Report on Principles-Based Reserves for Variable Universal Life with Guaranteed Minimum Death Benefits

Presented by the American Academy of Actuaries' Variable Universal Life Subgroup of the Life Reserves Work Group

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Variable Universal Life Subgroup

Bruce Friedland, F.S.A., M.A.A.A., Chair

Sue Deakins, F.S.A., M.A.A.A. John Di Meo, F.S.A., M.A.A.A. Gary Falde, , F.S.A., M.A.A.A. Anthony Ferraro, F.S.A., M.A.A.A. Frans Te Groen, F.S.A., M.A.A.A. Wen Liu, A.S.A., M.A.A.A.

Executive Summary

This report studies a Variable Universal Life (VUL) policy with a specified premium secondary guarantee for male issue ages 45 and 75. Each cell is modeled separately for both the Deterministic¹ and Stochastic Reserve in order to better isolate the drivers of the reserve levels. In practice, the Stochastic Reserve will be calculated in the aggregate. The product is designed to be profitable under anticipated experience assumptions and to be competitive in the marketplace. The secondary guarantee is aggressive for VUL and more consistent with a UL contract in order to stress test the principles-based reserve methodology. Appendix 1 shows product features and pricing results. Appendix 2 shows the product's competitive position.

The approach taken in the report is to look at the range of reserves under different assumptions. Both Deterministic and Stochastic Reserves are shown for three different sets of Prudent Estimate Assumptions reflecting different margin levels at various policy durations. The objective of this comparison is not to recommend an appropriate level for the margins in the Prudent Estimate Assumptions, but rather to show how reserves vary depending on the margins.

Illustrative historical appreciation rates are used to roll the account value forward from issue to each valuation date (various policy durations over the policy lifetime). The different rates help illustrate the impact of different starting conditions on the level of reserves. For the Deterministic Reserve, gross historical rates of 9% and 5% are illustrated. For the Stochastic Reserve, which is calculated only at duration 10, gross historical rates of 9%, 5%, and 0.45% are illustrated. (All gross rates quoted in this executive summary are before the deduction of investment management fees and mortality and expense (M&E) charges.)

For the Deterministic Reserve, gross future appreciation rates of 7% and 5% are illustrated as the prescribed assumption (prescribed levels that will be specified in section VM-20 of the Valuation Manual have not yet been set). These rates are used to project the account value forward from the valuation date. For the Stochastic Reserve, gross future appreciation rates are stochastically generated. The stochastic scenarios used are briefly described on page 3 of the report.

¹ All capitalized terms used herein and not otherwise defined herein shall have the meanings ascribed to such terms in the VM-20 September 2007 exposure draft.

Deterministic Reserve results are shown in Tables 1-4. Stochastic Reserve results for duration 10 are shown in Tables 5-6.

The Deterministic Reserve is often governed by the cash surrender value floor, mainly for age 45 and the earlier durations. Deterministic Reserves at levels well above CSV develop in some cases in later durations, specifically for age 75 and the 5% future separate account return assumption.

For the issue age 45 Stochastic Reserve, the average equity return for the 350 scenarios that were averaged to obtain the 65 CTE reserve was between 5% and 6% over time periods 10 to 30 years from the valuation date. Consistent with this, the Stochastic Reserve tended to be close to but lower than the 5% gross future appreciation rate Deterministic Reserve.

For the issue age 75 Stochastic Reserve, the average equity return for the 350 scenarios that were averaged to obtain the 65 CTE reserve was in a wider range over various time periods than for issue age 45. The Stochastic Reserve tended to be higher than either the 5% or 7% Deterministic Reserve because lower rates tended to occur in the early years after the valuation date and there was insufficient time for the separate account assets to recover before claims were paid.

Principles-based reserves are compared to current formulaic reserves. In general, the principlesbased reserves are much lower than 1980 CSO based formulaic reserves. Using 2001 CSO would cut formulaic reserves by about one third, with principles-based generally still remaining lower than formulaic reserves.

Principles-Based Reserves for Variable Universal Life with Guaranteed Minimum Death Benefits

Background

This report illustrates principles-based reserves for two example Variable Universal Life (VUL) policies with guaranteed minimum death benefits, and compares the results to current reserves under CRVM and Actuarial Guideline 37. The actual results for any particular insurer or actual block of business will likely be different than these illustrated results for a variety of reasons, such as the level of guarantees or Prudent Estimate Assumptions. These results do not reflect aggregation with other business.

The policies used for illustration are variable universal life with guaranteed minimum death benefit designs, and the assumed premium pattern is level. Two issue ages are studied, age 45 and age 75, both for select male insureds. No model office result was produced. Details of the product design and pricing are contained in Appendix 1.

The death benefit guarantee modeled is somewhat more aggressive than what is seen in the VUL market place today, but less aggressive than guarantees that exist on fixed universal life products. This was done to ensure that a general account reserve for the guaranteed death benefits would be developed in the calculations. Appendix 2 shows the premium relative to the marketplace.

The policies are priced to be profitable under the anticipated experience assumptions in use as specified in Appendix 3. The valuation assumptions are also shown in Appendix 3.

Both Deterministic and Stochastic Reserves are illustrated for three sets of Prudent Estimate Assumptions reflecting different margin levels as described in the Methodology section below. These reserves were also studied under different starting conditions as represented by different historical appreciation rates from policy issue to the valuation date.

Methodology

- The Gross Premium Valuation (GPV) method is used for the Deterministic Reserve. The Greatest Present Value of Accumulated Deficiencies (GPVAD) method is used for the Stochastic Reserve, where the Accumulated Deficiency at any projection year is measured as the negative of the projected statement value of general account and separate account assets. These definitions are consistent with recent Requirements for Principles-Based Reserves for Life Products exposure drafts and the September 2007 proposed exposure draft.
- The path of discount rates used in the present values equals the path of net asset earned rates generated by the projected general account assets (resulting from net positive transfers from the separate account that exceed benefits and expenses paid from the general account). Positive net cash flows in the general account are invested in 10 year bonds (100 bp gross spread over treasury, 25 bp annual default cost, and 5 bp annual investment expense, for a net spread of 70 bp over treasury). Negative cash flows are covered by borrowing rates specified in Appendix 3.
- The estimated Reported Reserve, and therefore the starting assets, for all reserve calculations in this report, was assumed to equal the separate account account value for the policy being valued. Therefore, general account assets at the projection start date were always set to zero. Thus, the impact of different potential general account starting asset portfolios, which in some cases would be made up of positive assets and in other cases would represent an initial borrowed balance, was not investigated. This was an intentional simplification introduced in order to focus the report on the equity and insurance risks of the variable life product.
- Hedges are not included in the modeling.
- Revenue sharing is included in the projection of cash flows.
- There are no policyholder initiated transfers between the separate account and the general account funds.
- Premium payments and charges are assumed to cease at age 100. Policy charges are deducted to the extent the account value can support them. Once the account value equals zero and if the no lapse guarantee is effective, there are no further policy lapses from that point forward for the life of the contract, regardless of (for simplicity in the projections) whether the account value becomes positive again.
- The September 2007 exposure draft provides that the future separate account gross appreciation rates for the Deterministic Reserve will be prescribed; however, the exact prescribed values have not yet been determined. Further, although the exposure draft

currently ties the prescribed separate account rates to a prescribed pattern of treasury interest rates and spreads over Treasuries, the LRWG is continuing to consider other possibilities, such as applying a CTE measure or percentile to the distribution of cumulative separate account returns from the stochastic generator. It is anticipated that the empirical results obtained in this report for the two different illustrative rates of 7% level and 5% level will provide the LRWG and LHATF with some insight as to the ramifications of different prescribed assumptions.

- The deterministic results are presented in Tables 1-4 for issue ages 45 and 75, historical appreciation rates of 9% and 5% (before investment management fees and M&E charges), and future appreciation rates of 7% and 5% (before investment management fees and M&E charges). Historical appreciation rates carry the policy from issue to the indicated valuation date. Future appreciation rates are used going forward from that point. In addition, a Deterministic Reserve using Anticipated Experience has been computed and is shown in the last two columns of each table. The "9% Rate" column is used to determine the "PBR Level of Margins" shown at the bottom of the tables.
- The three margin levels reflected in the three illustrative sets of prudent estimate assumptions are as follows:

Component	Margin 1	Margin 2	Margin 3
Interest Rate	1% lower	1% lower	1% lower
Mortality	3.5/ex	2001/ex	2001/ex
Lapse	1% higher	1% higher	1% lower
Expense	5% higher	5% higher	5% higher

For mortality, 3.5/ex means an extra mortality margin equal to 3.5 per thousand (.0035) divided by the expectation of life. 2001/ex means an extra mortality margin equal to the margin implicit in the 2001 CSO table.

These margins are not necessarily meant to represent Prudent Estimate Assumptions *per se*, but are meant to show sensitivity of the reserves to different margin levels.

• Stochastic reserves measured at the end of duration 10 are illustrated in Tables 5 and 6 for the same three levels of margins as used in Tables 1-4. The corresponding Deterministic Reserves and current formulaic reserves are also shown. Issue ages 45 and

75 are each illustrated on a standalone basis in order to facilitate a more detailed understanding of the drivers of the results. The actual Stochastic Reserves specified by the current VM-20 exposure draft would be calculated on an aggregate basis. The results can be viewed as those for a single policy issued 10 years prior at either age 45 or 75, or for a block of either 45 or 75 year olds where there were no lapses over the 10-year period. The results for each issue age are illustrated for historical separate account appreciation rates of .45% (a net return rate of 0% after revenue sharing and expenses but before M&E), 5% and 9%. The account value is rolled forward from issue to duration 10 using the indicated separate account appreciation rate.

- We used 1,000 stochastic treasury rate and large-cap equity return scenarios based on March 31, 2006 market data developed using Global CAP:Link[™]. We believe these scenarios meet both the current C3P1 and C3P2 stochastic scenario calibration criteria requirements. We understand that the treasury rate scenario requirements for meeting C3P1 are in the process of being updated, but we do not believe changes in C3P1 scenario requirements would have a significant impact on these results because we are modeling a VUL product with the account value 100% invested in equities.
- The Formulaic Total Reserve shown in Tables 1-6 includes CRVM as well as AG37 reserves. Reserves were capped at the net single premium.

Tables of Results

- The following Tables 1-4 show the Deterministic Reserves described previously. The tables also show margin levels in the reserves. The reserves with margin are labeled (1) (3), and the associated margins are described at the bottom of each column and in the Methodology section above.
- The top sections of Tables 1-4 show for the whole policy the policy values, formulaic reserves, and the PBR Deterministic Reserves generated by the various assumption sets before application of the cash surrender value floor (except the last column which is the anticipated experience basis with the floor applied).
- The middle sections of Tables 1-4 show the split of the whole policy Deterministic Reserve, after application of the cash surrender value floor, into a separate account reserve and a general account reserve. The formulaic reserve in excess of the variable account value is also shown. The separate account reserve shown is the variable account

value.² The general account reserve is the calculated reserve less the variable account value. Sometimes the general account reserve is negative and sometimes it is positive.

- Finally, the bottom sections of Tables 1-4 show the margin in the reserves for each assumption set by taking the difference between the total Deterministic Reserve without floor and the total anticipated experience reserve without floor.
- Tables 5-6 summarize the Stochastic Reserves described previously, along with the comparable Deterministic and formulaic reserves. The set of margins used and the future SA rate assumption are identified for each reported item as applicable.

 $^{^{2}}$ As indicated in a VM-20 drafting note, the reserve allocation between the general account and the separate account is still being worked on.

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45 Issue Age

9% Separate Account Historical Appreciation Rate

					Deterministic Reserves before CSV floor							Ant Exp
Policy	Death	Variable	Variable	Formulaic	Future	SA Rate of 7	%	Future S	A Rate of 5%		Ant Exp	PBR
Duratio	r Benefit	Fund Value	Surr Value	Total Res	(1)	(2)	(3)	(1)	(2)	(3)	PBReserve	w/CSV floor
C	1,000,000	-	-	-	(10,743)	(6,209)	(8,485)	(5,876)	(715)	5,437	(12,959)	-
1	1,000,000	7,250	-	19,734	(14,045)	(9,404)	(11,510)	(8,944)	(3,704)	2,590	(16,335)	-
2	1,000,000	15,000	4,000	37,733	(6,139)	(1,237)	(3,425)	(560)	5,019	11,744	(8,666)	4,000
3	1,000,000	22,750	11,750	56,623	1,926	7,098	4,827	8,020	13,947	21,126	(835)	11,750
4	1,000,000	31,500	20,500	76,526	11,025	16,452	14,050	17,577	23,851	31,298	8,013	20,500
5	5 1,000,000	40,500	29,500	97,481	20,500	26,185	23,641	27,524	34,152	41,098	17,240	29,500
10	1,000,000	97,000	91,500	219,467	80,472	87,339	83,712	89,059	97,472	105,009	75,906	91,500
20	1,000,000	316,500	316,500	542,998	290,196	297,255	291,652	294,076	303,108	299,850	284,207	316,500
30	1,000,000	765,250	765,250	765,255	727,295	731,309	725,490	731,384	735,089	730,276	721,794	765,250
40	1,766,000	1,766,000	1,766,000	1,766,035	1,718,276	1,724,040	1,720,004	1,721,242	1,726,510	1,722,911	1,714,487	1,766,000
50	3,846,000	3,846,000	3,846,000	3,845,976	3,804,758	3,805,823	3,804,919	3,804,948	3,806,054	3,805,130	3,804,636	3,846,000
60	8,410,500	8,410,500	8,410,500	8,410,500	8,430,359	8,428,897	8,429,699	8,429,565	8,428,205	8,428,952	8,431,248	8,431,248

		Formulaic							
Policy	Sep Account	General Acc		P	BR General	Account Reser	ve w/CSV Flo	or	
Duration	Reserve	Reserve	(1)	(2)	(3)	(1)	(2)	(3)	
0	-	-	-	-	-	-	-	5,437	
1	7,250	12,484	(7,250)	(7,250)	(7,250)	(7,250)	(7,250)	(4,660)	
2	15,000	22,733	(11,000)	(11,000)	(11,000)	(11,000)	(9,981)	(3,256)	
3	22,750	33,873	(11,000)	(11,000)	(11,000)	(11,000)	(8,803)	(1,624)	
4	31,500	45,026	(11,000)	(11,000)	(11,000)	(11,000)	(7,649)	(202)	
5	40,500	56,981	(11,000)	(11,000)	(11,000)	(11,000)	(6,348)	598	
10	97,000	122,467	(5,500)	(5,500)	(5,500)	(5,500)	472	8,009	
20	316,500	226,498	-	-	-	-	-	-	
30	765,250	5	-	-	-	-	-	-	
40	1,766,000	35	-	-	-	-	-	-	
50	3,846,000	(24)	-	-	-	-	-	-	
60*	8,410,500	-	19,859	18,397	19,199	19,065	17,705	18,452	

Reserve Margins = Reserve with margin less Anticipated Experience reserve

Policy	PBR: Level of Margins									
Duration	Formulaic	(1)	(2)	(3)	(1)	(2)	(3)			
0	12,959	2,216	6,750	4,474	7,083	12,244	18,396			
1	36,069	2,290	6,931	4,825	7,391	12,631	18,925			
2	46,399	2,527	7,429	5,241	8,106	13,685	20,410			
3	57,458	2,761	7,933	5,662	8,855	14,782	21,961			
4	68,513	3,012	8,439	6,037	9,564	15,838	23,285			
5	80,241	3,260	8,945	6,401	10,284	16,912	23,858			
10	143,561	4,566	11,433	7,806	13,153	21,566	29,103			
20	258,791	5,989	13,048	7,445	9,869	18,901	15,643			
30	43,461	5,501	9,515	3,696	9,590	13,295	8,482			
40	51,548	3,789	9,553	5,517	6,755	12,023	8,424			
50	41,340	122	1,187	283	312	1,418	494			
60	(20,748)	(889)	(2,351)	(1,549)	(1,683)	(3,043)	(2,296)			
Interest Rate Margin		1% lower	1% lower	1% lower	1% lower	1% lower	1% lower	none		
Mortality Margin		3.5 /ex	2001/ex	2001/ex	3.5 /ex	2001/ex	2001/ex	none		
Lapse Margin		1% higher	1% higher	1% lower	1% higher	1% higher	1% lower	none		
Expense Margin		5%	5%	5%	5%	5%	5%	none		

Duration 60 results show reserves greater than death benefit due to modeling inconsistencies where commissions are charged and m&e revenue is not generated.

45 Issue Age

5% Separate Account Historical Appreciation Rate

				Deterministic Reserves before CSV floor							9% Rate	Ant Exp
Policy	Death	Variable	Variable	Formulaic	Future	SA Rate of 7%	6	Future S	A Rate of 5%		Ant Exp	PBR
Duratio	r Benefit	Fund Value	Surr Value	Total Res	(1)	(2)	(3)	(1)	(2)	(3)	PBReserve	w/CSV floor
0	1,000,000	-	-	-	(10,743)	(6,209)	(8,485)	(5,876)	(715)	5,437	(12,959)	-
1	1,000,000	7,000	-	19,734	(14,269)	(9,623)	(11,715)	(9,147)	(3,904)	2,436	(16,552)	-
2	1,000,000	14,000	3,000	37,366	(7,039)	(2,113)	(4,247)	(1,365)	4,222	11,140	(9,539)	3,000
3	1,000,000	21,000	10,000	55,628	346	5,562	3,385	6,622	12,564	20,088	(2,367)	10,000
4	1,000,000	28,250	17,250	74,671	8,083	13,595	11,364	14,997	21,304	29,342	5,155	17,250
5	1,000,000	35,750	24,750	94,504	16,186	21,998	19,698	23,779	30,456	38,972	13,045	24,750
10	1,000,000	76,500	71,000	206,504	61,447	68,968	66,288	73,487	82,453	96,000	57,318	71,000
20	1,000,000	194,750	194,750	490,074	176,360	187,875	185,977	202,890	218,873	242,962	171,687	194,750
30	1,000,000	320,750	320,750	729,741	323,676	348,536	366,948	367,460	393,377	432,313	299,068	320,750
40	1,000,000	355,500	355,500	844,261	525,565	555,009	605,592	549,261	577,880	632,064	495,380	495,380
50	1,000,000	-	-	930,211	725,433	742,462	793,536	725,433	742,462	793,536	722,782	722,782
60	1,000,000	-	-	1,000,000	850,461	860,187	895,950	850,461	860,187	895,950	849,693	849,693

		Formulaic						
Policy	Sep Account	Gen Acc		F	BR General	Account Rese	rve w/CSV Fk	oor
Duration	Reserve	Reserve	(1)	(2)	(3)	(1)	(2)	(3)
0	-	-	-	-	-	-	-	5,437
1	7,000	12,734	(7,000)	(7,000)	(7,000)	(7,000)	(7,000)	(4,564)
2	14,000	23,366	(11,000)	(11,000)	(11,000)	(11,000)	(9,778)	(2,860)
3	21,000	34,628	(11,000)	(11,000)	(11,000)	(11,000)	(8,436)	(912)
4	28,250	46,421	(11,000)	(11,000)	(11,000)	(11,000)	(6,946)	1,092
5	35,750	58,754	(11,000)	(11,000)	(11,000)	(11,000)	(5,294)	3,222
10	76,500	130,004	(5,500)	(5,500)	(5,500)	(3,013)	5,953	19,500
20	194,750	295,324	-	-	-	8,140	24,123	48,212
30	320,750	408,991	2,926	27,786	46,198	46,710	72,627	111,563
40	355,500	488,761	170,065	199,509	250,092	193,761	222,380	276,564
50	-	930,211	725,433	742,462	793,536	725,433	742,462	793,536
60	-	1,000,000	850,461	860,187	895,950	850,461	860,187	895,950

Reserve Margins = Reserve with	n margin less Anticipated Expe	rience reserve	e F	PBR: Level o	f Margins				
Policy									
Duration	Formulaic	(1)	(2)	(3)	(1)	(2)	(3)		
0	12,959	2,216	6,750	4,474	7,083	12,244	18,396		
1	36,286	2,283	6,929	4,837	7,405	12,648	18,988		
2	46,905	2,500	7,426	5,292	8,174	13,761	20,679		
3	57,995	2,713	7,929	5,752	8,989	14,931	22,455		
4	69,516	2,928	8,440	6,209	9,842	16,149	24,187		
5	81,459	3,141	8,953	6,653	10,734	17,411	25,927		
10	149,186	4,129	11,650	8,970	16,169	25,135	38,682		
20	318,387	4,673	16,188	14,290	31,203	47,186	71,275		
30	430,673	24,608	49,468	67,880	68,392	94,309	133,245		
40	348,881	30,185	59,629	110,212	53,881	82,500	136,684		
50	207,429	2,651	19,680	70,754	2,651	19,680	70,754		
60	150,307	768	10,494	46,257	768	10,494	46,257		
Interest Rate Margin		1% lower	1% lower	1% lower	1% lower	1% lower	1% lower	none	
Mortality Margin		3.5 /ex	2001/ex	2001/ex	3.5/ex	2001/ex	2001/ex	none	
Lapse Margin		1% higher	1% higher	1% lower	1% higher	1% higher	1% lower	none	
Expense Margin		5%	5%	5%	5%	5%	5%	none	

75 Issue Age

9% Separate Account Historical Appreciation Rate

					Deterministic Reserves before CSV floor							Ant Exp
Policy	Death	Variable	Variable	Formulaic	Future	SA Rate of 7	%	Future S	A Rate of 5%		Ant Exp	PBR
Duration	n Benefit	Fund Value	Surr Value	Total Res	(1)	(2)	(3)	(1)	(2)	(3)	PBReserve	w/CSV floor
0	1,000,000	-	-	-	(24,810)	808	9,365	(5,355)	20,933	42,935	(37,294)	-
1	1,000,000	33,000	-	92,243	(41,737)	(16,794)	(7,971)	(21,494)	3,098	22,645	(54,326)	-
2	1,000,000	65,250	21,750	171,610	(4,709)	20,494	29,667	17,138	41,985	62,181	(17,915)	21,750
3	1,000,000	96,750	53,250	250,561	32,674	58,039	67,160	56,103	81,105	101,003	19,329	53,250
4	1,000,000	126,500	83,000	329,746	69,718	95,165	104,026	94,654	119,689	139,527	56,414	83,000
5	1,000,000	155,250	111,750	407,860	106,492	131,923	140,102	132,932	157,492	178,066	93,766	111,750
10	1,000,000	304,500	282,750	811,171	294,417	319,289	321,972	326,844	356,943	373,626	289,286	289,286
20	1,000,000	881,000	881,000	924,886	870,412	871,365	871,132	870,708	871,816	871,576	869,907	881,000
30	2,337,750	2,337,750	2,337,750	2,337,750	2,343,421	2,343,009	2,343,237	2,343,201	2,342,817	2,343,030	2,343,661	2,343,661
40	5,061,750	5,061,750	5,061,750	5,061,750	5,068,001	5,067,782	5,067,925	5,067,867	5,067,656	5,067,794	5,068,174	5,068,174

		Formulaic							
Policy	Sep Account	General Acc		P	BR General	Account Rese	vew/CSVFlo	oor	
Duration	Reserve	Reserve	(1)	(2)	(3)	(1)	(2)	(3)	
0	-	-	-	808	9,365	-	20,933	42,935	
1	33,000	59,243	(33,000)	(33,000)	(33,000)	(33,000)	(29,902)	(10,355)	
2	65,250	106,360	(43,500)	(43,500)	(35,583)	(43,500)	(23,265)	(3,069)	
3	96,750	153,811	(43,500)	(38,711)	(29,590)	(40,647)	(15,645)	4,253	
4	126,500	203,246	(43,500)	(31,335)	(22,474)	(31,846)	(6,811)	13,027	
5	155,250	252,610	(43,500)	(23,327)	(15,148)	(22,318)	2,242	22,816	
10	304,500	506,671	(10,083)	14,789	17,472	22,344	52,443	69,126	
20	881,000	43,886	-	-	-	-	-	-	
30*	2,337,750	-	5,671	5,259	5,487	5,451	5,067	5,280	
40*	5,061,750	-	6,251	6,032	6,175	6,117	5,906	6,044	

Reserve Margins = Reserve with margin less	Anticipated Exper	ience reserve							
Policy			F	BR:Levelof	f Margins				
Duration	Formulaic	(1)	(2)	(3)	(1)	(2)	(3)		
0	37,294	12,484	38,102	46,659	31,939	58,227	80,229		
1	146,569	12,589	37,532	46,355	32,832	57,424	76,971		
2	189,525	13,206	38,409	47,582	35,053	59,900	80,096		
3	231,232	13,345	38,710	47,831	36,774	61,776	81,674		
4	273,332	13,304	38,751	47,612	38,240	63,275	83,113		
5	314,094	12,726	38,157	46,336	39,166	63,726	84,300		
10	521,885	5,131	30,003	32,686	37,558	67,657	84,340		
20	54,979	505	1,458	1,225	801	1,909	1,669		
30	(5,911)	(240)	(652)	(424)	(460)	(844)	(631)		
40	(6,424)	(173)	(392)	(249)	(307)	(518)	(380)		
Interest Rate Margin	-	1% lower	1% lower	1% lower	1% lower	1% lower	1% lower	none	
Mortality Margin		3.5 /ex	2001/ex	2001/ex	3.5 /ex	2001/ex	2001/ex	none	
Lapse Margin		1% higher	1% higher	1% lower	1% higher	1% higher	1% lower	none	
Expense Margin		5%	5%	5%	5%	5%	5%	none	

Duration 30,40 results show reserves greater than death benefit due to modeling inconsistencies where commissions are charged and m&e revenue is not generated.

75 Issue Age

5% Separate Account Historical Appreciation Rate

					0	Deterministic F	Reserves bet	fore CSV floor			9% Rate	Ant Exp
Policy	Death	Variable	Variable	Formulaic	Future	SA Rate of 7%	6	Future S/	A Rate of 5%		Ant Exp	PBR
Duration	n Benefit	Fund Value	Surr Value	Total Res	(1)	(2)	(3)	(1)	(2)	(3)	PBReserve	w/CSV floor
(1,000,000	-	-	-	(24,810)	808	9,365	(5,355)	20,933	42,935	(37,294)	-
1	1,000,000	31,500	-	92,697	(42,331)	(17,352)	(7,957)	(22,316)	2,304	22,162	(55,739)	-
2	1,000,000	61,000	17,500	171,353	(6,327)	18,977	29,732	14,889	39,815	60,772	(21,936)	17,500
3	1,000,000	88,000	44,500	248,686	29,468	55,042	67,329	51,643	76,784	98,068	11,053	44,500
4	1,000,000	112,250	68,750	325,236	64,696	90,484	104,330	87,628	112,620	133,801	42,975	68,750
Ę	1,000,000	133,500	90,000	401,236	99,181	125,116	140,262	122,510	145,566	171,365	73,360	90,000
10	1,000,000	216,500	194,750	804,510	271,944	306,403	333,933	297,254	332,231	366,174	236,050	236,050
20	1,000,000	115,250	115,250	930,211	599,638	620,196	667,365	601,563	622,103	669,313	595,363	595,363
30	1,000,000	-	-	1,000,000	850,490	860,223	895,981	850,490	860,223	895,981	849,721	849,721
40	1,000,000	-	-	1,000,000	916,319	919,025	940,208	916,319	919,025	940,208	915,171	915,171

		Formulaic							
Policy	Sep Account	General Acc		P	BR General	aral Account Reserve w/CSV Floor			
Duration	Reserve	Reserve	(1)	(2)	(3)	(1)	(2)	(3)	
0	-	-	-	808	9,365	-	20,933	42,935	
1	31,500	61,197	(31,500)	(31,500)	(31,500)	(31,500)	(29,196)	(9,338)	
2	61,000	110,353	(43,500)	(42,023)	(31,268)	(43,500)	(21,185)	(228)	
3	88,000	160,686	(43,500)	(32,958)	(20,671)	(36,357)	(11,216)	10,068	
4	112,250	212,986	(43,500)	(21,766)	(7,920)	(24,622)	370	21,551	
5	133,500	267,736	(34,319)	(8,384)	6,762	(10,990)	12,066	37,865	
10	216,500	588,010	55,444	89,903	117,433	80,754	115,731	149,674	
20	115,250	814,961	484,388	504,946	552,115	486,313	506,853	554,063	
30	-	1,000,000	850,490	860,223	895,981	850,490	860,223	895,981	
40	-	1,000,000	916,319	919,025	940,208	916,319	919,025	940,208	

Reserve Margins = Reserve with margin less Anticipated Experience reserve								
Policy	Formulaic		F	BR: Level of	f Margins			
Duration	Total Res	(1)	(2)	(3)	(1)	(2)	(3)	
0	37,294	12,484	38,102	46,659	31,939	58,227	80,229	
1	148,436	13,408	38,387	47,782	33,423	58,043	77,901	
2	193,289	15,609	40,913	51,668	36,825	61,751	82,708	
3	237,633	18,415	43,989	56,276	40,590	65,731	87,015	
4	282,261	21,721	47,509	61,355	44,653	69,645	90,826	
5	327,876	25,821	51,756	66,902	49,150	72,206	98,005	
10	568,460	35,894	70,353	97,883	61,204	96,181	130,124	
20	334,848	4,275	24,833	72,002	6,200	26,740	73,950	
30	150,279	769	10,502	46,260	769	10,502	46,260	
40	84,829	1,148	3,854	25,037	1,148	3,854	25,037	
Interest Rate Margin		1% lower	1% lower	1% lower	1% lower	1% lower	1% lower	none
Mortality Margin		3.5 /ex	2001/ex	2001/ex	3.5 /ex	2001/ex	2001/ex	none
Lapse Margin		1% higher	1% higher	1% lower	1% higher	1% higher	1% lower	none
Expense Margin		5%	5%	5%	5%	5%	5%	none

Table 5
Duration 10 Results with Varying Historical Appreciation Rates

				Issue Age 45				
		Future		Histo	orica	al Appreciation	Raf	te
Basis	Margins	SA Rate		<u>0.45%</u>		<u>5.00%</u>		<u>9.00%</u>
Account Value			\$	58,500	\$	76,500	\$	97,000
Cash Surrender Value			\$	53,000	\$	71,000	\$	91,500
Formulaic Total Reserve			\$	195,839	\$	206,504	\$	219,467
Principles-Based Deterministic GPV : Anticipated Experience	None	9%	\$	40,999	\$	57,318	\$	75,906
Principles-Based Deterministic GPV	Margin 1	7%	\$	44,789	\$	61,447	\$	80,472
Principles-Based Deterministic GPV	Margin 2	7%	\$	53,113	\$	68,968	\$	87,339
Principles-Based Deterministic GPV	Margin 3	7%	\$	51,532	\$	66,288	\$	83,712
Principles-Based Deterministic GPV	Margin 1	5%	\$	60,018	\$	73,487	\$	89,059
Principles-Based Deterministic GPV	Margin 2	5%	\$	69,893	\$	82,453	\$	97,472
Principles-Based Deterministic GPV	Margin 3	5%	\$	88,614	\$	96,000	\$	105,009
Principles-Based Deterministic GPV With CSV floor	Margin 1	7%	\$	53,000	\$	71,000	\$	91,500
Principles-Based Deterministic GPV With CSV floor	Margin 1	5%	\$	60,018	\$	73,487	\$	91,500
Principles-Based Stochastic GPVAD (65 CTE) : Margin 1	Margin 1	Stochastic	\$	56,050	\$	70,168	\$	87,688
Principles-Based Stochastic GPVAD (65 CTE) : Margin 2	Margin 2	Stochastic	\$	65,322	\$	78,564	\$	95,251
Principles-Based Stochastic GPVAD (65 CTE) : Margin 3	Margin 3	Stochastic	\$	78,325	\$	86,951	\$	99,846
Reserve for Guaranteed Death Benefit (Reported Reserve less CSV)								
Reported = Maximum (Margin 1: 7% Deterministic, Margin 1 Stochastic)	Margin 1	Reported	\$	3,050	\$	-	\$	-
Reported = Maximum (Margin 1: 5% Deterministic, Margin 1 Stochastic)	Margin 1	Reported	\$	7,018	\$	2,487	\$	-
Stochastic GPVAD (65 CTE) / Deterministic 7% Future w/ CSV Floor	Margin 1			106%		99%		96%
Stochastic GPVAD (65 CTE) / Deterministic 5% Future w/ CSV Floor	Margin 1			93%		95%		96%
Stochastic GPVAD (65 CTE) / Cash Surrender Value	Margin 1			106%		99%		96%
Stochastic GPVAD (65 CTE) / Total Formulaic Reserve	Margin 1			29%		34%		40%
The gross separate account appreciation rate before investment advisory ex	penses and	I m&e is show	n.					

Table 6	
Duration 10 Results with Varying Historical Appreciation Rates	

		Issue Age 75			·			
		Future		Histo	rica	I Appreciation	Rate)
Basis	Margins	SA Rate		<u>0.45%</u>		<u>5.00%</u>		<u>9.00%</u>
Account Value			\$	143,000	\$	216,500	\$	304,500
Cash Surrender Value			\$	121,250	\$	194,750	\$	282,750
Form ulaic Total Reserve			\$	798,785	\$	804,510	\$	811,171
Principles-Based Deterministic GPV : Anticipated Experience	None	9%	\$	243,659	\$	236,050	\$	289,286
Principles-Based Deterministic GPV	Margin 1	7%	\$	264,134	\$	271,944	\$	294,417
Principles-Based Deterministic GPV	Margin 2	7%	\$	301,114	\$	306,403	\$	319,289
Principles-Based Deterministic GPV	Margin 3	7%	\$	343,491	\$	333,933	\$	321,972
Principles-Based Deterministic GPV	Margin 1	5%	\$	280.154	\$	297.254	\$	326.844
Principles-Based Deterministic GPV	Margin 2	5%	\$	316,221	\$	332.231	\$	356,943
Principles-Based Deterministic GPV	Margin 3	5%	\$	361,238	\$	366,174	\$	373,626
Principles-Based Deterministic GPV With CSV floor	Marcin 1	7%	\$	264.134	\$	271.944	\$	294,417
Principles-Based Deterministic GPV With CSV floor	Margin 1	5%	\$	280,154	\$	297,254	\$	326,844
Principles-Based Stochastic GPVAD (65 CTE) : Margin 1	Margin 1	Stochastic	\$	315,683	\$	334,368	\$	360,413
Principles-Based Stochastic GPVAD (65 CTE) : Margin 2	Margin 2	Stochastic	\$	376,105	\$	389,237	\$	405,467
Principles-Based Stochastic GPVAD (65 CTE) : Margin 3	Margin 3	Stochastic	\$	435,417	\$	437,297	\$	436,845
Reserve for Guaranteed Death Benefit (Reported Reserve less CSV)								
Reported = Maximum (Margin 1: 7% Deterministic, Margin 1 Stochastic)	Margin 1	Reported	\$	194,433	\$	139,618	\$	77,663
Reported = Maximum (Margin 1: 5% Deterministic, Margin 1 Stochastic)	Margin 1	Reported	\$	194,433	\$	139,618	\$	77,663
Stochastic GPVAD (65 CTE) / Deterministic 7% Future w/ CSV Floor	Marqin 1			120%		123%		122%
Stochastic GPVAD (65 CTE) / Deterministic 5% Future w/ CSV Floor	Margin 1			113%		112%		110%
Stochastic GPVAD (65 CTE) / Cash Surrender Value	Marqin 1			260%		172%		127%
Stochastic GPVAD (65 CTE) / Total Formulaic Reserve	Margin 1			40%		42%		44%
The gross separate account appreciation rate before investment advisory e	expenses and	m&e is show	'n.					

Observations

- There are not many products with aggressive guaranteed minimum death benefits currently in the VUL market place. We developed a more aggressive guarantee to stress test the principles-based reserve approach. The Total Formulaic Reserves (CRVM plus AG37) generated by this more aggressive guarantee are well in excess of cash values, often 5-10 times the cash value or more in the first 10 policy durations. The drop in reserve from Total Formulaic to PBR at certain durations in Tables 1-6 is higher than it might otherwise be as the AG37 reserve is based on 1980 CSO mortality. Using 2001 CSO would lower the Total Formulaic Reserve by about one-third. The principles-based reserve levels shown are well below these formulaic reserve levels.
- In many cases, the Deterministic Reserve is governed by the cash surrender value floor. In those cases, the general account reserve is a negative amount representing the surrender charge. This result happens more often for issue age 45, for the earlier durations, or for the 7% future SA appreciation assumption. Significant Deterministic Reserves above cash values develop in some cases however, particularly for issue age 75, or where more prolonged periods of lower historical SA appreciation (5%) have occurred prior to valuation, or for the 5% future SA appreciation assumption.
- The Stochastic Reserve was calculated at duration 10. For issue age 45, the average equity return for the 350 scenarios that made up the 65 CTE reserve was between 5% and 6% over time periods ranging from 10 to 30 years from the valuation date. Consistent with that, the Stochastic Reserve is somewhat lower than, but close to, the 5% future separate account return rate Deterministic Reserve and higher than the 7% Deterministic Reserve.
- For the Stochastic Reserve for issue age 75, the average equity return for the 350 scenarios that made up the 65 CTE reserve was in a wider range over various time periods than for issue age 45. Average returns ranged from a little more than 4% for the first 10 years after the valuation date (i.e., attained ages 85 to 95) to close to 7% for the first 20 years after the valuation date (i.e., attained ages 85 to 105). Because the lower returns occur in the early years after the valuation date and there is insufficient time for the separate account assets to recover before claims are paid, the Stochastic Reserve is higher than both the 5% and 7% Deterministic Reserve.
- Note that as historical separate account appreciation rates increase the Stochastic Reserves increase (due to higher initial account values on the valuation date leading to higher projected surrender and death benefits).

- The Reported Reserve in excess of CSV, which can perhaps be considered to be a measure of the reserve for the death benefit guarantee, decreases as historical separate account appreciation rates increase because the guaranteed minimum death benefits are further out-of-the-money.
- It is not always obvious when a lapse rate has a margin. To illustrate this we show lapse rates with margins that are both higher (margin (2)) and lower (margin (3)) than the anticipated experience. As you move through time and circumstances change, or depending on the level of the other assumptions, the direction of the lapse margin may need to change. For example, at some valuation points and depending on the levels of either the historical returns or the assumed future returns, high lapse rates are conservative and in others low lapse rates are conservative.
- In the latest durations, for the 9% historical return, the PBR reserve is larger than the death benefit. That is because the product modeled is still paying asset based trail commissions beyond age 100 even though M&E charges are not being assessed. This was an unintended result; however in the interest of time, coding was not changed and results not re-run. To the extent that there are expenses that are not covered by premium payments or policy charges, this type of result can occur.
- For the Stochastic Reserve, 1,000 scenarios may or may not be enough to accurately estimate a model's CTE 65 reserve. Stated another way, a CTE 65 reserve estimated using integrated, correlated scenarios may not be sufficiently near the exact CTE 65 reserve implied by the valuation model. Two ways to test if the estimate is reasonable are: 1) run more random scenarios and see that the CTE 65 reserve estimate does not change much from the initial scenario set run; or 2) calculate the standard deviation of the CTE estimator. The standard deviation calculation was used in this report.

The variance of the CTE estimator is described in an article in the **North American Actuarial Journal**, Vol. 9, No. 2, April 2005, "<u>Variance of the CTE Estimator</u>", Manistre and Hancock. The calculation for a given sample is:

VAR (CTE)
$$\approx \frac{\text{Var}(\mathbf{x}_1, \dots, \mathbf{x}_{(k)}) + \alpha \cdot (\text{CTE} - \mathbf{x}_{(k)})^2}{k}$$

where

 $\mathbf{x}_{\scriptscriptstyle(i)}$ is the ith sample order statistic, i.e., the ith largest reserve

 $\alpha = 1 - (k/n)$ = the CTE level percentage, where n = the total number of scenarios and k = the number of

scenarios used in the CTE calculation

CTE = $1/k \cdot \Sigma x_{(j)}$ for $1 \le j \le k$

In Appendix 4, the distribution of the stochastic results for Margin 1 is shown. In addition several summary statistics are provided, including σ (CTE65). On page 23, for the .45% historical growth with margin 1 scenario set, VAR (CTE65) = 489,895 so σ (CTE65) = 700. The standard error of the CTE65, σ/μ = .012. Both measures suggest that the sample scenarios produced a CTE65 reserve estimate acceptably close to the valuation model's exact CTE65 reserve, and that the number of scenarios simulated was sufficient. Results are shown for other historical growth rates and for the age 75 sets on the second set of charts in Appendix 4.

Appendix 1: Product Design and Pricing

Product Description and Pricing:

Issue Age 45

Plan of Insurance:

Insured Life:

Variable Universal Life with Guaranteed Minimum Death Benefits Male Age 45 Best NonTobacco

Amount of Insurance:	\$1,000,000 face
Length of premium paying period:	To Age 100
Mode of premium payment:	Annual
Target Premium:	\$11,000
Lifetime NLG Premium:	\$10,000
	W/ AG37 reserves
Pre-Tax IRR on Distr. Earnings	6.9%
Profit Margin (PV of Profit/PV of Premium) at 6%	14.6%
Breakeven Year (Profit Accum at 6%)	26

* Required Surplus was calculated as 3.6% of CRVM expense allowance plus .10% of assets plus \$1.20 per 1000 of Net Amount at Risk

Product Description and Pricing:

Issue Age 75

Plan of Insurance:	Variable Universal Life with Guaranteed Minimum Death Benefits
Insured Life:	Male Age 75 Best NonTobacco
Amount of Insurance:	\$1,000,000 face
Length of premium paying period:	To Age 100
Mode of premium payment:	Annual
Target Premium:	\$58,000
Lifetime NLG Premium:	\$50,000
	W/AG37 reserves
Pre-Tax IRR on Distr. Earnings	7.1%
Profit Margin (PV of Profit/PV of Premium) at 6%	9.0%
Breakeven Year (Profit Accum at 6%)	16

* Required Surplus was calculated as 3.6% of CRVM expense allowance plus .10% of assets plus \$1.20 per 1000 of Net Amount at Risk

Market Pespective

Issue Age 45 Non Tobacco \$1,000000

Issue Age 75 Non Tobacco \$1,000000

		Lifetime Guaranteed		Lifetime Guaranteed
	Company	DB Premium *	Company	DB Premium *
1	Company M: Hybrid	8,286	1 Company I: Hybrid	38,433
2	Company B: Hybrid/2001	8,289	2 Company G: 2001	40,001
3	Company I: Hybrid	8,309	3 Company B: Hybrid/2001	46,733
4	Company G: 2001	8,901	4 Company M: Hybrid	47,628
5	Company C: 2001	9,260	5 LRWG - VUL	50,000
6	LRWG - VUL	10,000	6 Company O	50,290
7	Company H: Hybrid	10,614	7 Company H: Hybrid	51,218
8	Company E	12,360	8 Company O	52,020
9	Company F	13,200	9 Company E	58,080
10	Company A	13,230	10 Company F	60,600
11	Company F	13,920	11 Company F	67,080
12	Company D	17,000	12 Company F	67,440
13	Company L	17,377	13 Company A	70,830
14	Company J	17,480	14 Company N	71,950
15	Company K	17,480	15 Company D	89,090
16	Company O	18,370	16 Company L	95,623
17	Company B	18,930	17 Company B	96,750
18	Company N	19,038	18 Company I	98,468
19	Company I	19,218	19 Company N	99,781
20	Company N	19,294	20 Company C: 2001	N/A
21	Company O	21,190	21 Company J	N/A
			22 Company K	N/A

* Source: Blease Research 9/30/2006 Full Disclosure Software

Valuation Assumptions Issue Age 45

	Mortality	rates	
	Pricing	with mortality	
	Estimate per	margin of 3.5	with 2001
Attained age	1000	ex	CSO margin
45	0.2813	0.3645	0.6284
46	0.4122	0.4974	0.7815
47	0.5314	0.6187	0.9243
48	0.6280	0.7175	1.0461
49	0.7104	0.8022	1,1553
50	0.7950	0.8892	1.2686
51	0.8798	0.9765	1.3840
52	0.9700	1.0694	1.5069
53	1.0763	1.1785	1.6482
54	1,2463	1.3514	1.8557
55	1.3965	1.5048	2.0459
56	1 6659	1 7775	2 3583
57	1 9469	2 0619	2 6853
58	2 2653	2 3840	3 0530
59	2.2000	2.6730	3 3911
60	2,0000	3 0270	3 7978
61	3 2322	3 3632	4 1908
62	3 6383	3 7739	4 6627
63	4 0717	4 2123	5 1672
64	4.0717	4.2123	5 7333
04	4.5011	4.7070	5.7555
60	5.0969	5.2403	7 0200
67	5.0951	5.6520	7.0399
67	0.4157	0.5790	7.8578
68	7.2148	7.3850	8.7625
69	8.1245	8.3027	9.7869
70	9.1022	9.2884	10.8895
/1	10.2531	10.4478	12.1765
72	11.5673	11.7713	13.6392
73	13.0314	13.2454	15.2657
74	14.6012	14.8259	17.0132
75	16.5055	16.7418	19.1124
76	18.5090	18.7581	21.3300
//	20.7674	21.0301	23.8238
78	23.4040	23.6817	26.7201
79	26.4708	26.7648	30.0735
80	29.7182	30.0299	33.6369
81	33.6283	33.9594	37.8969
82	37.9923	38.3444	42.6474
83	42.8760	43.2510	47.9584
84	47.9476	48.3476	53.5024
85	53.7720	54.1993	59.8516
86	60.4335	60.8906	67.0953
87	67.6116	68.1011	74.9175
88	75.5387	76.0636	83.5583
89	84.4779	85.0413	93.2872
90	94.2091	94.8140	103.8880
91	104.1101	104.7597	114.7435
92	114.3815	115.0796	126.0680
93	125.3591	126.1100	138.2125
94	137.0957	137.9041	151.2432
95	149.6560	150.5273	165.2396
96	163.6224	164.5622	180.7995

	Mortality rates						
	Pricing	with mortality					
	Estimate per	margin of 3.5	with 2001				
Attained age	1000	ex	CSO margin				
97	178.5908	179.6045	197.5193				
98	211.2181	195.5241	215.2705				
99	194.4315	212.3941	234.1214				
100	229.0296	230.2916	254.1256				
101	244.3807	245.7283	269.8388				
102	260.0610	261.4971	285.7626				
103	272.7194	274.2453	298.5109				
104	286.2665	287.8914	312.1170				
105	300.7187	302.4532	326.5882				
106	316.3960	318.2522	342.2345				
107	333.0225	335.0131	358.7524				
108	350.4663	352.6054	375.9894				
109	368.3879	370.6921	393.5889				
110	388.5546	391.0458	413.3244				
111	409.6854	412.3824	433.8198				
112	432.2250	435.1456	455.4565				
113	456.2760	459.4273	478.2092				
114	481.9272	485.2840	501.9528				
115	509.2932	512.7497	526.4769				
116	458.5020	461.7929	471.5906				
117	489.6270	493.2576	500.4564				
118	522.8255	526.7630	530.6555				
119	568.3739	572.4304	572.4072				
120	1000.0000	1000.0000	1000.0000				

Lapse Rates						
Level Pay						
	Pricing	Higher	Lower			
Att Age	Estimate	<u>Lapses</u>	Lapses			
45	4.00%	5.00%	3.00%			
46	3.80%	4.80%	2.80%			
47	3.60%	4.60%	2.60%			
48	3.40%	4.40%	2.40%			
49	3.20%	4.20%	2.20%			
50-54	3.00%	4.00%	2.00%			
55-64	1.80%	2.80%	0.80%			
65-89	1.20%	2.20%	0.20%			
90+	1.00%	2.00%	0.00%			
Lapses include	apse and surre	ender				
Dynamic Lapse:	0.00% while F	·V < 0				

Valuation Assumptions Issue Age 75

Attained agePricing Estimate per 1000with mortality margin of 3.5 exwith 2001 CSO margin755.41285.63027.8103767.56557.795910.17607710.330010.574713.17647813.820214.080416.92687917.737018.013821.12978021.270621.565524.97768125.556525.871129.61218230.014430.350434.45548335.331635.90940.20068439.536639.921244.87908544.837545.250650.71508652.328352.773058.80908761.168261.647368.31808871.086971.603077.2119981.524482.079990.21109091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102		Mortality	rates	
Attained ageEstimate per 1000 margin of 3.5 ex CSO margin755.41285.63027.8103767.56557.795910.17607710.330010.574713.17647813.820214.080416.92687917.737018.013821.12978021.270621.565524.97768125.556525.871129.61218230.014430.350434.45548335.331635.690940.20068439.536639.921244.87908544.837545.250650.71508652.328352.773058.80908761.168261.647368.31808871.086971.603078.97218981.524482.079990.21109091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963778.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088 <tr< th=""><th></th><th>Driaina</th><th></th><th></th></tr<>		Driaina		
age1000 margin of 3.5 exCSO margin755.41285.63027.8103767.56557.795910.17607710.330010.574713.17647813.820214.080416.92687917.737018.013821.12978021.270621.565524.97768125.556525.871129.61218230.014430.350434.45548335.331635.690940.20068439.536639.921244.87908544.837545.250650.71508652.328352.773058.80908761.168261.647368.31808871.086971.603078.97218981.524482.079990.21109091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963778.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088 <trr>103271.8627</trr>	Attained	Estimate per	with mortality	with 2001
755.41285.63027.8103767.56557.795910.17607710.330010.574713.17647813.820214.080416.92687917.737018.013821.12978021.270621.565524.97768125.556525.871129.61218230.014430.350434.45548335.331635.690940.20068439.536639.921244.87908544.837545.250650.71508652.328352.773058.80908761.168261.647368.31808871.086971.603078.97218981.524482.079990.21109091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.43193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920	age	1000	margin of 3.5 ex	CSO margin
767.56557.795910.17607710.330010.574713.17647813.820214.080416.92687917.737018.013821.12978021.270621.565524.97768125.556525.871129.61218230.014430.350434.45548335.331635.690940.20068439.536639.921244.87908544.837545.250650.71508652.328352.773058.80908761.168261.647368.31808871.086971.603078.97218981.524482.079990.21109091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.43193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.63521053	75	5.4128	5.6302	7.8103
7710.330010.574713.17647813.820214.080416.92687917.737018.013821.12978021.270621.565524.97768125.565525.871129.61218230.014430.350434.45548335.331635.690940.20068439.536639.921244.87908544.837545.250650.71508652.328352.773058.80908761.168261.647368.31808871.086971.603078.97218981.524482.079990.21109091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106 <td>76</td> <td>7.5655</td> <td>7.7959</td> <td>10.1760</td>	76	7.5655	7.7959	10.1760
78 13.8202 14.0804 16.9268 79 17.7370 18.0138 21.1297 80 21.2706 21.5655 24.9776 81 25.5565 25.8711 29.6121 82 30.0144 30.3504 34.4554 83 35.3316 35.6909 40.2006 84 39.5366 39.9212 44.8790 85 44.8375 45.2506 50.7150 86 52.3283 52.7730 58.8090 87 61.1682 61.6473 68.3180 88 71.0869 71.6030 78.9721 89 81.5244 82.0799 90.2110 90 91.2314 91.8287 100.7885 91 101.2159 101.8584 111.7319 92 111.7663 112.4579 123.3431 93 123.1989 123.9439 135.9515 94 135.4675 136.2705 149.5211 95 148.8133 149.6794	77	10.3300	10.5747	13.1764
7917.737018.013821.12978021.270621.565524.97768125.556525.871129.61218230.014430.350434.45548335.331635.690940.20068439.536639.921244.87908544.837545.250650.71508652.328352.773058.80908761.168261.647368.31808871.086971.603078.97218981.524482.079990.21109091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.263610733.027933.0211358.7919	78	13.8202	14.0804	16.9268
80 21.2706 21.5655 24.9776 81 25.5565 25.8711 29.6121 82 30.0144 30.3504 34.4554 83 35.3316 35.6909 40.2006 84 39.5366 39.9212 44.8790 85 44.8375 45.2506 50.7150 86 52.3283 52.7730 58.8090 87 61.1682 61.6473 68.3180 88 71.0869 71.6030 78.9721 89 81.5244 82.0799 90.2110 90 91.2314 91.8287 100.7885 91 101.2159 101.8584 111.7319 92 111.7663 112.4579 123.3431 93 123.1989 123.9439 135.9515 94 135.4675 136.2705 149.5211 95 148.8133 149.6794 164.3043 96 162.5006 163.4346 179.5699 97 177.0963 178.1036	79	17.7370	18.0138	21.1297
81 25.5565 25.8711 29.6121 82 30.0144 30.3504 34.4554 83 35.3316 35.6909 40.2006 84 39.5366 39.9212 44.8790 85 44.8375 45.2506 50.7150 86 52.3283 52.7730 58.8090 87 61.1682 61.6473 68.3180 88 71.0869 71.6030 78.9721 89 81.5244 82.0799 90.2110 90 91.2314 91.8287 100.7885 91 101.2159 101.8584 111.7319 92 111.7663 112.4579 123.3431 93 123.1989 123.9439 135.9515 94 135.4675 136.2705 149.5211 95 148.8133 149.6794 164.3043 96 162.5006 163.4346 179.5699 97 177.0963 178.1036 195.9043 98 192.7607 193.8468	80	21.2706	21.5655	24.9776
82 30.0144 30.3504 34.4554 83 35.3316 35.6909 40.2006 84 39.5366 39.9212 44.8790 85 44.8375 45.2506 50.7150 86 52.3283 52.7730 58.8090 87 61.1682 61.6473 68.3180 88 71.0869 71.6030 78.9721 89 81.5244 82.0799 90.2110 90 91.2314 91.8287 100.7885 91 101.2159 101.8584 111.7319 92 111.7663 112.4579 123.3431 93 123.1989 123.9439 135.9515 94 135.4675 136.2705 149.5211 95 148.8133 149.6794 164.3043 96 162.5006 163.4346 179.5699 97 177.0963 178.1036 195.9043 98 192.7607 193.8468 213.4752 99 209.6112 210.7810	81	25.5565	25.8711	29.6121
83 35.3316 35.6909 40.2006 84 39.5366 39.9212 44.8790 85 44.8375 45.2506 50.7150 86 52.3283 52.7730 58.8090 87 61.1682 61.6473 68.3180 88 71.0869 71.6030 78.9721 89 81.5244 82.0799 90.2110 90 91.2314 91.8287 100.7885 91 101.2159 101.8584 111.7319 92 111.7663 112.4579 123.3431 93 123.1989 123.9439 135.9515 94 135.4675 136.2705 149.5211 95 148.8133 149.6794 164.3043 96 162.5006 163.4346 179.5699 97 177.0963 178.1036 195.9043 98 192.7607 193.8468 213.4752 99 209.6112 210.7810 232.3948 100 227.7725 229.0290 </td <td>82</td> <td>30.0144</td> <td>30.3504</td> <td>34.4554</td>	82	30.0144	30.3504	34.4554
84 39.5366 39.9212 44.8790 85 44.8375 45.2506 50.7150 86 52.3283 52.7730 58.8090 87 61.1682 61.6473 68.3180 88 71.0869 71.6030 78.9721 89 81.5244 82.0799 90.2110 90 91.2314 91.8287 100.7885 91 101.2159 101.8584 111.7319 92 111.7663 112.4579 123.3431 93 123.1989 123.9439 135.9515 94 135.4675 136.2705 149.5211 95 148.8133 149.6794 164.3043 96 162.5006 163.4346 179.5699 97 177.0963 178.1036 195.9043 98 192.7607 193.8468 213.4752 99 209.6112 210.7810 232.3948 100 227.7725 229.0290 252.7596 101 242.9047 244.24	83	35.3316	35.6909	40.2006
8544.837545.250650.71508652.328352.773058.80908761.168261.647368.31808871.086971.603078.97218981.524482.079990.21109091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482	84	39.5366	39.9212	44.8790
86 52.3283 52.7730 58.8090 87 61.1682 61.6473 68.3180 88 71.0869 71.6030 78.9721 89 81.5244 82.0799 90.2110 90 91.2314 91.8287 100.7885 91 101.2159 101.8584 111.7319 92 111.7663 112.4579 123.3431 93 123.1989 123.9439 135.9515 94 135.4675 136.2705 149.5211 95 148.8133 149.6794 164.3043 96 162.5006 163.4346 179.5699 97 177.0963 178.1036 195.9043 98 192.7607 193.8468 213.4752 99 209.6112 210.7810 232.3948 100 227.7725 229.0290 252.7596 101 242.9047 244.2472 268.2670 102 258.8729 260.3053 284.5088 103 271.8627 <t< td=""><td>85</td><td>44.8375</td><td>45.2506</td><td>50.7150</td></t<>	85	44.8375	45.2506	50.7150
8761.168261.647368.31808871.086971.603078.97218981.524482.079990.21109091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	86	52.3283	52.7730	58.8090
8871.086971.603078.97218981.524482.079990.21109091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	87	61.1682	61.6473	68.3180
8981.524482.079990.21109091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	88	71.0869	71.6030	78.9721
9091.231491.8287100.788591101.2159101.8584111.731992111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	89	81.5244	82.0799	90.2110
91101.2159101.8584111.731992111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	90	91.2314	91.8287	100.7885
92111.7663112.4579123.343193123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	91	101.2159	101.8584	111.7319
93123.1989123.9439135.951594135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	92	111.7663	112.4579	123.3431
94135.4675136.2705149.521195148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	93	123.1989	123.9439	135.9515
95148.8133149.6794164.304396162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	94	135.4675	136.2705	149.5211
96162.5006163.4346179.569997177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	95	148.8133	149.6794	164.3043
97177.0963178.1036195.904398192.7607193.8468213.475299209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	96	162.5006	163.4346	179.5699
98 192.7607 193.8468 213.4752 99 209.6112 210.7810 232.3948 100 227.7725 229.0290 252.7596 101 242.9047 244.2472 268.2670 102 258.8729 260.3053 284.5088 103 271.8627 273.3865 297.6188 104 285.7920 287.4165 311.6352 105 300.7271 302.4627 326.6114 106 316.4030 318.2608 342.2636 107 333.0279 335.0211 358.7919 108 350.4701 352.6138 376.0473 109 368.3901 370.7024 393.6796 110 388.5546 391.0608 413.4735 111 409.6854 412.4113 434.0782 112 432.2250 435.2035 455.9169 113 456.2760 459.5482 479.0502 114 481.9272 485.5458 503.5146	97	177.0963	178.1036	195.9043
99209.6112210.7810232.3948100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	98	192.7607	193.8468	213.4752
100227.7725229.0290252.7596101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	99	209.6112	210.7810	232.3948
101242.9047244.2472268.2670102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	100	227.7725	229.0290	252.7596
102258.8729260.3053284.5088103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	101	242.9047	244.2472	268.2670
103271.8627273.3865297.6188104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	102	258.8729	260.3053	284.5088
104285.7920287.4165311.6352105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	103	271.8627	273.3865	297.6188
105300.7271302.4627326.6114106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	104	285,7920	287.4165	311.6352
106316.4030318.2608342.2636107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	105	300.7271	302.4627	326.6114
107333.0279335.0211358.7919108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	106	316,4030	318.2608	342.2636
108350.4701352.6138376.0473109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	107	333.0279	335.0211	358.7919
109368.3901370.7024393.6796110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	108	350,4701	352.6138	376.0473
110388.5546391.0608413.4735111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	109	368.3901	370.7024	393.6796
111409.6854412.4113434.0782112432.2250435.2035455.9169113456.2760459.5482479.0502114481.9272485.5458503.5146	110	388.5546	391.0608	413.4735
112 432.2250 435.2035 455.9169 113 456.2760 459.5482 479.0502 114 481.9272 485.5458 503.5146	111	409.6854	412,4113	434.0782
113 456.2760 459.5482 479.0502 114 481.9272 485.5458 503.5146	112	432,2250	435,2035	455,9169
114 481.9272 485.5458 503.5146	113	456,2760	459.5482	479.0502
	114	481.9272	485.5458	503.5146
115 509.2932 513.3302 529.3628	115	509,2932	513.3302	529.3628
116 538.4790 543.0434 556.6324	116	538,4790	543.0434	556.6324
117 569.6040 574.8953 585.3872	117	569 6040	574 8953	585 3872
118 602 8025 609 3218 615 7665	118	602 8025	609 3218	615 7665
119 648 3509 658 3040 658 2472	119	648 3500	658 3040	658 2472
	120	1000 0000	1.000.00040	1000 0000

Lapse Rates			
	Pricing	Higher	Lower
Att Age	Estimate	Lapses	Lapses
75	2.20%	3.20%	1.20%
76	2.00%	3.00%	1.00%
77	1.80%	2.80%	0.80%
78	1.60%	2.60%	0.60%
79	1.40%	2.40%	0.40%
80-89	1.20%	2.20%	0.20%
90+	1.00%	2.00%	0.00%
Lapses include lapse and surrender Dynamic Lapse: 0.00% while FV < 0			

Appendix 3: Experience Assumptions

Valuation Assumptions Issue Ages 45 and 75

Deterministic Interest Rates	Best Estimate	With Margin
Gross General Account Rate Based on investment philosophy with level yield curve	7.00%	6.00%
Borrowing Rate	7.00%	6.00%

Separate Account Deterministic Rates	Best Estimate	With Margin	With Margin
Gross Earned Rate	9.00%	7.00%	5.00%
Investment Advisory Expenses	0.70%	0.70%	0.70%
Net SA Credited Rate (pre M&E)	8.30%	6.30%	4.30%
Revenue Sharing	0.25%	0.25%	0.25%

Expense Assumptions			
		Best	With 5%
Non Acquisition		<u>Estimate</u>	Margin
Per Policy		\$50.00	\$52.50
Per Unit		\$0.00	\$0.00
Per Death		\$100.00	\$105.00
Per Surrender		\$20.00	\$21.00
Prem Taxes		2.50%	2.63%
Acquisition			
Per Policy		\$73.74	\$73.74
% of Targ Prem		10%	10%
Per Unit		\$1.29	\$1.29
Commissions	Yrs		
% of Target	1	115%	115%
% of Target	2-10	5%	5%
% of Target	11+	2%	2%
Trail Commissions			
% Account Value	11-20	.15%	.15%
% Account Value	21+	.10%	.10%

Appendix 4: Distribution of Stochastic Results

Distribution of Stochastic Results At Duration 10

Issue Age = 45, Margin 1, Historical Growth = .45%





Issue Age = 45, Margin 1, Historical Growth = 9%

φ00,000 ·	φ100,000	557	
\$100,000 -	\$120,000	27	
\$120,000 -	\$140,000	3	
Fotal		1000	
Cash Value	\$91,500		
Minimum	\$0		
Maximum	\$127,909		
Average	\$78,784		
CTE 65	\$87,688		
/ariance of CTE	Estimator	277,705	
StdDev of CTE B	Estimator	527	
Standard Error		0.6%	



2 3 22 3 \$0-\$20 \$20-\$40 \$40-\$60 \$60-\$80 \$80-\$100 \$100-\$120 \$120-\$140 Reserves in \$thousands

Appendix 4: Distribution of Stochastic Results Distribution of Stochastic Results At Duration 10

Stochastic Re	serves	Number of
GPVAD Rese	rve Range	Scenarios
\$130,000 -	\$175,000	126
\$175,000 -	\$220,000	162
\$220,000 -	\$265,000	235
\$265,000 -	\$310,000	288
\$310,000 -	\$355,000	167
\$355,000 -	\$400,000	24
\$400,000 -	\$445,000	C
Total		1000
Cash Value	\$121,250	
Minimum	\$127,900	
Maximum	\$395,692	
Average	\$253,310	
CTE 65	\$315,683	
Variance of CT	E Estimator	3,651,573
StdDev of CTE	Estimator	1,911
Standard Error		0.6%



Issue Age = 75, Margin 1, Historical Growth = 5%

Stochastic Reserves		Number of
GP VAD Kesel	ve Kange	Scenarios
\$195,000 - \$235,000 - \$275,000 - \$315,000 - \$355,000 - \$395,000 - \$435,000 - Total	\$235,000 \$275,000 \$315,000 \$355,000 \$395,000 \$435,000 \$485,000	412 164 182 159 72 9 2 1000
Cash Value Minimum Maximum Average CTE 65	\$194,750 \$196,895 \$442,271 \$266,101 \$334,368	
Variance of CT StdDev of CTE Standard Error	E Estimator Estimator	6,394,685 2,529 0.8%







Issue Age = 75, Margin 1, Historical Growth = 9%