year design life was used. Our methodology was to design such a model, based on a multivariate analysis, which compares the life cycle cost of each of the two systems over the 30-year life.

The input parameters for this financial model are various pertinent variables provided to us by the industry participants that we interviewed. These variables are outlined in the *Assumptions* section of this paper. It is important to note that this model was designed to allow for changes in these input variables to reflect the specific operating TCO components of a particular facility.

Figure 1: Traditional wood-timber storage system

Figure 2: Polymeric Storage System

Assumptions

Our TCO model includes variables typically found in a life-cycle cost analysis including:

- System design life
- Rate of inflation
- Cost of money

Personnel familiar with coil storage operations suggested that the following variables also be included in the model:

- Storage system component costs (including blocks, spacers, chains, etc.)
- Number of floor level blocks
- Life of each component
- Labor for moving chains
- Wood block disposal costs
- Damage cost avoidance

A financial model was then created, which allowed multiple values to be entered. The model then calculates both present and future values of each system, for each year, through the end of the system design life.

Figure 3: Chained Coils

Test-Case Model Variables

The intent of our test-case model was to use highly conservative input variables for each coil storage system. This evaluation assumed that standard wood-blocks would be compared to a polymeric modular system each with 50 coils to be stored at floor level.

The following standard economic variables were common for both systems.

System Design Life (years)	30
Inflation Rate	10%
Cost of Money	6%

Figure 4: Common variables

For the wood block system, the variables in the following table were used:

Wood Block Cost/@	$	5
# Wood Blocks/Floor Coil		2
# Floor level coils		50
Wood Block Life (years)		4
Wood Block Disposal Cost/@	$	10
Chain Cost (per chain)	$	50
Ave chains per block		0.5
Chain Life (years)		7
Chain handling per shift (hours)		1
Coil Moving time saved/shift		2
Fully burdened labor rate ($/hour)	$	15
Work shifts per w eek		1
Work days per shift		5

Figure 5: Wood block system variables table

The following variables were used for calculating the life cycle cost of the polymeric modular system. For ease of presentation, all components (rails, spacers, connectors and blocks) of the polymeric modular system were aggregated into the cost of the polymer block.

Cost/Polymer Block (all components)	$	155
# Polymer Blocks/Floor Coil		4
# Floor level coils		50
Polymeric System Life (years)		30

Figure 6: Polymeric storage system variables table

Because there was no consensus among those that we interviewed regarding a value for coil damage due to the use of chains, no such costs were used in the financial model. Further, our analysis did not take into account costs related to property or casualty costs resulting from coil related accidents.

Results

The analyses that make up the results in this section are detailed in Appendix A with graphs illustrating the break even values in Appendices B and C. Based on the variables shown above, the future value TCO savings from the Polymeric modular system were significant when compared to a wood storage system. As shown in Figure 6, although the polymeric modular is initially more costly than the wood system, its future cash savings over the 30-year design life approaches $2.0 million (6,400%) for the 50 floor level coil storage system. The Future Value, break even for the polymeric modular system versus the wood blocks is approximately 2½ years.

FV Results:	Cumulative FV: Cash Expenditures (Year)			
	1	10	20	30
Wood System	14,450	197,065	697,062	2,025,298
Polymer System	31,000	31,000	31,000	31,000
Savings	(16,550)	166,065	666,062	1,994,298
	-53%	536%	2149%	6433%

Figure 7: Cumulative, future value cost comparison

Most financial professionals prefer to compare the present value costs over the life of the system, which are provided in Figure 7. On a present value basis, the polymeric modular system provides a TCO savings of almost $340,000 (1,100%) over the system life. The Present Value, break even for the polymeric modular system versus the wood blocks is approximately 3 years.

PV Results:	Cumulative Net Present Value (Year)			
	1	10	20	30
Wood System	14,450	124,000	245,250	369,250
Polymer System	31,000	31,000	31,000	31,000
Savings	(16,550)	93,000	214,250	338,250
	-53%	300%	691%	1091%

Figure 8: Cumulative, present value cost comparison

There have also been operators who chose the option to lease the polymer system through a third party. This has allowed them to gain the use of the entire polymer coil storage system throughout the facility, while paying for it over 5 to 10 years. Figure 9 shows the present value costs of a polymeric modular system, leased for 7 years, with an 8% lease rate, to a wood system. Experience has shown that certain leasing companies provide attractive rates for the polymeric system because it is a long-life, tangible assets that is viewed as valuable collateral. In this and most cases, the polymeric modular system is immediately more cost effective than the wood system, while allowing the owner to preserve precious capital for other purposes. Appendix D includes both the data analysis and present value graph for this leasing option scenario.

PV Results:	Cumulative Net Present Value (Year)			
	1	10	20	30
Wood	14,450	124,000	245,250	369,250
Poly w/Lease	5,954	47,634	47,634	47,634
Savings	8,496	76,366	197,616	321,616
	143%	160%	415%	675%

Figure 9: Cumulative, present value cost comparison assuming 7 year lease of polymeric system

Summary

In evaluating the true cost of a coil storage system, one must consider more than just the cost of the coil storage components. When operators take into account other real costs associated with a coil storage system by conducting a life cycle analysis, prudent business judgment often guides a purchasing decision to using what may initially seem to be a more expensive solution. Once all appropriate costs are considered, a well designed system using state-of-the art materials usually results in a more financially beneficial decision over the design/useful life of the coil storage system.

[1] Kirwin, William. “CIO Update: To Control TCO, It Must Be Measured and Managed” Gartner Applied Methodology, April 2003

[2] Baach, Michael; Detweiler, Stephen; Nebehay, Leonard. "Safe, Economical Coil Storage: A Case Study" The Philpott Rubber Company, 2008.

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Appendix A
TCO Calculation Table
Alternative Coil Storage Systems

Wood System

	FV					PV	
Year	Blocks	Chains	Ongoing Labor	TTL Cost	Cummulative	Net Cash	Cummulative
1	1,500	1,250	11,700	14,450	14,450	14,450	14,450
2			12,870	12,870	27,320	11,700	26,150
3			14,157	14,157	41,477	11,700	37,850
4			15,573	15,573	57,050	11,700	49,550
5	2,196		17,130	19,326	76,376	13,200	62,750
6			18,843	18,843	95,219	11,700	74,450
7			20,727	20,727	115,946	11,700	86,150
8		2,436	22,800	25,236	141,182	12,950	99,100
9	3,215		25,080	28,295	169,477	13,200	112,300
10			27,588	27,588	197,065	11,700	124,000
11			30,347	30,347	227,412	11,700	135,700
12			33,381	33,381	260,794	11,700	147,400
13	4,708		36,720	41,427	302,221	13,200	160,600
14			40,392	40,392	342,612	11,700	172,300
15		4,747	44,431	49,178	391,790	12,950	185,250
16			48,874	48,874	440,664	11,700	196,950
17	6,892		53,761	60,654	501,317	13,200	210,150
18			59,137	59,137	560,455	11,700	221,850
19			65,051	65,051	625,506	11,700	233,550
20			71,556	71,556	697,062	11,700	245,250
21	10,091		78,712	88,803	785,865	13,200	258,450
22		9,250	86,583	95,833	881,698	12,950	271,400
23			95,241	95,241	976,939	11,700	283,100
24			104,765	104,765	1,081,705	11,700	294,800
25	14,775		115,242	130,016	1,211,721	13,200	308,000
26			126,766	126,766	1,338,487	11,700	319,700
27			139,443	139,443	1,477,930	11,700	331,400
28			153,387	153,387	1,631,317	11,700	343,100
29	21,631	18,026	168,726	208,383	1,839,700	14,450	357,550
30			185,598	185,598	2,025,298	11,700	369,250
Totals	65,009	35,709	1,924,580	2,025,298		369,250	

Polymeric System

	FV					PV	
Year	RollBlocks	Chains	Ongoing Labor	Net Cash	Cummulative	Net Cash	Cummulative
1	31,000	-	-	31,000	31,000	31,000	31,000
2	-	-	-	-	31,000	-	31,000
3		-	-	-	31,000	-	31,000
4		-	-	-	31,000	-	31,000
5		-	-	-	31,000	-	31,000
6		-	-	-	31,000	-	31,000
7		-	-	-	31,000	-	31,000
8	-	-	-	-	31,000	-	31,000
9	-	-	-	-	31,000	-	31,000
10	-	-	-	-	31,000	-	31,000
11	-	-	-	-	31,000	-	31,000
12	-	-	-	-	31,000	-	31,000
13	-	-	-	-	31,000	-	31,000
14	-	-	-	-	31,000	-	31,000
15	-	-	-	-	31,000	-	31,000
16	-	-	-	-	31,000	-	31,000
17	-	-	-	-	31,000	-	31,000
18	-	-	-	-	31,000	-	31,000
19	-	-	-	-	31,000	-	31,000
20	-	-	-	-	31,000	-	31,000
21	-	-	-	-	31,000	-	31,000
22	-	-	-	-	31,000	-	31,000
23	-	-	-	-	31,000	-	31,000
24	-	-	-	-	31,000	-	31,000
25	-	-	-	-	31,000	-	31,000
26	-	-	-	-	31,000	-	31,000
27	-	-	-	-	31,000	-	31,000
28	-	-	-	-	31,000	-	31,000
29	-	-	-	-	31,000	-	31,000
30	-	-	-	-	31,000	-	31,000
Totals	31,000	-		27,200		31,000	

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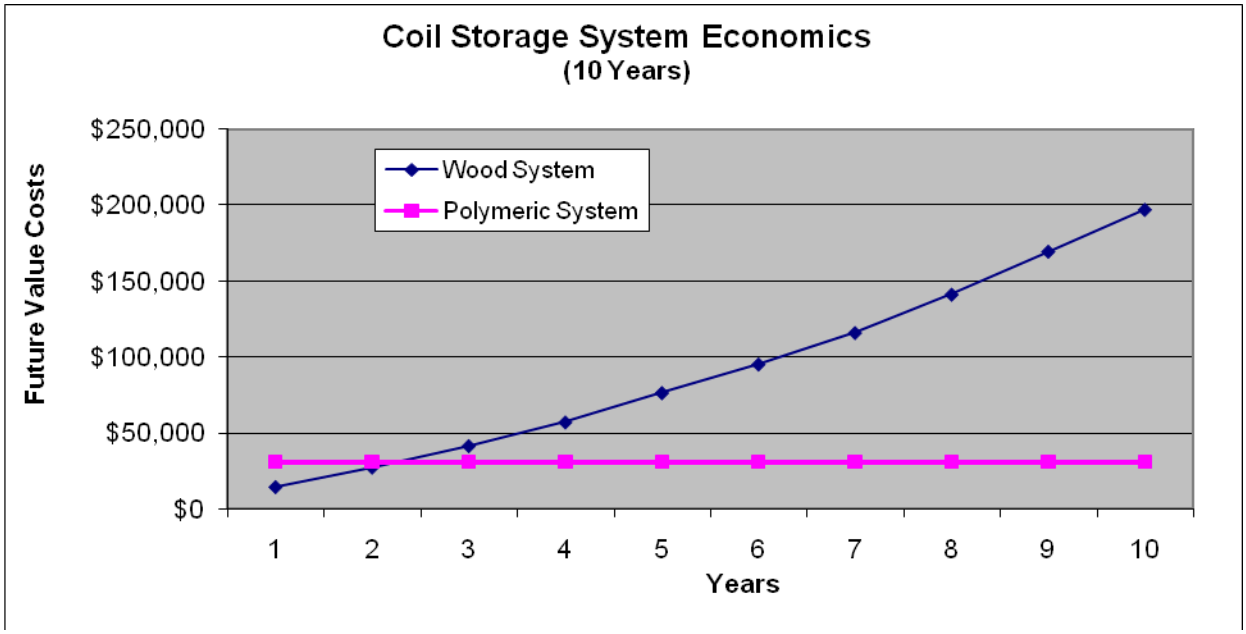
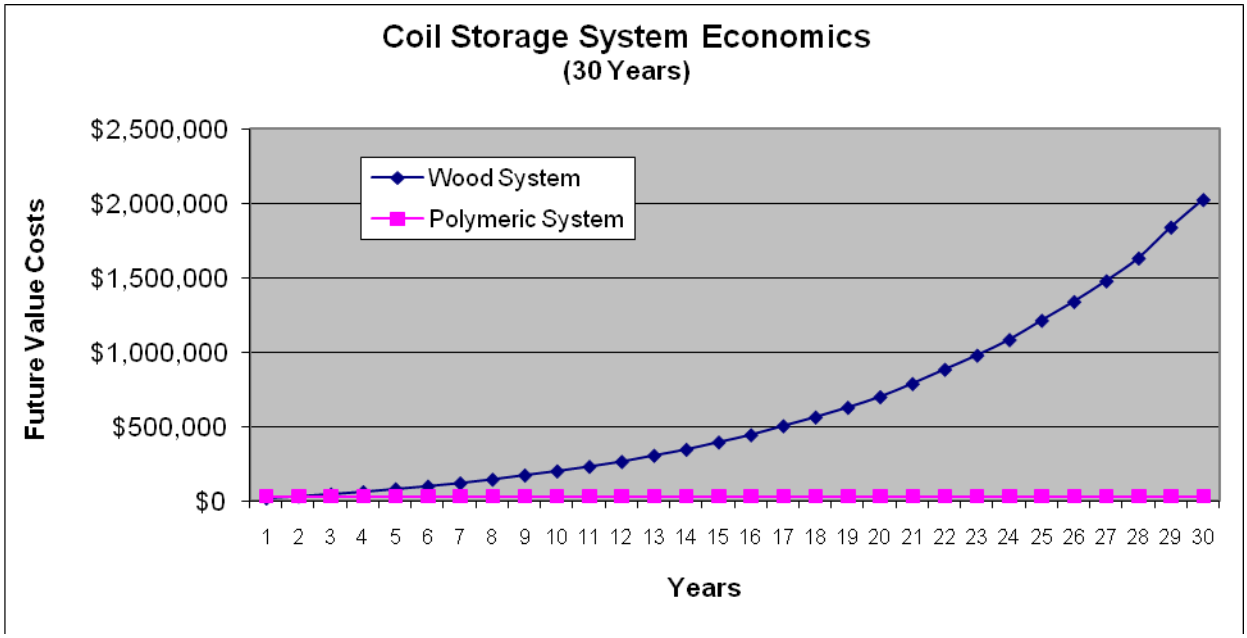
Appendix B
Costs versus Time Graphics
Alternative Coil Storage Systems

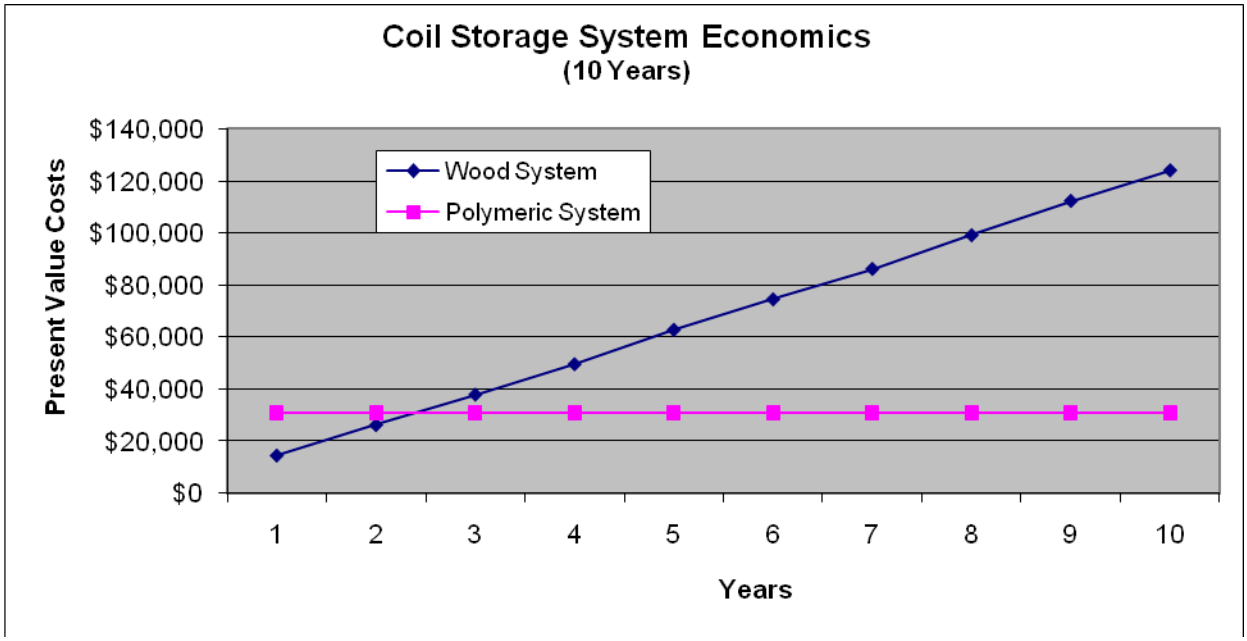
Future Value Graphs

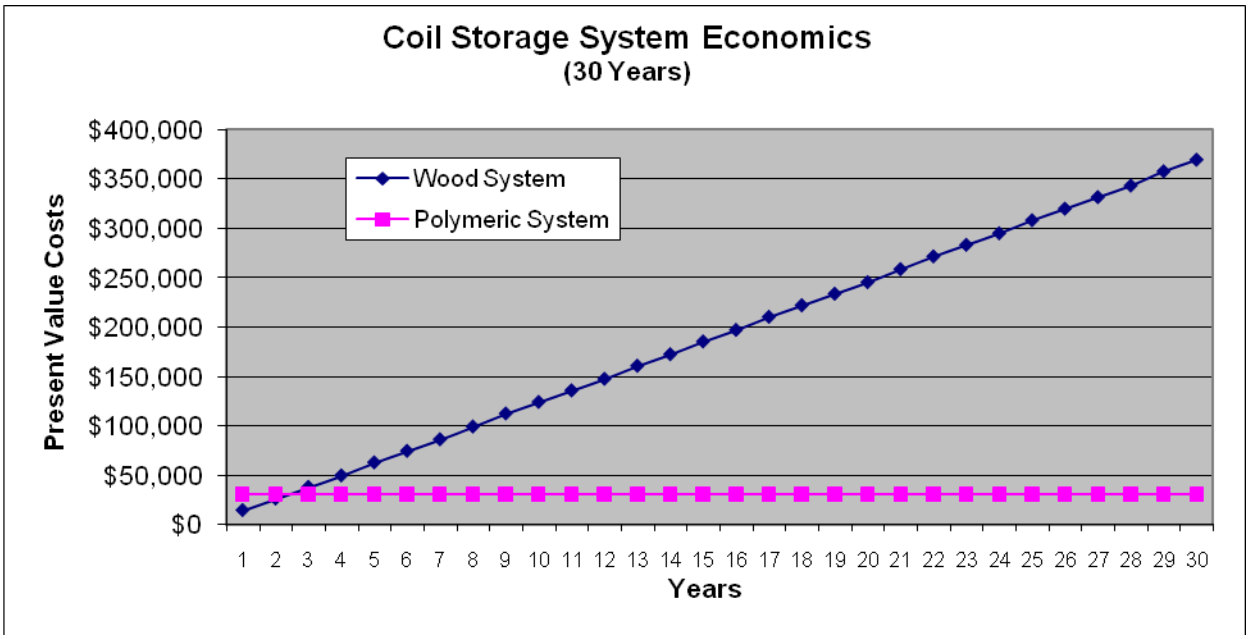




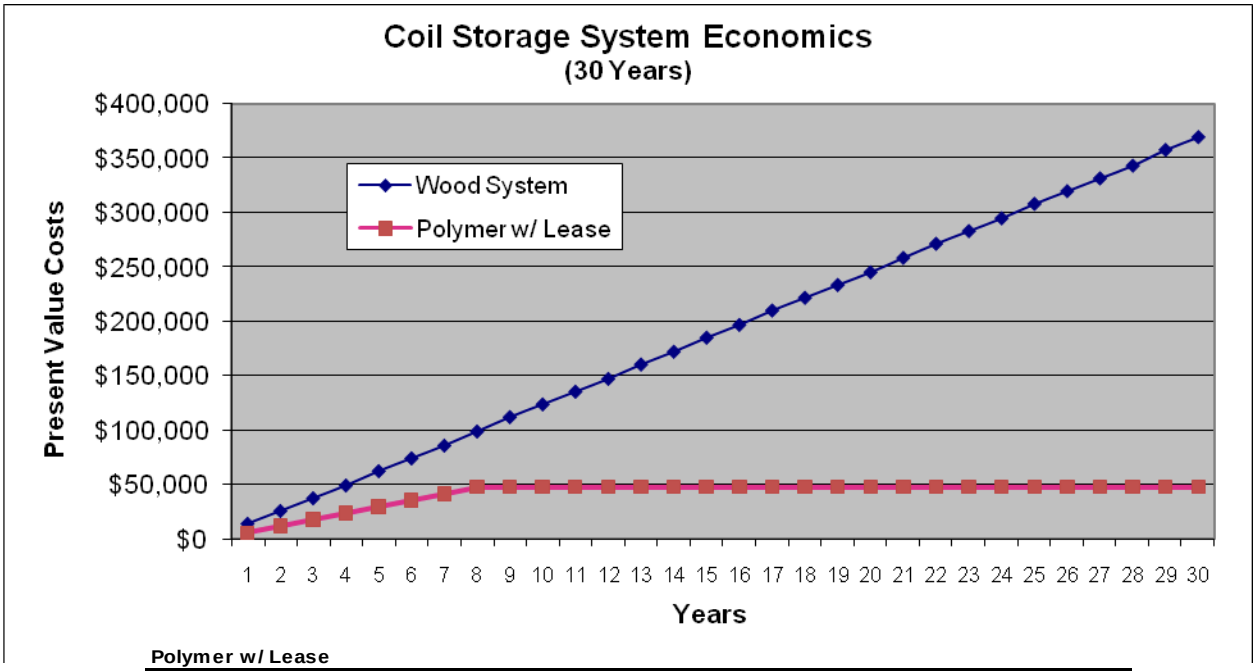
Appendix C
Costs versus Time Graphics
Alternative Coil Storage Systems

Present Value Graphs





Appendix D
Polymer System Lease Option
Costs versus Time Chart & Present Value Graphic
Alternative Coil Storage Systems



Polymer w/ Lease

	FV					PV	
Year	Lease Pmt	Chains	Chain Labor	Net Cash	Cummulative	Net Cash	Cummulative
1	5,954	-	-	5,954	5,954	5,954	5,954
2	5,954	-	-	5,954	11,908	5,954	11,908
3	5,954	-	-	5,954	17,863	5,954	17,863
4	5,954	-	-	5,954	23,817	5,954	23,817
5	5,954	-	-	5,954	29,771	5,954	29,771
6	5,954	-	-	5,954	35,725	5,954	35,725
7	5,954	-	-	5,954	41,680	5,954	41,680
8	5,954	-	-	5,954	47,634	5,954	47,634
9	-	-	-	-	47,634	-	47,634
10	-	-	-	-	47,634	-	47,634
11	-	-	-	-	47,634	-	47,634
12	-	-	-	-	47,634	-	47,634
13	-	-	-	-	47,634	-	47,634
14	-	-	-	-	47,634	-	47,634
15	-	-	-	-	47,634	-	47,634
16	-	-	-	-	47,634	-	47,634
17	-	-	-	-	47,634	-	47,634
18	-	-	-	-	47,634	-	47,634
19	-	-	-	-	47,634	-	47,634
20	-	-	-	-	47,634	-	47,634
21	-	-	-	-	47,634	-	47,634
22	-	-	-	-	47,634	-	47,634
23	-	-	-	-	47,634	-	47,634
24	-	-	-	-	47,634	-	47,634
25	-	-	-	-	47,634	-	47,634
26	-	-	-	-	47,634	-	47,634
27	-	-	-	-	47,634	-	47,634
28	-	-	-	-	47,634	-	47,634
29	-	-	-	-	47,634	-	47,634
30	-	-	-	-	47,634	-	47,634
Totals	47,634	-		47,634		47,634	