Milliman Research Report

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VM-20 Impact Study Compendium

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The author acknowledges the contributions made by the companies participating in the ACLI's efforts to review VM-20 Impact Study results.

INTRODUCTION

As followers of the National Association of Insurance Commissioners' (NAIC) principle-based approach to reserves and capital and participants in the VM-20 Impact Study (Study) will be aware, this initiative is entering a key phase with critical milestones planned for 2012. Many companies have expended significant time and resources in participating in the NAIC's VM-20 Impact Study. This report is the result of Milliman's engagement with the American Council of Life Insurers (ACLI) to review the data produced by companies submitting their Study results to the ACLI. Not all companies participating in the Study chose to submit data to the ACLI; however, the data received is sufficient enough to identify key issues within the proposed VM-20 requirements. In addition to the Study data, the ACLI requested supplementary data from these companies in order to better understand the outcomes of the Study. The ACLI's objective in performing a review of the submitted data in parallel with the larger Study effort, facilitated by Towers Watson, is to enable the ACLI to be proactive as issues arise and to communicate these issues to its member companies.

The report is presented in four main sections:

Phase 1	This section provides an overview of the outcome of Phase 1 of the Study for each product type: term insurance (term), universal life with secondary guarantee insurance (ULSG), whole life insurance (WL), universal life insurance (UL), and variable universal life insurance (VUL).
Phase 2	Organized by sensitivity, this section provides a summary of the outcome of Phase 2 of the Study. The Phase 2 data includes sensitivity results intended to measure the impact of changes in assumptions on the Phase 1 components.
ACLI Data Request	This section provides detail on four additional requests, the purpose of which is to further investigate outcomes of the VM-20 Impact Study results and provide supplemental analysis.
Appendices	Appendices A through E are organized by product type, and provide the detail from Phase 1. Appendix F provides the detail from Phase 2. Appendices G and H provide the detail from the ACLI data Requests Nos. 2 and 3.

BACKGROUND

After many years in development, a principle-based approach to reserve determination is now recognized in the Standard Valuation Model Law (SVL). The revised SVL was provisionally adopted by the NAIC in 2009. The SVL relies on a valuation manual to specify the detail behind calculating statutory minimum reserves for all product types. For life insurance, this detail is found in VM-20.[1] In 2010, the NAIC solicited industry participation in a field test to gauge the impact of implementing VM-20. This effort was carried out in two phases and over the better part of calendar year 2011. The insurance product types represented in the effort included term insurance, whole life, simplified issue whole life, accumulation universal life, universal life with secondary guarantees, and variable universal life. The first phase included calculation of primary components of VM-20 including reserve exclusion tests, net premium reserves, deterministic reserves, stochastic reserves, and current statutory reserves. The second phase included a variety of sensitivity tests, the purpose of which is to provide insight into the Phase 1 results and specifically the sensitivity of the reserve components to changes in assumptions and changes in the underlying methodology.

Because many of the concepts in VM-20 are new for statutory life insurance valuation, the industry and regulators agreed a field test would be appropriate. Specifically, the regulators and industry are using the Study results to:

- Assess the outcome of the VM-20 calculations for different product types
- Develop an understanding of areas where the methods, assumptions or language of VM-20 could be improved

In concert with these objectives, the ACLI requested that companies voluntarily submit Study results to Milliman so that results could be summarized and analyzed in parallel with the regulatory review. This report summarizes the analysis performed during this parallel review. The reader is assumed to be familiar with the requirements found in VM-20 and, aside from the glossary of terms at the end, this report does not attempt to provide a comprehensive explanation of these requirements. To maintain confidentiality, each company's results are reported on a normalized basis per $1,000 of direct face amount, unless otherwise noted. Identifying marks and comments were removed from the materials presented to ACLI by Milliman. Companies submitting Study results to Milliman were a part of the review process in the development of this report.

[1] See the glossary for brief definitions of terms. Specific VM-20 requirements are not spelled out in this report. The reader is directed to VM-20 for detailed descriptions of calculations and minimum reserve requirements. Specifically, the October 16, 2010, exposure draft of VM-20 is the document from which the Study began.

LIMITATIONS

In summarizing the results of the Study, the author relied on the accuracy and completeness of data and other information provided by contributing companies. The author has not audited or verified this data and other information. If the underlying data is inaccurate or incomplete, the results of this analysis may likewise be inaccurate or incomplete. It is important to note these results are limited by the following:

- Aspects of VM-20 continue to develop. Specifically, the net premium reserve approach and the allowable methods of determining a company's modeled investment earnings (Alternative 1 vs. Alternative 2) are parameters that are likely to look different in the adopted version of VM-20 than in the exposure draft used by Study participants.

- Not every company participating in the Study chose to submit results for review by the ACLI. This report considers only the data available to the ACLI.

- The content of data submissions across companies was not consistent. For example, one company may have completed a robust submission including all components of Phase 1 and Phase 2 while another company may have submitted portions of each, or omitted Phase 2 altogether. To the extent possible, all submitted data is included in this analysis.

- Each company interpreted VM-20 requirements independently. Though the Impact Study process provided feedback on individual questions, in the end each company is making its own interpretations regarding the requirements of VM-20 and its implementation.

- Each company contact was provided the opportunity to review the exhibit portraying its results for accuracy and completeness. Any errors or omissions during this process imply errors or omissions in the corresponding exhibit.

Milliman does not intend to legally benefit any third-party recipient of its work product. As a research report, Milliman consents to distribution of this work product in its entirety by its client, the ACLI.

The author is a member of the American Academy of Actuaries and meets the qualification standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

EXECUTIVE SUMMARY

During the process of examining the ACLI's database of information generated by the VM-20 Impact Study (Study) exercise, it became apparent that common threads were difficult to pin down. In reacting to VM-20 requirements, the product types tested have different reasons for producing outlier results. The body of this report and the appendices provide a review of the detail by product type and by submission. Only by a review of the detail can one appreciate the breadth and depth of the complexities involved in principle-based reserve requirements.

Framework

Right-sizing reserves is understood as a primary objective of VM-20. When compared to today's formulaic minimums, however, the change introduced by VM-20 requirements varies widely across the various submissions (and by corollary, across companies).

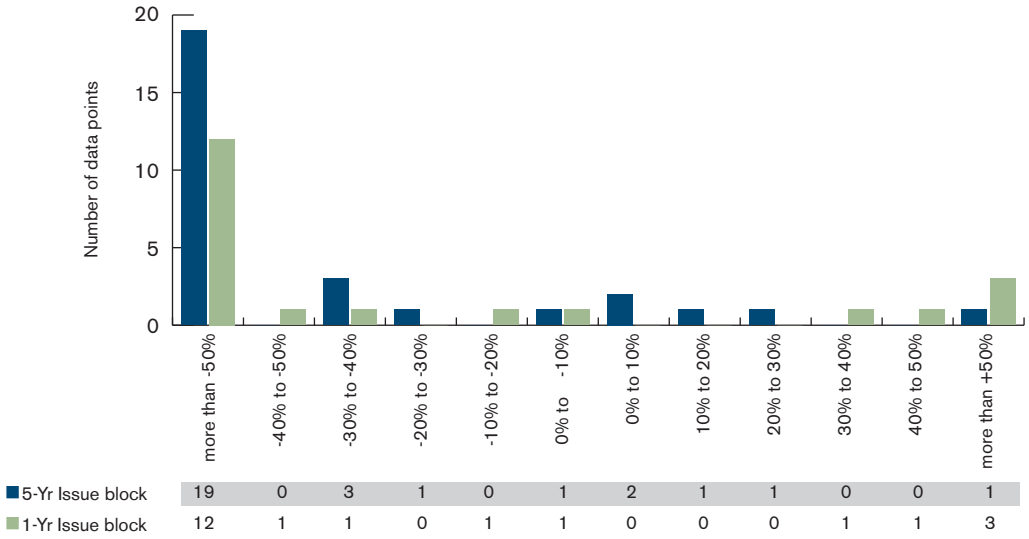
In general, the Phase 1 outcome for term insurance finds that:

- The net premium reserve (NPR) floor is the VM-20 minimum reserve
- The VM-20 minimum reserve represents a large percentage decrease from current formulaic minimums

Of the 10 companies providing term data, there are a total of 50 data points for each reinvestment alternative tested, including the various level premium term periods, 1-year and 5-year issue blocks. A histogram of the distribution of the percentage change in minimum reserve is shown in Figure 1 for all 50 data points of Alternative 2 (Alt 2).

In this report, the Phase 1 section on term insurance provides context for these results, and Appendix A provides company-by-company detail of the VM-20 components for each of these 10 companies.

FIGURE 1: TERM, ALT 2, PERCENTAGE CHANGE FROM CURRENT RESERVE LEVELS



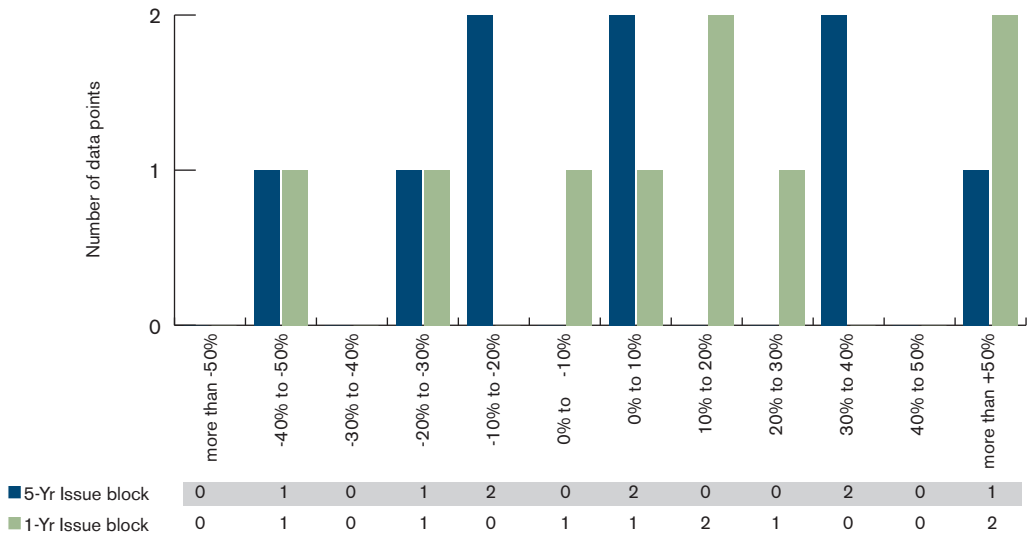
The Phase 1 outcome for universal life with secondary guarantee (ULSG) insurance generally finds that:

- The stochastic reserve (SR) is the VM-20 minimum reserve
- The VM-20 minimum reserve represents both increases and decreases compared to reserves calculated under the current methodology, varying widely among companies

Of the nine companies providing ULSG data, there are a total of 18 data points for each reinvestment alternative, including the 1-year and 5-year issue blocks. A histogram of the distribution of the percentage change in minimum reserve is shown in Figure 2 for these 18 data points over Alt 2. The percentage changes for ULSG range from a low of -43% to a high of 257%, as can be seen in the table in Figure 8 in the Phase 1 section.

In this report, the Phase 1 section on ULSG provides context for these results, and Appendix B provides company-by-company detail of the VM-20 components for each of these nine companies.

FIGURE 2: ULSG, ALT 2, PERCENTAGE CHANGE FROM CURRENT RESERVE LEVELS



Through the Impact Study process, it becomes apparent that the NPR methodology as defined for fund-based products is complex, difficult to implement, and may not be comprehensive enough in its definition. It also does not appear to have the expected relationship with the VM-20 modeled reserve components either initially or over the projection period. ACLI's Request No. 1 provides data demonstrating the projected NPR for a ULSG product block becoming larger in the later policy years than either of the deterministic reserve (DR) and the current formulaic minimums (Figure 37). This result confirms that the NPR method for fund-based products requires additional work.

The Phase 1 outcome for whole life, universal life (without secondary guarantees), and variable universal life finds the VM-20 minimum reserves at the same level as today's standards, i.e., 0% change from current reserve levels. For companies that were able to provide the modeled reserve components of DR and stochastic reserve (SR), these reserves are often shown to be less than the NPR, which VM-20 defines as equivalent to current formulaic minimums. For these products, the cash values will generally determine the floor reserve, and cash value requirements for whole life and universal life will usually exceed the DR and SR. An overview of Phase 1 results for these product types is found in the Phase 1 section with detail in Appendices C, D, and E.

Historically, differences between statutory reserves and tax basis reserves have been driven by valuation interest rates and methodology, including effective dates of new methodologies.

It is obvious that material increases in insurance company tax payments will be realized should the excess of modeled reserve amounts over the NPR not be considered deductible for tax purposes.

Mortality

On the surface, credibility blending to an industry table seems a rational method to use when company experience is less than fully credible. For companies participating in Phase 2 of the Impact Study and modeling term insurance, the conservatism attributable to credibility blending with an industry table represents on average a 59% increase in the DR for total company level credibility blending. More granular credibility blending would add another 26% to the DR. For ULSG, credibility blending represents on average a 23% increase to the SR for total company level credibility blending, and an additional 7% for more granular credibility approaches. These results can be seen in more detail in Figure 20 of the Phase 2 section.

The VM-20 mortality assumption includes more components than just credibility blending, however. Underlying the VM-20 requirements for valuation mortality are: (i) the underwriting criteria scoring system used to map into the appropriate industry table, (ii) the level of granularity used to assign credibility factors, (iii) the industry table to which the experience is blended, and (iv) the time period over which the blending occurs. In addition, mortality improvement is not allowed as part of the projected mortality. Overall, the increase in modeled reserves for term insurance is 216% (DR), for ULSG is 57% (DR) and 40% (SR), and for WL is 56% (DR) and 49% (SR). While there are a number of margins embedded in the VM-20 mortality assumptions, the credibility blending process as a whole appears to be particularly significant. See Figure 20 detail for more information on Phase 2 mortality sensitivities.

Reinvestment assumptions

The Impact Study confirms that the asset reinvestment parameters within VM-20 need careful consideration. Two reinvestment alternatives were tested. In the ULSG product type where modeled reserves prevailed as minimum reserves, Alternative 1 (Alt 1) produced minimum reserves ranging from 111% (Exhibit 12 in appendices) to 153% (Exhibit 13 in appendices) of Alt 2 minimum reserves. Besides producing larger modeled reserves, Alt 1 has limitations with respect to modeling processes, because default costs are embedded in the prescribed spread formula.

In any principle-based methodology, volatility in reserves from one period to the next is a concern. VM-20 is no exception. Phase 2 Sensitivity 4 results clearly indicate greater volatility in reserves emerging with period-to-period changes in the valuation date yield curve as opposed to changes to the mean reversion rate parameter of the scenario generator (Sensitivity 5). If interest rates have moved down from the prior reporting period, reserves will increase, while asset book values remain unchanged. Conversely, if interest rates have moved up from the prior reporting period, reserves will decrease. Changes to reserves that are due to changes in the mean reversion target are smaller in comparison. For example, choosing the SR for ULSG as a sample data point, the SR increases 13% on average assuming a 100-basis-point drop in initial yield curve rates and increases 6% on average assuming a 100-basis-point drop in the scenario generator's mean reversion parameter. The new statutory requirements would benefit from a careful balancing of the short-term economic environment and the long-term economic expectations. See Figures 23 and 24 for detailed results for these two sensitivities.

Margins

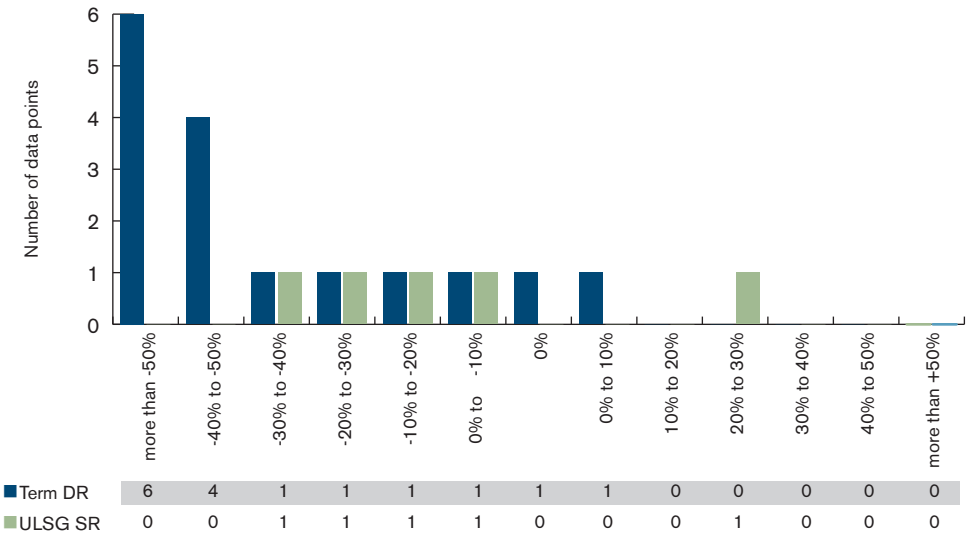
This topic encompasses two concerns: first the requirement for explicit margins on each risk factor that is not stochastically modeled or prescribed and, second, margins implicit in the components of VM-20 requirements that are not at the judgment of the company.

Explicit margins are quantified in Phase 2 Sensitivity 1.5a, which calls for the modeled reserves to be calculated without explicit margins. For companies participating in Phase 2, removing explicit margins reduces DR on average 117%[2] for term and reduces SR on average 11% for ULSG (Figure 21). Within these averages are individual company results that vary widely. For example, a term company reports no impact to the DR for the aggregated term block if calculated without explicit margins, implying offsetting correlations among the various level term period policies. On the other hand, a ULSG company reports a 30% reduction to the SR if explicit margins are omitted. Yet another ULSG company reports an increase to the modeled SR if all explicit margins are removed. They attribute this result to the fact that, once

[2] 45% reduction if one extreme outlier is ignored.

removed, the absence of the mortality margin changes the balance of the yearly renewable term (YRT) reinsurance cash flows from a net benefit (as it is with the margins) to a net cost. Figure 3 is a histogram of the 21 data points available from Sensitivity 1.5a, which provides the modeled reserve without explicit VM-20 margins. Appendix F provides more context and detail for this sensitivity.

FIGURE 3: IMPACT OF REMOVING EXPLICIT MARGINS, PERCENTAGE CHANGE IN RESERVE



With respect to implicit margins, the following elements of the VM-20 requirements may be considered implicit margins:

- The deterministic economic scenario. This scenario is built using uniform downward shocks each month for 20 years, sufficient to eventually get down to the 80th percentile on the distribution of 20-year shocks. After 20 years, the shocks are at a level that maintains the cumulative shock at the 80th percentile. This is in contrast to the baseline scenario[3] where all shocks are zero.
- The CTE70 measurement for stochastic reserves has built-in conservatism in the methodology as well as the choice of CTE70 rather than a lower CTE metric.
- The discount rate for the scenario reserves, which is required to be 105% of the 1-year U.S. Treasury rate over the scenario.

[3] The baseline scenario as used in the stochastic exclusion test.

- No recognition of mortality improvement. Figure 20 shows that ignoring mortality improvement increases the DR 87% on average for term blocks and 8% on average for ULSG blocks.

- Credibility blending as a method for developing the mortality assumption as well as using the 2008 VBT as the industry table. The implication of these implicit margins is discussed above in the Mortality section.

- The mean reversion parameter in the economic scenario generator process and in particular the speed of reversion. Figure 24 indicates fluctuations of -2% to 7% for term DR and -5% to 6% for ULSG SR for plus 100-basis-point and minus 100-basis-point changes in the mean reversion parameter of the scenario generator. Contrast this with the result from Figure 23, which shows relatively greater percentage fluctuations of -8% to 7% for term DR and -10% to 13% for ULSG SR when the initial yield curve is increased 100 basis points or reduced 100 basis points, respectively.

Each of these implicit margins provides an additional layer of conservatism to the final result, which already reflects the conservatism of the explicit margins.

PHASE 1

OVERVIEW

This section provides a high-level overview of the Phase 1 results by line of business. The detail for each insurance block submission is found in numbered exhibits in appendices A through E. Any particular company's situation can only be fully understood by careful review of the complete Phase 1 analysis, found in these appendices.

Term insurance is presented first, followed by universal life with secondary guarantee (ULSG), whole life (WL), universal life without secondary guarantee (UL), and variable universal life (VUL). If a participating company contributed data on more than one product type, each type is presented independently. The following list describes the items captured in the Phase 1 exhibits of this section.

SR per $1,000	Stochastic reserve (SR) per $1,000 of direct insurance amount. A cash flow model-based reserve calculated as a CTE70 of a distribution of scenario reserves.
DR per $1,000	Deterministic reserve (DR) per $1,000 of direct insurance amount. A cash flow model-based reserve calculated as the present value of net cash flows.[4]
NPR per $1,000	Net premium reserve (NPR) per $1,000 of direct insurance amount. The NPR is floored at the greater of the policy's cash value and the cost of insurance to the next paid-to date (for non-fund-based policies) or the next processing date (for fund-based policies).
VM-20 Minimum	VM-20 Section 2 minimum reserve per $1,000 of direct insurance amount. This amount depends on the outcome of the exclusion tests.
Current Formulaic per $1,000	Current statutory reserve per $1,000 of direct insurance amount the company is holding on the policies being modeled, including basic and deficiency reserves.
Stochastic Exclusion Test (SET)	This is the SET ratio as defined by VM-20 Section 6B. Unless noted otherwise, this ratio is presented on a net of reinsurance basis. For term insurance, this ratio is presented as the highest ratio produced by either the level term period only, or the entire lifetime period. A ratio less than 4.5% means the stochastic reserve need not be calculated for the group of policies.
Deterministic Exclusion Test (DET)	This test compares the sum of guaranteed gross premiums to the sum of net premiums. A group of policies pass this test if guaranteed gross premiums exceed the net premiums. This test is currently defined only on a direct insurance basis. Some contributing companies chose to produce DET results on a net of reinsurance basis by reducing the gross premiums by reinsurance gross premiums and by reducing the valuation net premiums by the reinsurance net premiums.

[4] All cash flow calculations in VM-20 requirements are pre-tax.

1-year Block, 5-year Block	In Phase 1, results are generated for two population files. The 1-year block includes policies issued during the 12 months preceding the December 31, 2009, valuation date. The 5-year block includes policies issued during the five years preceding the valuation date. As part of Phase 2, these populations may be extended to include a 10-year and 15-year issue block.
Alternative 1, Alternative 2	Credit spread alternative definitions contemplated by the VM-20 exposure draft. Both are explained in more detail in the glossary. These two approaches are abbreviated as Alt 1 and Alt 2.
Gross OAS	Option-adjusted spread over Treasuries in basis points implied by the market value on the valuation date.
Net OAS	Option-adjusted spread over Treasuries in basis points implied in market value net of default costs on the valuation date.
WAL	Weighted average life of the asset portfolio.

The format used to summarize a company's submission in each exhibit is explained below:

i. **Exhibit number**: Followed by a brief description of the product type.

ii. **Exclusion test panel**: Results of SET and DET.

iii. **Phase 1 amounts per $1,000 of direct face amount**: Includes SR, DR, NPR, and VM-20 minimum reserve for direct and net of reinsurance over reinvestment strategies Alt 1 and Alt 2. The minimum reserve considers the outcome of the exclusion tests.

iv. **Phase 1 ratios to current**: VM-20 minimum reserve compared to the current formulaic reserve on a direct and net of reinsurance basis.

v. **Fixed income starting assets**: Provides the gross option-adjusted spread, assumed default cost in basis points, the net option-adjusted spread, and the weighted average life of the assets included in the starting assets.

vi. **Starting assets to modeled reserve**: The ratio of book value of starting assets to DR and SR amounts, where applicable.

vii. **Discussion**: The discussion box includes observations and comments from the contributing company about the results. It may include additional charts and graphs, as available, to illustrate these points.

SUBMISSIONS BY LINE OF BUSINESS

Term insurance

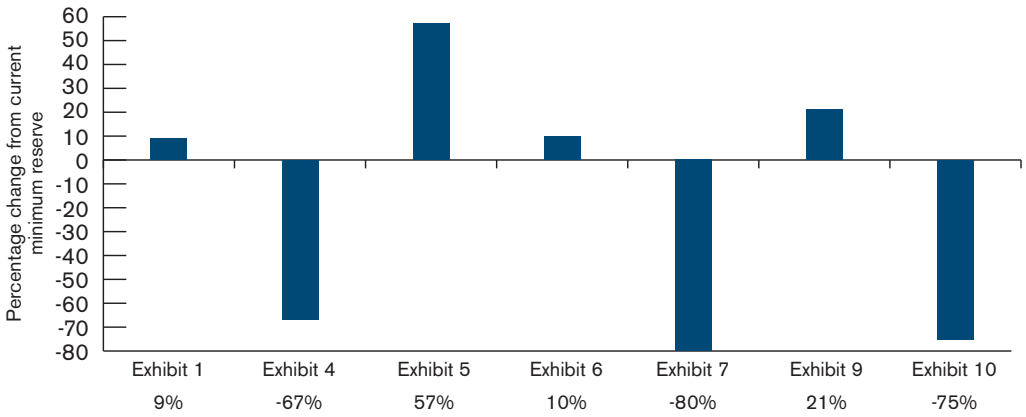
Ten blocks of term insurance results were submitted in response to the ACLI data call. Exhibits 1-10 in Appendix A display the details of term insurance results. Companies varied in how these term blocks were tested. Some considered each level term period independently, some considered all level term periods in aggregate, and others submitted data both ways. For the majority of term insurance blocks, the exclusion tests are satisfied, the minimum reserve under VM-20 is most frequently the NPR, and the VM-20 minimum reserve is lower than current statutory reserve amounts. There are exceptions, however, and these exceptions are each unique.

The table in Figure 5 summarizes the Phase 1 reserve outcomes. The table in Figure 6 summarizes information collected regarding starting assets.

Observations made regarding the term insurance Phase 1 results include the following:

- Longer level premium term periods are less likely to pass the SET than the shorter level premium term periods.
- When calculating the SET ratio, material amounts of YRT reinsurance can produce non-intuitive results, because the numerator and denominator of the ratio do not both change in proportion to the amount reinsured (Exhibit 4 in appendices).
- When the block fails the DET, it is most likely over the level premium period, not the lifetime period.
- VM-20 does not have a technical definition for implementing the DET test on a net-of-reinsurance basis, but two term companies have calculated this exclusion test on a net-of-reinsurance basis (Exhibits 1 and 2 in appendices).
- Reinsurance reserve credits can be higher or lower than current formulaic.
- For submissions with asset information, the average gross option-adjusted spread on starting assets (assets selected to support the liability cash flows) is 171 basis points with 39 basis points default cost, resulting in approximately a 130 basis points net option-adjusted spread. The weighted average life of the portfolio is approximately 15 years (Figure 6).
- When compared to current formulaic minimums, the change introduced by VM-20 requirements varies widely across companies. For example, within aggregate blocks (blocks that include more than one level premium term period) of term insurance with five years of issues in the block, this variation ranges from a 57% increase (Exhibit 5 in appendices, 5-year issue block) to an 80% decrease (Exhibit 7 in appendices, 5-year issue block). These extremes for the 5-year issue blocks are shown in Figure 4 on page 13.

FIGURE 4: AGGREGATE TERM BLOCKS (5-YEAR ISSUE BLOCK, ALT 2)



- The mode of reinsurance premium payments can result in a negative net-of-reinsurance reserve amount, similar to current minimum standards.

- As a present value of cash flows method, the modeled DR is structured much differently than the NPR or a GAAP reserve, particularly in the early policy years. Many of the term insurance exhibits show negative DR amounts, particularly if the company's anticipated experience is deemed to have high credibility. In this situation, the early-year DRs reflect the future profitability inherent in the block, whereas the NPR follows a calculation method that depends on a level net premium and GAAP reserves follow a calculation method that spreads profits over the period during which premiums are received. These differences may drive the DR well below comparable commissioner's reserve valuation method (CRVM) or GAAP reserves, particularly in the early policy years.

FIGURE 5: TERM INSURANCE (ALT 2) NET OF REINSURANCE WHERE APPLICABLE

		1-YEAR ISSUE BLOCK			5-YEAR ISSUE BLOCK		
EXHIBIT	BLOCK	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT
1	10T	3.86	NPR	123%	4.01	NPR	-31%
1	20T	1.88	NPR	-38%	4.15	NPR	-55%
1	30T	4.52	SR	47%	10.11	SR	15%
1	AGGR	2.79	SR	1%	8.99	SR	9%
2	10T	0.46	NPR	-16%	1.94	NPR	-3%
2	20T	0.42	NPR	-47%	3.07	NPR	-37%
2	30T	0.26	NPR	-88%	2.34	NPR	-62%
3	20T	0.39	NPR	-75%	2.33	NPR	-66%
4	10T	0.27	NPR	138%	1.86	NPR	-35%
4	20T	0.12	NPR	-96%	3.08	DR	-57%
4	30T	0.89	DR	-86%	3.56	DR	-62%
4	AGGR	0.15	NPR	-95%	2.09	DR	-67%
5	AGGR	0.64	NPR	-60%	(1.09)	NPR	57%
6	AGGR	5.16	DR	38%	7.18	DR	10%
7	10T				3.10	NPR	-60%
7	15T				2.52	NPR	-66%
7	20T				1.93	NPR	-69%
7	30T				1.97	SR	-73%
7	15R[5]				9.87	SR	-64%
7	20R[5]				5.73	SR	-55%
7	30R[5]				3.12	SR	-63%
7	AGGR				1.97	NPR	-80%
8	10T	0.00	NPR	-100%	0.19	NPR	-94%
8	20T	0.00	NPR	-100%	0.78	NPR	-80%
9	AGGR	5.87	DR	88%	7.59	DR	21%
10	10T	0.73	NPR	-70%	1.52	NPR	-71%
10	15T	0.61	NPR	-72%	2.43	NPR	-67%
10	20T	0.41	NPR	-86%	1.98	NPR	-72%
10	30T	0.29	NPR	-94%	1.64	NPR	-82%
10	AGGR	0.47	NPR	-85%	1.84	NPR	-75%

FIGURE 6: TERM INSURANCE STARTING ASSET DATA (IN BASIS POINTS)

EXHIBIT	GROSS OAS	DEFAULT CHARGE	NET OAS	WAL
1	203	86	117	12
2	164	25	135	18
3	155	50	109	14
4	– NOT PROVIDED –			
5	180	– NOT PROVIDED –		14
6 (1-YEAR)	161	35	127	22
6 (5-YEAR)	211	31	180	14
7	165	30	135	6
8	– NOT PROVIDED –			
9 (ALT 2)	133	17	108	18
10	– NOT PROVIDED –			
AVERAGE	171	39	130	15

[5] *R* in this schedule implies a term product with return of premium.

Universal life with secondary guarantee insurance

Nine blocks of ULSG insurance were submitted in response to the ACLI data call. Exhibits 11-19 in Appendix B display the details of ULSG results. Many of these blocks have the mortality risk reinsured using YRT arrangements. The characteristics of the product types are outlined in the table in Figure 7.

FIGURE 7: ULSG

EXHIBIT	SECONDARY GUARANTEE STRUCTURE
11	LIFETIME GUARANTEE; TWO SHADOW ACCOUNTS
12	SPECIFIED PREMIUM TEST
13	TERM UL; SHADOW ACCOUNT WITH MULTIPLE CHARGE/INTEREST CREDIT STRUCTURES DEPENDING ON PAYMENT LEVEL
14	LIFETIME GUARANTEE: SINGLE SHADOW ACCOUNT
15	LIFETIME GUARANTEE; MULTIPLE SHADOW ACCOUNTS
16	LIFETIME GUARANTEE; MULTIPLE SHADOW ACCOUNTS
17	LIFETIME GUARANTEE; SHADOW ACCOUNT WITH DUAL COST OF INSURANCE STRUCTURE
18	LIFETIME GUARANTEE: SINGLE SHADOW ACCOUNT
19	MINIMUM PREMIUM FOR 10 YEARS, FOLLOWED BY LAPSE PROTECTION VALUE FOR LIFETIME; SINGLE SHADOW ACCOUNT WITH DUAL COST OF INSURANCE STRUCTURE

The table in Figure 8 on page 16 summarizes the VM-20 minimum reserve result for Alt 2 on a net-of-reinsurance basis. For all nine exhibits, the 1-year and 5-year issue blocks fail the SET. In this situation, VM-20 requires calculation of all three components (SR, DR, and NPR). The table in Figure 8 on page 16 depicts only a portion of the total picture. Comprehensive detail can be found in the exhibits in Appendix B.

Observations regarding the ULSG Phase 1 results include the following:

- The ULSG blocks are very sensitive to the modeled reinvestment parameters. For example, Exhibit 11 in the appendices shows a 35% increase over current reserves for the 5-year issue block under Alt 2, and a 68% increase under Alt 1. In another example, Exhibit 17 in the appendices shows an 11% decrease under VM-20 for Alt 2, and a 6% increase under VM-20 using Alt 1.

- These blocks are also influenced by the modeling of reinsurance cash flows. In all cases where a modeled reserve serves as the minimum reserve, the reinsurance reserve credit far exceeds the current reinsurance reserve credit using CRVM minimums. The reason for this stems from the mortality assumption development process required by VM-20 (credibility blending, with margin) and the reinsurance treaty premium levels. Most companies did not increase the treaty premiums because they view these premiums as consistent with mortality expectations and do not anticipate the reinsurer moving away from the stated treaty premium rate schedule. As a result, the modeled reinsurance cash flows emerge as a net cash flow benefit to the model because modeled mortality exceeds YRT reinsurance premium amounts. Even the companies that did include an appropriate margin on reinsurance premiums realize a net benefit to their YRT reinsurance arrangement.

- Product design plays a significant role in the outcome of VM-20 minimum reserves. The table in Figure 8 on page 16 provides detail supporting these observations.

  — The products with less sophisticated no-lapse guarantee design (Exhibit 12 in the appendices, specified premium test, and Exhibit 14 in the appendices, single shadow account) demonstrate reserve reductions under VM-20. Exhibit 18 in the appendices is contrary to this conclusion, but the company has commented on the conservatism of its model assumptions and its surprise at the modeled outcome in relation to current minimum standards.

  — Products with sophisticated no-lapse guarantee design (Exhibits 11, 13, 15, and 16 in appendices) demonstrate reserve increases over current. Here too there are submissions that fall outside this tidy

conclusion. Exhibits 17 and 19 in the appendices categorize themselves as having a single shadow account with dual cost of insurance (COI) structure and demonstrate reserve reductions, albeit dependent upon the reinvestment alternative (Alt 1 shows increases for these two submissions).

- There remain issues with the NPR methodology.
  - As currently defined, the NPR for fund-based products was difficult for companies to calculate. For some, these difficulties precluded them from submitting the NPR in Phase 1 until much later in the Study timeline.
  - It becomes apparent that the NPR needs to be more comprehensive in its definition in order to accommodate the variety of ULSG designs that exist in the marketplace today.
  - If the NPR is considered the federally prescribed tax reserve, there is a potentially significant loss in deductible tax reserve inherent in the current definitions of NPR and the VM-20 minimum reserve. Specifically, any time the DR or SR prevails as the minimum reserve, there will be a deductible reserve (i.e., NPR) less than this amount.
- Operational issues also emerge in the process of generating the various components of VM-20.
  - The 98%-102% collar on starting asset amounts for modeled reserves can be incredibly troublesome. Many participating companies commented on the difficulty of iterating to an allowable starting asset amount. With respect to the SR, the problem stems from having a discount rate (1.05 times the 1-year U.S. Treasury rate over the scenario path) that is disconnected from the earnings rate of the subject business. The iteration process truly becomes test-guess-retest.
  - With respect to the DR, if the purpose of the starting asset amount is to support the projected liability cash flows without an ending redundancy (ending positive asset amount), then requiring a starting asset amount within 2% of the final, modeled DR may not be the correct amount at all. Many submitting companies overlooked this 2% collar requirement for the DR, as evidenced by the starting asset ratios in the exhibits. At least one company noted that, when complying with the 2% collar requirement, the DR produces overly excessive asset amounts at the end of the projection.
  - Run-time and resources are consistently mentioned by participating companies when asked about the difficulties encountered during the Study. This is particularly true for the ULSG product type, which is due to the SR calculations.

FIGURE 8: ULSG (ALT 2) NET OF REINSURANCE

		1-YEAR ISSUE BLOCK			5-YEAR ISSUE BLOCK		
EXHIBIT	BLOCK	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT
11	2 SHADOW ACCOUNTS	93.51	SR	27%	122.01	SR	35%
12	SPECIFIED PREMIUM	56.88	SR	-22%	71.42	SR	-26%
13	TERM UL	3.57	DR	257%	5.87	DR	249%
14	1 SHADOW ACCOUNT	37.79	NPR	-41%	65.64	NPR	-43%
15	MULTIPLE SHADOW ACCOUNTS	56.08	NPR	19%	101.58	NPR	19%
16	MULTIPLE SHADOW ACCOUNTS	93.31	DR	0%	127.40	DR	7%
17	DUAL COI SHADOW ACCOUNT	23.91	SR	-2%	43.79	SR	-11%
18	1 SHADOW ACCOUNT	102.12	SR	90%	141.90	SR	40%
19	DUAL COI SHADOW ACCOUNT	74.45	SR	11%	119.19	SR	-19%

The table in Figure 9 demonstrates the yield characteristics of the starting assets for these models. Comparing the data in Figure 9 back to the same table of information for term insurance, ULSG models use a starting asset base with higher yield and longer weighted average life.

FIGURE 9: ULSG STARTING ASSET DATA (IN BASIS POINTS)

EXHIBIT	GROSS OAS	DEFAULT CHARGE	NET OAS	WAL
11	297	31	175	8
12	209	32	177	20
13	– NOT PROVIDED –			
14	– NOT PROVIDED –			
15	195	28	167	28
16	223	19	204	25
17	– NOT PROVIDED –			
18	223	25	198	20
19	133	17	108	18
AVERAGE	213	25	172	20

The VM-20 minimum reserve per $1,000 is also influenced by the modeling of reinsurance cash flows. Calibrating VM-20 net and direct reserves to current formulaic net and direct reserves presents a very different picture for the per-$1,000 reinsurance reserve credit. In the table in Figure 10, Exhibits 11, 15, 16, and 19 are examples of the impact on modeled reserves when cash flows are projected with a VM-20 mortality assumption together with reinsurance treaty premiums that are developed with consideration for the company's expected mortality experience.

FIGURE 10: ULSG (ALT 2) DEMONSTRATION OF IMPACT OF REINSURANCE, 5-YEAR ISSUE BLOCK

	VM-20			CURRENT FORMULAIC		
EXHIBIT	DIRECT	NET	RESERVE CREDIT	DIRECT	NET	RESERVE CREDIT
11	149.42	122.01	27.41	91.92	90.32	1.60
12	71.80	71.42	0.38	96.82	96.76	0.06
13	DIRECT NOT PROVIDED			DIRECT NOT PROVIDED		
14	66.02	65.64	0.38	118.30	115.70	2.60
15	112.50	101.58	10.92	85.89	85.60	0.29
16	134.72	127.40	7.32	120.18	119.00	1.18
17	43.79	43.79	0.00	49.42	49.42	0.00
18	NO REINSURANCE			NO REINSURANCE		
19	127.68	119.19	8.49	148.31	148.06	0.25

Whole life insurance

Six blocks of whole life insurance were submitted in response to the ACLI data call. Exhibits 20-25 in Appendix C display the details of whole life results. The characteristics of the product types are outlined in the table in Figure 11.

FIGURE 11: WHOLE LIFE

EXHIBIT	BLOCK CHARACTERISTICS
20	SIMPLIFIED ISSUE WHOLE LIFE WITH SUPPLEMENTARY ACCIDENTAL DEATH BENEFITS WHICH ARE REINSURED
21	TRADITIONAL PARTICIPATING WHOLE LIFE; NO REINSURANCE
22	TRADITIONAL PARTICIPATING WHOLE LIFE INSURANCE WITH YRT REINSURANCE IN FORCE
23	TRADITIONAL PARTICIPATING WHOLE LIFE INSURANCE; NO REINSURANCE IN FORCE
24	FINAL EXPENSE WHOLE LIFE MARKETED USING SIMPLIFIED AND GUARANTEED ISSUE PROGRAMS; NO REINSURANCE IN FORCE.
25	TRADITIONAL PARTICIPATING WHOLE LIFE; NO REINSURANCE

For whole life, VM-20 defines the NPR as equivalent to current formulaic minimums. Five of the six submissions passed both exclusion tests and, for these five, VM-20 minimum reserves are equal to current formulaic minimum reserves.

Exhibit 20: Exclusion test panel: Pass for 1-, 5-, 10-, and 15-year issue blocks
SR: not provided
DR: not provided

Exhibit 21: Exclusion test panel: Pass for 1- and 5-year issue blocks
SR: not provided
DR: shown to be less than NPR

Exhibit 22: Exclusion test panel: Pass for 1-, 5-, 10-, and 15-year issue blocks
SR: shown to be less than NPR for 1-, 5-, 10-, and 15-year issue blocks
DR: shown to be less than NPR for 1-, 5-, 10-, and 15-year issue blocks

Exhibit 23: Exclusion test panel: Pass for 1-, 5-, 10-, and 15-year issue blocks
SR: not provided
DR: not provided

Exhibit 24: Exclusion test panel: Fail SET
SR: shown to be the minimum reserve

Exhibit 25: Exclusion test panel: Pass for 1- and 5-year issue blocks
SR: shown to be less than NPR
DR: shown to be less than NPR

The company providing the data in Exhibit 24 reviewed the initial SET result and determined the primary driver of the failing result as a simplified reinvestment asset assumption. Retesting the SET with more emphasis on a realistic asset type and credit quality produced a result that passed for all but the 1-year issue block, Alt 1. The company did not rerun the Phase 1 analysis. Of the six submissions this is the only one with VM-20 minimum reserves in excess of current formulaic reserves. For all others there is no change from current statutory minimum amounts. Exhibit 24 is also the only final expense type whole life insurance. In their testing, the company uses the 1980 VBT as the industry mortality table. This company's credibility is determined as 26% using the limited fluctuation method. As a result of the credibility blending, the mortality assumption used in the Study is considerably higher than company experience. The table in Figure 12 on page 19 summarizes the Study results by exhibit.

One company determined the NPR according to VM-20 Section 3 (Exhibit 22 in appendices). Section 3 produces a reserve that is 35% of current formulaic minimums for the 1-year issue block and 80% of current formulaic minimums for the 5-year issue block. This company also produced the full complement of VM-20 reserve components for 1-, 5-, 10-, and 15-year issue blocks. In each, the modeled components are shown to be less than the NPR, consistent with the indicators of the exclusion tests.

FIGURE 12: WHOLE LIFE (ALT 2) NET OF REINSURANCE

	1-YEAR ISSUE BLOCK			5-YEAR ISSUE BLOCK		
EXHIBIT	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT
20	0.27	NPR	0%	9.30	NPR	0%
21	0.97	NPR	0%	18.89	NPR	0%
22	2.20	NPR	0%	28.01	NPR	0%
23	2.02	NPR	0%	20.08	NPR	0%
24	17.22	SR	235%	57.20	SR	5%
25	1.28	NPR	0%	22.05	NPR	0%

The table in Figure 13 summarizes the reported yield characteristics of the starting assets for these models. Comparing the data in Figure 13 back to the same table of information for term insurance and ULSG, whole life has a lower net spread and shorter weighted average life than either of these other lines of business, for the portfolios used in this testing.

FIGURE 13: WHOLE LIFE STARTING ASSET DATA (IN BASIS POINTS)

EXHIBIT	GROSS OAS	DEFAULT CHARGE	NET OAS	WAL
20	164	25	135	18
21	153	36	117	9
22	160	52	126	15
23	– NOT PROVIDED –			
24	108	2	95	8
25	– NOT PROVIDED –			
AVERAGE	146	29	118	12

Universal life insurance

Two blocks of universal life insurance (UL) were submitted in response to the ACLI data call. Exhibits 26 and 27 in Appendix D display the details of UL results. The characteristics of the product types are outlined in the table in Figure 14. The UL products include no secondary guarantee provisions, but do include non-guaranteed elements of interest, cost of insurance charges, and expense loads.

FIGURE 14: UNIVERSAL LIFE

EXHIBIT	BLOCK CHARACTERISTICS
26	CURRENT ASSUMPTION UNIVERSAL LIFE WITH CASH VALUE ENHANCEMENT PROVISION
27	CURRENT ASSUMPTION UNIVERSAL LIFE

For universal life policies without secondary guarantees, Section 3 of VM-20 defines the NPR as equivalent to current formulaic minimums. Both of the UL submissions passed both exclusion tests and, as a result, VM-20 minimum reserves are equal to NPR or current formulaic reserves. In practice, these companies would not be required to calculate the DR or SR, but for the Study they did provide some of these components.

Exhibit 26: Exclusion test panel: Pass for 1- and 5-year issue blocks
SR: shown to be less than NPR
DR: shown to be less than NPR

Exhibit 27: Exclusion test panel: Pass for 1-, 5-, 10-, and 15-year issue blocks
SR: not provided
DR: shown to be less than NPR for 1- and 5-year blocks, greater than NPR for 10- and 15-year blocks

One company (Exhibit 27) determined the NPR according to VM-20 Section 3, obtaining reserves very similar to the current formulaic approach. The table in Figure 15 summarizes the Study results by exhibit.

FIGURE 15: UNIVERSAL LIFE (ALT 2) NET OF REINSURANCE

	1-YEAR ISSUE BLOCK			5-YEAR ISSUE BLOCK		
EXHIBIT	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT
26	125.05	NPR	0%	202.71	NPR	0%
27	8.96	NPR	0%	30.67	NPR	0%

The data provided in Exhibit 27 provides insight into this company's projected reserves under three method types: DR, Net GAAP, and current formulaic (NPR). It is interesting to note that the level premium methods (Net GAAP and NPR) have similar slopes, while the DR method produces a steeper slope. As a result, the DR reserves ultimately exceed the NPR reserves beginning with the 10-year issue block.

The table in Figure 16 summarizes the reported yield characteristics of the starting assets for these models. Comparing the data in Figure 16 back to the same table of information for whole life insurance in Figure 13, UL and whole life have similar net option-adjusted spreads and weighted average life for the portfolios used in this testing.

FIGURE 16: UNIVERSAL LIFE STARTING ASSET DATA (IN BASIS POINTS)

EXHIBIT	GROSS OAS	DEFAULT CHARGE	NET OAS	WAL
26, 1-YEAR ISSUE BLOCK	210	50	143	13
26, 5-YEAR ISSUE BLOCK	210	49	144	11
27, 1-YEAR ISSUE BLOCK	134	40	94	12
27, 5-YEAR ISSUE BLOCK	134	45	89	12
AVERAGE	172	46	118	12

Variable universal life insurance

Three blocks of variable universal life insurance (VUL) were submitted in response to the ACLI data call. Exhibits 28, 29, and 30 in Appendix E display the details of VUL results. The characteristics of the product types are outlined in the table in Figure 17. The VUL products include non-guaranteed elements of interest, cost of insurance charges, and expense loads.

FIGURE 17: VARIABLE UNIVERSAL LIFE

EXHIBIT	BLOCK CHARACTERISTICS
28	VUL WITH DEATH BENEFIT GUARANTEE
29	VUL, NO SECONDARY GUARANTEE PROVISIONS
30	VUL, NO SECONDARY GUARANTEE PROVISIONS

For VUL policies without secondary guarantees, Section 3 of VM-20 defines the NPR as equivalent to current formulaic minimums. All three contributing companies interpreted the NPR as equivalent to current formulaic reserves. Each of the exhibits portrays a different outcome with respect to the exclusion tests and the VM-20 minimum reserve.

Exhibit 28: Exclusion test panel: Fail SET
Minimum reserve: NPR or DR depending on issue block

Exhibit 29: Exclusion test panel: Fail SET
Minimum reserve: NPR (1-, 5-, 10-, and 15-year)

Exhibit 30: Exclusion test panel: Pass SET
SR is the greatest component for all but the 1-year issue block, Alt 2
Minimum reserve: NPR (1-, 5-, 10-, and 15-year)

The table in Figure 18 summarizes the Study results by exhibit.

FIGURE 18: VARIABLE UNIVERSAL LIFE (ALT 2) NET OF REINSURANCE

	1-YEAR ISSUE BLOCK			5-YEAR ISSUE BLOCK		
EXHIBIT	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT
28	10.42	NPR	0%	15.54	NPR	0%
29	3.81	NPR	0%	63.62	NPR	0%
30	29.54	NPR	0%	47.47	NPR	0%

	10-YEAR ISSUE BLOCK			15-YEAR ISSUE BLOCK		
EXHIBIT	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT	VM-20 MIN RES PER $1,000	TYPE	% INCREASE OVER CURRENT
28	23.18	DR	24%	31.78	DR	34%
29	210.95	NPR	0%	452.11	NPR	0%
30	NOT PROVIDED			NOT PROVIDED		

Exhibit 28 (with a death benefit guarantee) can be called the most intuitive outcome in that it fails the SET, and produces minimum reserves in excess of the NPR floor for blocks with later duration policies.

Exhibit 29 (no secondary guarantee) fails the SET and produces no modeled reserve amounts greater than the NPR floor. It is likely this company would not use the SET ratio test, but rather opt for an alternative stochastic exclusion test demonstration.

Exhibit 30 (no secondary guarantee) passes the SET yet technically can hold the NPR floor as the minimum reserve even though the calculated SR is greater than this floor. A review of this case study reveals that aggressive equity returns in certain of the 1,000 scenarios provided by the Impact Study puts the policies into a cash value corridor position. Cost of insurance charge spreads, which ultimately turn negative, are exacerbated by the increased net amount at risk, producing an extreme tail situation that influences the CTE70 (SR) result. This combination of events does not appear to be captured by the SET scenarios, thus the passing exclusion test panel. Details on this case study are found in Appendix E.

None of the companies reported yield characteristics of the starting assets for these models. In two of the three, starting assets of a negative amount were used.

PHASE 2

OVERVIEW

Phase 2 of the Impact Study included a series of sensitivities performed using the 5-year issue block and reinvestment Alternative 2 (Alt 2). A brief explanation of each sensitivity and a summary of the corresponding testing results follow. Phase 2 results are measured as a percentage change from the comparable modeled reserve (DR or SR) from Phase 1, with one exception being Sensitivity 1. For example, the percentage changes are determined as either:

$$[DR^{Sensitivity\ N} \div DR^{Phase\ 1}] - 1$$

or

$$[SR^{Sensitivity\ N} \div SR^{Phase\ 1}] - 1$$

with appropriate adjustments when both reserves are negative or when one reserve is negative, one positive. Averages across submissions are simple averages, not weighted by insurance amount. For each submission, the detail for Phase 2 is included in tables found in Appendix F.

Sensitivities were assigned a priority order in the Study: Sensitivities 1-5 are high priority, Sensitivities 6-12 are medium, and Sensitivities 13-17 are low. Each company was requested to perform as many sensitivity tests as possible. The number and content of Phase 2 submissions to the ACLI analysis are limited to the following, by line of business, shown in the table in Figure 19.

FIGURE 19: PHASE 2 SUBMISSIONS

LINE OF BUSINESS	PHASE 2 SUBMISSIONS TO ACLI
TERM	9, SOME INCLUDING PARTIAL DATA
ULSG	5, SOME INCLUDING PARTIAL DATA
VUL	2, BOTH ARE PARTIAL
WHOLE LIFE	2, ONE SUBMITTING DATA, THE OTHER DEMONSTRATING SET RESULTS
UL	1, PARTIAL DATA

Sensitivity 1: Mortality attribution

This is a multi-level sensitivity. The attribution starts with Sensitivity 1a, which is a deterministic reserve using a best-estimate mortality assumption.[6] Progressive steps add layers of conservatism. The conservatism in the VM-20 mortality assumption requirements are quantified by comparing each step in the attribution back to the first step, best estimate. Step 1b removes mortality improvement, if applicable. Step 1c includes the explicit VM-20 mortality margin. Step 1d adopts the credibility-blending approach to mortality rates, with a total company view of credibility. Total company view implies using an entire block of policies with similar underwriting methods to define a credibility segment in determining its credibility factor. Step 1e is a more granular approach to credibility whereby the credibility factor is determined at whatever underwriting class, gender, or smoking status level is applicable for the block being tested. In theory, Step 1e should equate to the Phase 1 result. Most participating companies performed Sensitivity 1 as just described. The instructions, however, were revised midway through the Study and, as a result, some companies submitted Sensitivity 1 in line with the original instructions, which did not focus on mortality alone. Only results consistent with the mortality attribution instructions, as revised, are included in the table in Figure 20 on page 24.

[6] Including mortality improvement, if applicable, and omitting explicit margins.

FIGURE 20: SENSITIVITY 1: MORTALITY ATTRIBUTION

CHANGE AS PERCENT OF BEST ESTIMATE

STEP	DESCRIPTION	TERM DR	ULSG DR	ULSG SR	WL DR	WL SR	UL DR	UL SR	VUL DR	VUL SR
1A	BEST ESTIMATE	0%	0%	0%	0%	0%	–	–	0%	0%
1B	REMOVE IMPROVEMENT	87%	8%	6%	–	–	–	–	–	–
1C	INCLUDE EXPLICIT MARGIN	131%	13%	10%	12%	10%	–	–	-1%	1%
1D	TOTAL COMPANY CREDIBILITY	190%	43%	33%	37%	30%	–	–	–	–
1E	GRANULAR CREDIBILITY	216%	57%	40%	56%	49%	–	–	-2%	4%

ATTRIBUTION[7]

STEP	DESCRIPTION	TERM DR	ULSG DR	ULSG SR	WL DR	WL SR	UL DR	UL SR	VUL DR	VUL SR
1A	BEST ESTIMATE	0%	0%	0%	0%	0%	–	–	0%	0%
1B	REMOVE IMPROVEMENT	87%	8%	6%	–	–	–	–	–	–
1C	INCLUDE EXPLICIT MARGIN	44%	5%	4%	12%	10%	–	–	-1%	1%
1D	TOTAL COMPANY CREDIBILITY	59%	30%	23%	25%	20%	–	–	–	–
1E	GRANULAR CREDIBILITY	26%	14%	7%	19%	19%	–	–	-1%	3%

While the attribution suggests the explicit mortality margin may be reasonable (though quite high for term insurance), the implicit margin introduced by the requirement of credibility blending to an industry table (2008 VBT) is clearly excessive, even if evaluated at a total company level.

- Not surprisingly, term policies react with significantly more movement in the DR than do permanent products when underlying mortality rates change.
- Each ULSG company in the Phase 2 data has reinsurance cash flows in the model, which are running through as a net benefit. Therefore, the mortality attribution is affected by this condition. With each more conservative step in the attribution, the reinsurance cash flows become more of a benefit because reinsurance premiums remain unchanged. If modeled on a direct basis, the ULSG attribution could be higher than shown.
- The VUL company results are puzzling because the DR decreased with the addition of explicit margins. This company suggests that the increase in DR from lower decrements in 1c slightly outweighs the savings from reduction in death claims in 1a and 1e.

[7] Increase in percentage change by step. Example: Term DR Attribution 1c = 131% - 87%.

Sensitivity 1.5: Margins

This is a two-part sensitivity. Sensitivity 1.5a removes explicit margins from all prudent-estimate assumptions that contain margins, while Sensitivity 1.5b doubles these margins. These steps are quantified by measuring the percentage change from the Phase 1 DR or SR result, as appropriate. Term insurance blocks are more sensitive to margins than are permanent coverages. Each of WL, UL, and VUL include only one company's results. The only product type that is close to symmetric in its response to margins is WL.

FIGURE 21: SENSITIVITY 1.5: MARGINS

		CHANGE AS PERCENT OF PHASE 1 RESULT								
STEP	DESCRIPTION	TERM DR	ULSG DR	ULSG SR	WL DR	WL SR	UL DR	UL SR	VUL DR	VUL SR
1.5A	NO EXPLICIT MARGINS	-117%[8]	-17%	-11%	-14%	-14%	–	–	0%	-50%
1.5B	DOUBLE EXPLICIT MARGINS	115%	9%	9%	15%	14%	23%	8%	1%	43%

Sensitivity 2: Reserve pattern

Results from the calculation of additional issue-year blocks or additional projection periods are included in the exhibits in the appendices supporting the Phase 1 section.

Sensitivity 3: Model compression

In this sensitivity, companies calculated modeled reserves using fewer model points than were used in Phase 1. For all but VUL, model compression produced slight increases or decreases relative to Phase 1. The one company contributing VUL for Sensitivity 3 indicated their model was compressed across issue ages.

FIGURE 22: SENSITIVITY 3: MODEL COMPRESSION

		CHANGE AS PERCENT OF PHASE 1 RESULT								
STEP	DESCRIPTION	TERM DR	ULSG DR	ULSG SR	WL DR	WL SR	UL DR	UL SR	VUL DR	VUL SR
FEWER MODEL POINTS		-5%	-1%	2%	-2%	-2%	–	–	-60%	-93%

Sensitivity 4: Valuation date Treasury curve changes

Auxiliary scenario sets were provided for Sensitivities 4a, 4b, and 4c. Scenarios for Sensitivity 4a assume an initial yield curve increased 100 basis points from Phase 1, scenarios for Sensitivity 4b assume an initial yield curve decreased 100 basis points from Phase 1, and scenarios for Sensitivity 4c assume an initial yield curve that is inverted. The DR will be influenced by changes in the initial yield curve because the net asset earned rate is the rate at which the cash flows are discounted. Likewise, the SR will be influenced by changes in the initial yield curve because 105% of the projected path of 1-year Treasury rates is the rate used for discounting the statement value of assets projected at each year. Results in the table in Figure 23 suggest that, for products with non-guaranteed elements (WL, UL) that can be made to dynamically react with the changing interest environment, the level of initial yield curve (or shape thereof) has little effect on the resulting modeled reserve. Term and ULSG, however, demonstrate modeled reserves more sensitive to initial interest conditions. Results shown for VUL are the average of two contributing companies with material increases in DR for all the parts of Sensitivity 4.

[8] This value is influenced by one extreme outlier (Exhibit 4, 10T). Removing the outlier produces a -45% average change for Sensitivity 1.5a and a 66% average change for Sensitivity 1.5b.

This sensitivity confirms the potential for volatility in reported statutory minimum reserves from period to period.

FIGURE 23: SENSITIVITY 4: INITIAL YIELD CURVE

		CHANGE AS PERCENT OF PHASE 1 RESULT									
STEP	DESCRIPTION	TERM DR	TERM SR	ULSG DR	ULSG SR	WL DR	WL SR	UL DR	UL SR	VUL DR	VUL SR
4A	INITIAL YC + 100 BPS	-8%	-10%	-12%	-10%	-1%	-2%	1%	0%	37%	9%
4B	INITIAL YC - 100 BPS	7%	9%	12%	13%	1%	2%	0%	0%	35%	0%
4C	INITIAL YC INVERTED	16%	16%	14%	10%	-1%	-1%	0%	0%	22%	22%

Sensitivity 5: Economic scenario generator parameters

Auxiliary scenario sets are provided for Sensitivities 5a, 5b, 5c, and 5d. Sensitivity 5a is run over scenarios that reflect a 100-basis-point increase to the mean reversion parameter assumed in the scenario generator. Sensitivity 5b is a 100-basis-point decrease to this parameter. Sensitivity 5c increases the mean reversion point for the long-rate volatility by 50%. Sensitivity 5d increases the volatility of the stochastic volatility process by 50%.

Comparing the tables in Figures 23 and 24 suggests there is less movement in modeled reserves with changes to the parameters of the scenario generator than there is with changes to the initial yield curve (Sensitivity 4).

FIGURE 24: SENSITIVITY 5: ECONOMIC SCENARIO GENERATOR PARAMETERS

		CHANGE AS PERCENT OF PHASE 1 RESULT									
STEP	DESCRIPTION	TERM DR	TERM SR	ULSG DR	ULSG SR	WL DR	WL SR	UL DR	UL SR	VUL DR	VUL SR
5A	MRP + 100 BPS	-2%	2%	-5%	-5%	-3%	-2%	0%	0%	–	9%
5B	MRP - 100 BPS	7%	-3%	3%	6%	3%	3%	1%	0%	–	-13%
5C	150% LONG RATE VOL	5%	1%	1%	3%	1%	5%	0%	2%	–	1%
5D	150% STOCH VOL	-1%	3%	-1%	9%	0%	3%	0%	1%	–	-4%

Sensitivity 6: Net premium reserve modifications

For those blocks of business where VM-20 Section 3 calculations are performed, the following sensitivities are requested in Phase 2.

a. For ULSG, change the lapse formula in VM-20 Section 3.C.3.c.ii from

$$L_{s+t} = R_{x+t} \times 0.01 + (1 - R_{x+t}) \times 0.005 \times r_{x+t}$$

to

$$L_{s+t} = R_{x+t} \times 0.03 + (1 - R_{x+t}) \times 0.015 \times r_{x+t}$$

b. For policies for which the no-cash value benefit stream rules apply, change the valuation interest rate from 5% to 4%; for policies for which the cash value benefit stream rules apply, change the valuation interest rate from 4% to 3%.

c. For those testing product blocks not subject to Section 3 calculations, use Section 3 to calculate the NPR. Results for the only company that provided this information are found in Exhibit 23.

The ULSG results in the table in Figure 25 are composed of two submissions. Both performed Sensitivity 6b; only one performed Sensitivity 6a. In general, the NPR was difficult to process for ULSG modelers because the method is new and not captured in available valuation platforms, and because it requires policy premium determinations (premiums solves) at issue and at valuation date.

FIGURE 25: SENSITIVITY 6: CHANGES TO NET PREMIUM RESERVE ASSUMPTIONS

		CHANGE AS PERCENT OF PHASE 1 NPR	
	DESCRIPTION	TERM	ULSG
6A	INCREASE IN LAPSE RATE FOR ULSG		-16%
6B	DECREASE IN INTEREST RATE	6%	20%

Sensitivity 7: 10% permanent increase in mortality

A 1.10 factor is applied to VM-20 mortality rates used in the cash flow projection model in all years. For products with non-guaranteed elements, cost of insurance charges are not correspondingly increased. Not surprisingly, the term insurance blocks demonstrate a greater increase in reserve with the 10% permanent increase in mortality than the permanent insurance blocks.

FIGURE 26: SENSITIVITY 7: 10% PERMANENT INCREASE IN MORTALITY

		CHANGE AS PERCENT OF PHASE 1 RESULT									
STEP	DESCRIPTION	TERM DR	TERM SR	ULSG DR	ULSG SR	WL DR	WL SR	UL DR	UL SR	VUL DR	VUL SR
1.10 X MORTALITY RATES		68%	67%	3%	3%	13%	12%	–	–	0%	2%

Sensitivity 8: Lapse rates

Sensitivity 8a represents a 20% reduction to lapse rates used in the modeling, while Sensitivity 8b represents a 20% increase in lapse rates used in the modeling.

FIGURE 27: LAPSE RATES

		CHANGE AS PERCENT OF PHASE 1 RESULT									
STEP	DESCRIPTION	TERM DR	TERM SR	ULSG DR	ULSG SR	WL DR	WL SR	UL DR	UL SR	VUL DR	VUL SR
8A	80% OF BASELINE LAPSE	4%	23%	5%	6%	7%	7%	–	–	16%	-19%
8B	120% OF BASELINE LAPSE	-4%	-24%	-4%	-5%	-6%	-5%	–	–	-26%	13%

Sensitivity 9: ULSG premium

Sensitivity 9 is run in three parts. Sensitivity 9a calls for a 25% premium acceleration (1.25 factor applied to each policy's premium in all years), Sensitivity 9b calls for a 25% premium deceleration (0.75 factor applied to each policy's premium in all years), and Sensitivity 9c calls for the model to use the premium that maintains the guarantee. Specifically, for 9c, use the baseline premium assumption until a premium is necessary to prevent the policy from lapsing without value. At that point, assume the policyholder pays the minimum premium required to keep the policy in force until the next policy year. For products with more than one set of shadow account charges, use the lowest set of charges in determining the minimum premium. Four participants provided Sensitivities 9a and 9b, and only one of these four provided Sensitivity 9c.

The table in Figure 28 shows the detail for each submitting company along with the average for both DR and SR. With one exception, both DR and SR decrease with either an increase or decrease to paid premium. This result suggests participating companies are assuming a premium level that, in aggregate, produces a higher level of reserves than would an assumption that includes a margin in either direction.

FIGURE 28: SENSITIVITY 8: ULSG PREMIUM

		CHANGE AS PERCENT OF PHASE 1 RESULT BY ULSG EXHIBIT				
DESCRIPTION		11	14	15	16	AVERAGE
DR						
9A	25% PREMIUM ACCELERATION	-1%	-41%	7%	-14%	-12%
9B	25% PREMIUM DECELERATION	-8%	-11%	-41%	-1%	-15%
9C	BASELINE, THEN MINIMUM AS NECESSARY			10%		10%
SR						
9A	25% PREMIUM ACCELERATION	-1%	-46%	7%	-15%	-14%
9B	25% PREMIUM DECELERATION	-8%	-26%	-38%	-1%	-18%
9C	BASELINE, THEN MINIMUM AS NECESSARY			13%		13%

Sensitivity 10: No tail profit for term

Sensitivity 10 applies only to term insurance models. In this sensitivity, a 100% lapse rate is assumed immediately following the level premium term period. The table in Figure 29 shows two percentages, one with all submitted data, and the second with the highest outlier removed as well as blocks reporting a 0% change. The second percentage is included because the highest outlier is well beyond the distribution of the remaining data and materially influences the average. Blocks reporting a 0% change are either blocks that did not have insurance periods beyond the level premium term period, or are blocks where 100% lapse was part of the baseline assumption to begin with.

FIGURE 29: SENSITIVITY 10: NO TAIL PROFIT FOR TERM

	CHANGE AS PERCENT OF PHASE 1 RESULT
DESCRIPTION	TERM DR
ALL SUBMITTED DATA	66%
HIGHEST AND LOWEST OUTLIERS REMOVED	31%

Sensitivity 11: Starting assets

Sensitivity 11 applies only to models for which the DR and SR are calculated, and tests the response of these reserves to a 10% increase or decrease in the starting asset amount. The table in Figure 30 shows these reserve changes as a percentage change from the corresponding Phase 1 result. Aside from VUL, the DR seems influenced very little by any change in starting assets. The SR, however, is very sensitive to the level of assets in force at the projection start date. This is consistent with feedback from the participating companies about the difficulty in managing the starting asset values in the SR calculations to within a 2% margin of the ending SR. For some models, it was truly a test-guess-retest process with no clear indication of how to estimate the starting asset amount other than iteratively.

FIGURE 30: STARTING ASSETS

		CHANGE AS PERCENT OF PHASE 1 RESULT									
STEP	DESCRIPTION	TERM DR	TERM SR	ULSG DR	ULSG SR	WL DR*	WL SR*	UL DR	UL SR	VUL DR	VUL SR
11A	INCREASE 10%	0%	-7%	1%	-9%	0%	-15%	–	–	6%	2%
11B	DECREASE 10%	1%	12%	-1%	11%	0%	28%	–	–	11%	-2%

* one submission

Sensitivity 12: Disinvestment strategy

Sensitivity 12 applies only to models for which the DR and SR are calculated, and tests the response of these reserves to the way in which models generate cash when needed. The three disinvestment strategies are a) sell assets, b) borrow cash, and c) use negative assets. Of the few term and ULSG companies that submitted results for this sensitivity, the range of percentage changes from the Phase 1 corresponding modeled reserve was -1% to 1%, suggesting that all three disinvestment strategies are essentially equivalent in their impact to the final result.

Sensitivity 13: Equity rates

Sensitivity 13 is intended for VUL models. No results were submitted.

Sensitivity 14: Expenses

Sensitivity 14 tests a 10% increase to expenses.

FIGURE 31: SENSITIVITY 14: 10% INCREASE IN EXPENSES

		CHANGE AS PERCENT OF PHASE 1 RESULT									
STEP	DESCRIPTION	TERM DR	TERM SR	ULSG DR	ULSG SR	WL DR	WL SR	UL DR	UL SR	VUL DR	VUL SR
10%	EXPENSE INCREASE	5%	–	1%	2%	6%	6%	–	–	12%	4%

Sensitivity 15: Asset credit spreads

In this sensitivity, asset credit spread assumptions are modified. Sensitivity 15a reflects a credit spread table with a lower initial credit spread. Sensitivity 15b reflects a credit spread table with a lower ultimate credit spread. There is limited participation in this sensitivity, but what is available suggests that initial credit spreads are more critical to the modeled reserve than are ultimate credit spreads, as demonstrated by the higher percentage changes in Sensitivity 15a when compared to Sensitivity 15b.

FIGURE 32: SENSITIVITY 15: ASSET CREDIT SPREADS

		CHANGE AS PERCENT OF PHASE 1 RESULT									
STEP	DESCRIPTION	TERM DR	TERM SR	ULSG DR	ULSG SR	WL DR	WL SR	UL DR	UL SR	VUL DR	VUL SR
15A	LOWER INITIAL	5%	–	–	–	–	–	–	–	-16%	-4%
15B	LOWER ULTIMATE	1%	–	–	–	–	–	–	–	-7%	-3%

Sensitivity 16: Dynamic lapse

Submitted results for this sensitivity are for one of the ULSG blocks. Sensitivity 16a doubles the additional or dynamic lapse rates and Sensitivity 16b reduces these rates by half. The table in Figure 33 shows results that suggest this product's reserve levels are not highly sensitive to changes in the additional or dynamic lapse formula, likely because the product is generally sold as a protection product rather than an accumulation product.

FIGURE 33: SENSITIVITY 16: DYNAMIC LAPSE

		CHANGE AS PERCENT OF PHASE 1 NPR	
	DESCRIPTION	ULSG DR	ULSG SR
16A	DOUBLE	-2%	-3%
16B	HALF	1%	0%

Sensitivity 17: Double defaults

In this sensitivity, assumed default rates are doubled. This sensitivity impacts the ULSG product type the most. As in some of the earlier sensitivities, VUL reacts in a manner opposite to the other lines of business. In this case, the VUL company explained that the SR decreased with increases to the default charges because the interest credited rate is tied to the competitor rate, and the competitor rate decreases with increase to default charges, so the credited rate declines, thus widening the profit margin on interest.

FIGURE 34: SENSITIVITY 17: DOUBLE DEFAULTS

	CHANGE AS PERCENT OF PHASE 1 RESULT									
DESCRIPTION	TERM DR	TERM SR	ULSG DR	ULSG SR	WL DR	WL SR	UL DR	UL SR	VUL DR	VUL SR
DOUBLE DEFAULT RATES	2%	–	7%	8%	4%	3%	–	–	4%	-2%

ACLI DATA REQUEST

OVERVIEW

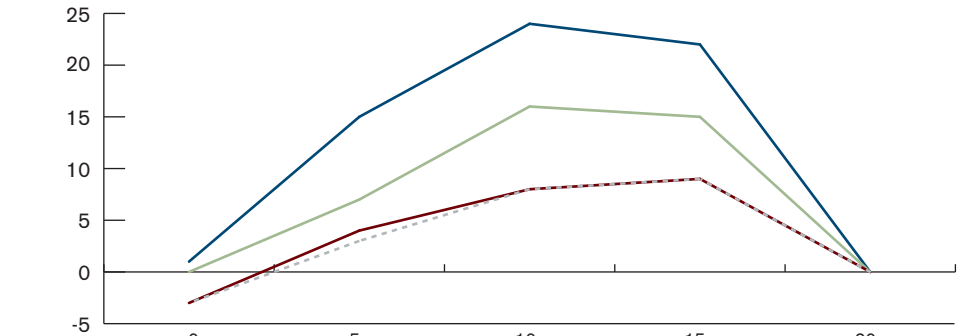
This section presents submissions the ACLI requested of member companies participating in the VM-20 Impact Study. There are four requests, the purpose of which is to better understand Phase 1 results that were emerging at the time Phase 1 data was collected.

No. 1: Baseline reserve

Using the deterministic methodology, calculate a reserve at valuation date and every five years thereafter, up to Projection Period 40. Use the 1-year issue block and reinvestment Alternative 2 (Alt 2) for this request. Use asset adequacy analysis assumptions and 5% level interest rates for earnings and for discounting cash flows. Calculate this reserve net of reinsurance, if applicable. Use your company's anticipated mortality without improvement and a 10% margin on the mortality rates. Asset portfolio should be the same as used in Phase 1.

Figure 35 is from a 20-year term insurance block. The chart also shows the NPR and current CRVM formulaic reserve. The DR and baseline reserves are essentially the same, but there are two offsetting assumptions at work. In determining the DR, this company used a VM-20 mortality assumption equal to company experience (i.e., fully credible) plus a 4% margin, while the baseline reserve incorporates a 10% margin. If all other assumption elements are the same, then the baseline should exceed the DR. However, the discount rate of 5% in the baseline reserve is higher than the net asset earned rate used to discount cash flows in producing the DR. Figure 35 provides a picture of the relationships between current formulaic, NPR, and the two modeled reserves for a 20-year term product.

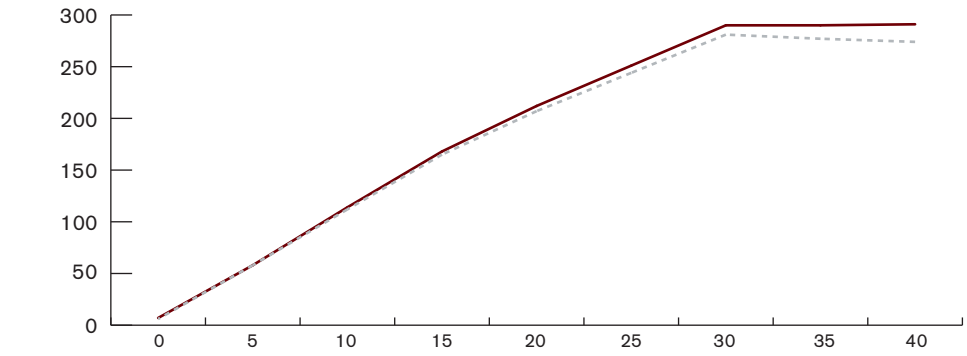
FIGURE 35: 20T



	0	5	10	15	20
Baseline	-3	3	8	9	0
DR	-3	4	8	9	0
NPR	0	7	16	15	0
CRVM	1	15	24	22	0

Figure 36 is from a ULSG block. In determining the DR, this company used a VM-20 mortality assumption equal to company experience (i.e., fully credible) plus a margin in the range of 3% to 10%. Similar to the term block in Figure 35, the baseline reserve in Figure 36 on page 32 tracks the DR reasonably well, until the later projection periods, where they diverge, which is probably due to cumulative impacts of minor assumption differences.

FIGURE 36: ULSG

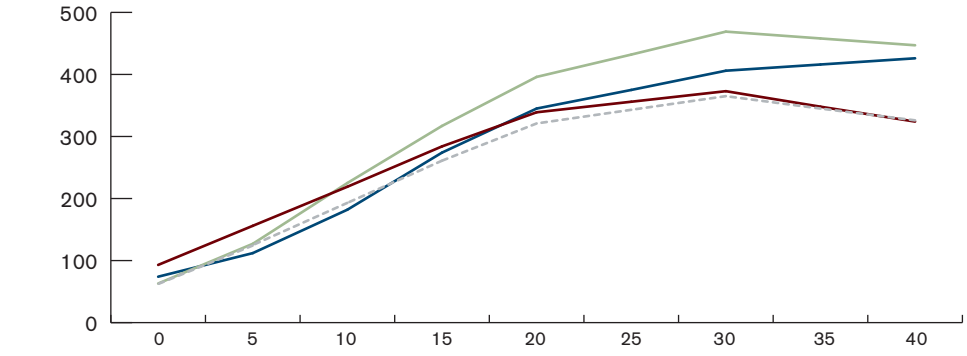


	0	5	10	15	20	25	30	35	40
Baseline	6	58	112	165	207	244	281	277	274
DR	7	58	114	168	212	251	290	290	291

Figure 37 is from a ULSG block. In determining the DR, this company used a VM-20 mortality assumption of credibility-blended mortality together with a margin of 7.5% to 13.8%. The DR initially is greater than the baseline reserve by 48%, and this difference narrows over time. Because of the nature of the deterministic reserve methodology, any margins or other conservatism (such as credibility blending) is recognized in the early policy years. The relationship between DR and baseline suggests a higher level of conservatism in the VM-20 assumptions than in the baseline assumptions.

The surprising outcome shown in Figure 37 is the pattern of the NPR as calculated by this company. It crosses over the DR in the 10th year and remains higher through the 40th year. This is not a pattern that would be expected from a floor reserve requirement.

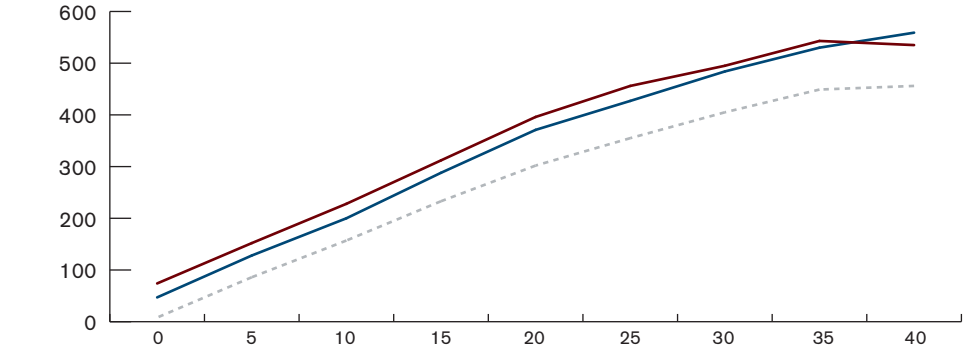
FIGURE 37: ULSG



	0	5	10	15	20	25	30	35	40
Baseline	63	125	193	261	321	343	365	345	326
DR	93	156	219	284	339	356	373	348	324
NPR	63	127	225	317	396	432	469	458	447
CRVM	74	112	182	274	345	375	406	416	426

Figure 38 is also from a ULSG block. In determining the DR, this company used a VM-20 mortality assumption of credibility-blended mortality together with a margin of 5.6% to 7.4%. Initial DR is multiples greater than baseline, then 76% greater, 45% greater, and so on. Baseline reserve and DR differences appear to be narrowing, but taking more policy years to do so than in Figure 37. Here, the differences in VM-20 assumptions and baseline reserve assumptions are much greater, while the CRVM is situated in between the two modeled reserves, crossing above both in later years.

FIGURE 38: ULSG

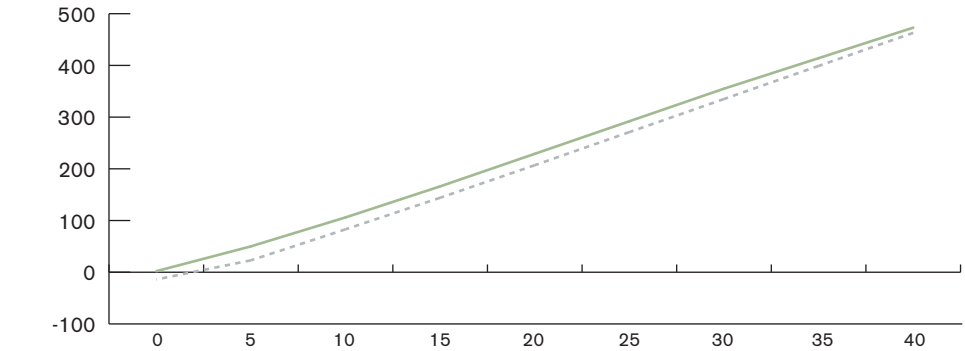


	0	5	10	15	20	25	30	35	40
Baseline	8	86	157	233	302	355	405	449	456
DR	74	152	228	312	396	456	495	543	535
CRVM	47	128	200	288	371	427	484	530	559

In summary, Figures 35 and 36 portray DRs built using company experience and some degree of margin and these DRs are reasonably consistent with a baseline reserve using company experience and 10% margin. On the other hand, Figures 37 and 38 make it clear that DRs assuming credibility-blended mortality plus a mortality margin create a level of conservatism that exceed the baseline reserve.

Figure 39 is from a WL block. Because the block passes both exclusion tests, the company provided only the baseline reserve and the NPR (equal to CRVM) reserve.

FIGURE 39: WL



	0	5	10	15	20	25	30	35	40
Baseline	-14	23	83	144	207	271	335	399	463
NPR (=CRVM)	2	50	106	166	229	292	355	414	473

No. 2: ULSG questionnaire

The ACLI's Request No. 2 consisted of a series of questions targeted at ULSG products in order to provide further insight into the Phase 1 results. Listed below are common threads within the responses. Detailed responses to this question set are included in Appendix G. The following list presents a general picture of the nature of responses to the ULSG questionnaire. It applies to those companies contributing to the ACLI data request and may not represent the larger Impact Study pool of ULSG products.

Please refer to Appendix G for a complete presentation of the questions posed in the questionnaire and the participant responses as it is oftentimes the responses outside of the norm that are most thought-provoking.

- The product tested in the Impact Study is the company's shadow account universal life product, with a lifetime secondary guarantee.
- Generally, a single segment emerges when AG 38 reserves are calculated.
- The strength of the secondary guarantee in the ULSG product is designed to compete with peer products in the upper quartile to upper half of similar ULSG products in the market.
- In the cash flow model, YRT reinsurance premiums were not adjusted from treaty provisions, if YRT reinsurance was applicable to the model. As a result, YRT cash flows are projected as a net benefit to the aggregate cash flows.
- The premium payments assumed are equivalent to a *billed* or *stipulated* level with adjustments to the modeled premium if the policy becomes fully funded (i.e., premiums cease).
- No margin was applied to the premium payment assumption.
- No adjustments were made to the non-guaranteed elements throughout the projection for any scenario.

No. 3: General questionnaire

The ACLI's Request No. 3 consisted of a series of general VM-20 process questions appropriate for all lines of business in order to provide further insight into the Phase 1 results. Listed below are common threads within the responses. Detailed responses to this question set are included in Appendix H. The following list presents a general picture of the nature of responses to the questionnaire. It applies to those companies contributing to the ACLI data request and may not represent the larger Impact Study pool of participants.

Please refer to Appendix H for a complete presentation of the questions posed in the questionnaire and the participant responses as it is oftentimes the responses outside of the norm that are most thought-provoking.

- The majority of participants determined credibility-adjusted mortality rates according to their interpretations of VM-20 mortality assumption requirements. Limited fluctuation credibility theory was used by some participants in determining credibility levels.
- Half of the participants used the underwriting criteria scoring tool, half did not. It was not unusual to encounter problems or issues with the tool, when applying it to the company's underwriting schematic.
- The aggregate credibility level of mortality ranges from 0% to 100%. For the most part, it was this level of credibility that was used in the calculation of the mortality margin.
- Credibility factors (i.e., those factors used to blend company experience with industry experience) are determined at levels of sex and smoking classification or at levels of sex, smoking classification, and underwriting category.

- The credibility of mortality is assumed to remain constant for anywhere from 10 to 30 policy years. After this point, the mortality credibility reduces to 0% over a period of time, typically five years. Adjustments may be made to very young or very old ages such that these ages reflect industry experience to a greater degree than other ages.

- About half of the participants customarily recognize mortality improvement in internal modeling performed for other business purposes. The other half do not.

- The mortality margins applied to mortality rates within the model vary by issue age and possibly other characteristics. For the companies providing responses to ACLI Request No. 3, the following statistics emerge:

Average margin	7.4%
Median margin	6.0%
Low margin	3.0%
High margin	16.0%

- Lapse assumptions are based on company experience studies with increases or decreases for margin anywhere from 0% to 25%. Some participants using Canadian term to 100 lapse assumptions consider these rates to include margin.

- Actual assets were used in the model as starting assets.

- There is a mixture of practices regarding inclusion of existing pretax IMR (PIMR) in the model and future PIMR.

- As with ULSG, the YRT reinsurance premiums were not increased from premiums specified in the treaty and, as a result, YRT reinsurance cash flows are a net benefit to the aggregate cash flows.

No. 4: Starting assets questionnaire

A starting asset portfolio is required by VM-20 to be within 2% of the modeled reserve amount, whether DR or SR. Many companies found this a very difficult requirement to work with, particularly for the SR. From a theoretical viewpoint, the requirement may not make sense for the DR. Request No. 4 asks for an alternate run on the DR whereby, rather than the starting asset amount, the focus is on the ending asset amount. In other words, find the starting asset amount such that the ending asset amount is essentially $0. The question this request attempts to answer is whether the 2% requirement for starting assets results in a projection where the ending assets are essentially exhausted without booking interim negative asset amounts, and if not, what is the starting asset amount that does exhaust the assets at the end? This alternate starting asset amount is then considered to be the DR. One would not have to discount any cash flows under this method, because the starting asset amount is designed to (nearly) completely resolve the obligations without interim deficiencies.

Figures 40 and 41 present submitted results by product type for the 1-year and 5-year issue blocks. Results are normalized in terms of the starting assets used for the DR calculation in Phase 1. The outcome of the request is measured in terms of the change to the DR when starting assets are adjusted such that ending assets are near $0.

From this work, the following observations are made.

- If the objective of the 2% starting asset requirement is to produce a projection which concludes with $0 ending asset values, the objective is not being met as evidenced by the Phase 1 run results below. The ending asset amounts can be higher (Ref. 2, 4, 5, 6, 7, 9 and 11) or lower (Ref. 1, 3, 8, 10, 12, 13, 14, and 15).

- Under this alternative DR methodology, the change to the DR is material for some models. The change to the DR from the Phase 1 calculation to the ACLI Request No. 4 calculation is shown in the last columns of Figures 40 and 41.

- It would be beneficial from both a regulatory and practical viewpoint for VM-20 to accommodate an alternate calculation of the DR, or to remove the 2% starting asset requirement altogether. As seen by these results, it may or may not produce a reserve outcome that makes sense given the $0 ending asset objective.

FIGURE 40: 1-YEAR ISSUE BLOCK

SUBMISSION REF.	INSURANCE TYPE	STARTING ASSETS ÷ DR	RUN	DR	STARTING ASSETS	ENDING ASSETS	CHANGE TO DR[9]
1	ULSG	100%	PHASE 1	1,003	1,000	(2,126)	
			REQUEST NO. 5		1,012	12	0.9%
2	ULSG	107%	PHASE 1	936	1,000	5,333	
			REQUEST NO. 5		926	12	-1.0%
3	ULSG	100%	PHASE 1	1,000	1,000	(2,170)	
			REQUEST NO. 5		1,216	14	21.6%
4	10T	523%[10]	PHASE 1	191	1,000	780	
			REQUEST NO. 5		250	2	30.9%
5	20T	100%	PHASE 1	998	1,000	533	
			REQUEST NO. 5		487	6	-51.2%
6	30T	100%	PHASE 1	998	1,000	454	
			REQUEST NO. 5		913	8	-8.5%
7	AGGR	100%	PHASE 1	1,003	1,000	867	
			REQUEST NO. 5		764	7	-23.8%

FIGURE 41: 5-YEAR ISSUE BLOCK

SUBMISSION REF.	INSURANCE TYPE	STARTING ASSETS ÷ DR	RUN	DR	STARTING ASSETS	ENDING ASSETS	CHANGE TO DR
8	ULSG	101%	PHASE 1	992	1,000	(714)	
			REQUEST NO. 5		1,004	2	1.2%
9	ULSG	105%	PHASE 1	951	1,000	3,963	
			REQUEST NO. 5		943	1	-0.8%
10	ULSG	100%	PHASE 1	1,000	1,000	(686)	
			REQUEST NO. 5		1,073	(1)	7.3%
11	ULSG	96%	PHASE 1	1,040	1,000	32,054	
			REQUEST NO. 5		685	(4)	-34.1%
12	10T	108%	PHASE 1	922	1,000	(522)	
			REQUEST NO. 5		1,651	5	79.1%
13	20T	100%	PHASE 1	999	1,000	(241)	
			REQUEST NO. 5		1,382	5	38.3%
14	30T	100%	PHASE 1	998	1,000	(1,198)	
			REQUEST NO. 5		1,403	5	40.6%
15	AGGR	100%	PHASE 1	999	1,000	(1,248)	
			REQUEST NO. 5		1,422	5	42.3%

9 (Starting Assets Request No. 4 ÷ Phase 1 DR) - 1.

10 Starting assets set equal to NPR.

APPENDIX A

TERM INSURANCE EXHIBITS

EXHIBIT 1: 10-, 20-, AND 30-YEAR LEVEL PREMIUM TERM AND AGGREGATE

Face amounts in excess of $1 million are 50% reinsured using a YRT treaty arrangement. Aggregate results consider all policies modeled as a group.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET: DIRECT[11]		DET: NET[11]	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	0.4%	0.7%	0.3%	0.7%	P	P	P	P
20T	4.0%	3.3%	4.0%	3.2%	P	F	P	P
30T	11.6%	10.2%	11.1%	9.8%	F	F	F	F
AGGR	5.5%	4.8%	5.9%	5.1%	F	F	P	P

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	3.82	6.88	0.86	3.81	3.86	4.01	3.86	4.01	NPR	NPR
20T	4.23	10.48	4.18	8.06	1.88	4.15	1.88	4.15	NPR	NPR
30T	4.98	10.14	4.89	8.07	1.25	2.64	4.98	10.14	SR	SR
AGGR	3.71	9.02	3.70	7.08	2.08	3.53	3.71	9.02	SR	SR

ALTERNATIVE 2 — ALT 1/ALT 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	3.82	6.89	0.74	3.69	3.86	4.01	3.86	4.01	NPR	NPR	1.00	1.00
20T	3.60	10.32	3.35	7.26	1.88	4.15	1.88	4.15	NPR	NPR	1.00	1.00
30T	4.52	10.11	3.46	6.57	1.25	2.64	4.52	10.11	SR	SR	1.10	1.00
AGGR	2.72	8.99	2.79	6.18	2.08	3.53	2.79	8.99	SR	SR	1.33	1.00

[11] DET results shown are based on level term period; all cells pass over lifetime period.

PHASE I (NET), RATIOS TO CURRENT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
10T	3.86	4.01	1.73	5.79	123%	-31%
20T	1.88	4.15	3.03	9.19	-38%	-55%
30T	4.98	10.14	3.07	8.77	62%	16%
AGGR	3.71	9.02	2.75	8.27	35%	9%

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
10T	3.86	4.01	1.73	5.79	123%	-31%
20T	1.88	4.15	3.03	9.19	-38%	-55%
30T	4.52	10.11	3.07	8.77	47%	15%
AGGR	2.79	8.99	2.75	8.27	1%	9%

PHASE I (DIRECT; REINSURANCE CREDIT) , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM DIRECT[12] 1 YR	VM-20 MINIMUM DIRECT[12] 5 YR	VM-20 REINSURANCE RESERVE CREDIT 1 YR	VM-20 REINSURANCE RESERVE CREDIT 5 YR	CURRENT FORMULAIC RESERVE CREDIT 1 YR	CURRENT FORMULAIC RESERVE CREDIT 5 YR
10T	4.13	4.33	0.27	0.33	0.25	0.30
20T	2.00	8.36	0.12	4.21	0.09	0.11
30T	5.27	10.23	0.29	0.09	0.07	0.08
AGGR	3.94	9.12	0.23	0.10	0.12	0.14

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM DIRECT[12] 1 YR	VM-20 MINIMUM DIRECT[12] 5 YR	VM-20 REINSURANCE RESERVE CREDIT 1 YR	VM-20 REINSURANCE RESERVE CREDIT 5 YR	CURRENT FORMULAIC RESERVE CREDIT 1 YR	CURRENT FORMULAIC RESERVE CREDIT 5 YR
10T	4.13	4.33	0.27	0.33	0.25	0.30
20T	2.00	7.55	0.12	3.40	0.09	0.11
30T	4.59	10.07	0.07	(0.04)	0.07	0.08
AGGR	2.96	9.10	0.24	0.11	0.12	0.14

[12] VM-20 minimum reserve component on direct basis assumes same reserve type as shown in Net of Reinsurance table except for 20T, 5-year issue block, which fails DET on a direct basis.

ASSET INFORMATION

	FIXED INCOME STARTING ASSETS				STARTING ASSET TO MODELED RESERVE (ALT 2)			
	GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE	SR		DR	
ISSUE BLOCK					1 YR	5 YR	1 YR	5 YR
10T	202.7	86.2	116.5	12	99%	100%	100%	100%
20T	202.7	86.2	116.5	12	102%	100%	100%	100%
30T	202.7	86.2	116.5	12	102%	102%	100%	100%
AGGR	202.7	86.2	116.5	12	102%	100%	100%	100%

DISCUSSION

Stochastic exclusion tests are working as expected. In particular, the longer level term periods demonstrate higher SET ratios. If valued as an aggregate block, full stochastic analysis is required to establish VM-20 minimum reserves. The DET results are, for the most part, what one would expect. The 20T block (5-year issue) provides an anomalous result in that the block fails the DET on a gross or direct basis, and passes on a net of reinsurance basis. In calculating the DET net of reinsurance, the company reduced the sum of direct gross premiums by the YRT gross premium, and reduced the sum of NPR net premiums by the YRT net premium. Both direct and net premiums assume an annual mode payment basis. This difference in reserve method pre- and post-reinsurance makes the reinsurance reserve credit unusually large.

The distribution of business for the 10T block is different to the 20T or 30T blocks in that the population has a higher percentage of males, smokers, and standard (as opposed to preferred) risks. It also includes a higher proportion of older issue ages and relatively lower policy sizes.

Current formulaic deficiency reserves represent approximately 17% of this blocks statutory reserve.

The weighted average life of the modeled asset portfolio falls short of the 20- and 30-year term period, and likely has an impact on the VM-20 components which drive the minimum reserve (DR and SR, respectively) for those two term periods.

EXHIBIT 2: 10, 20, 30 YEAR LEVEL PREMIUM TERM (SIMPLIFIED ISSUE)

Reinsurance is bulk accidental death benefit coverage (ADB).

10-year product is a 10-year insurance period; 20- and 30-year products have annually increasing premiums after level period.

Results presented here include the 1-year, 5-year, 10-year, and 15-year issue blocks (10- and 15-year issue blocks are provided with Phase 2).

EXCLUSION TEST PANEL

	SET: ALT 1				SET: ALT 2				DET: DIRECT & NET[13]			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
10T	1.40%	2.47%	0.08%	0.08%	1.33%	2.36%	0.08%	0.08%	P	P	P	P
20T	0.10%	0.22%	0.19%	0.19%	0.12%	0.21%	0.15%	0.16%	P	P	P	P
30T	1.29%	1.25%	1.30%	0.93%	1.15%	1.15%	1.22%	0.86%	P	P	P	P

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

STOCHASTIC AND DETERMINISTIC RESERVES NOT PROVIDED.

	ALTERNATIVE 1											
	NPR				VM-20 MINIMUM				TYPE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
10T	0.46	1.94	2.36	2.36	0.46	1.94	2.36	2.36	NPR	NPR	NPR	NPR
20T	0.42	3.07	5.33	6.32	0.42	3.07	5.33	6.32	NPR	NPR	NPR	NPR
30T	0.26	2.34	4.66	6.72	0.26	2.34	4.66	6.72	NPR	NPR	NPR	NPR

	ALTERNATIVE 2											
	NPR				VM-20 MINIMUM				TYPE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
10T	0.46	1.94	2.36	2.36	0.46	1.94	2.36	2.36	NPR	NPR	NPR	NPR
20T	0.42	3.07	5.33	6.32	0.42	3.07	5.33	6.32	NPR	NPR	NPR	NPR
30T	0.26	2.34	4.66	6.72	0.26	2.34	4.66	6.72	NPR	NPR	NPR	NPR

PHASE I (NET), RATIOS TO CURRENT

	CURRENT FORMULAIC				VM-20 MINIMUM (ALT 1, ALT 2)				% CHANGE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
10T	0.55	1.99	2.36	2.36	0.46	1.94	2.36	2.36	-16%	-3%	0%	0%
20T	0.79	4.91	8.12	9.49	0.42	3.07	5.33	6.32	-47%	-37%	-34%	-33%
30T	2.20	6.17	9.82	12.78	0.26	2.34	4.66	6.72	-88%	-62%	-53%	-47%

[13] Policies pass DET over the level premium period only as well as the lifetime period.

PHASE I (DIRECT; REINSURANCE CREDIT), AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	VM-20 MINIMUM DIRECT				VM-20 REINSURANCE RESERVE CREDIT				CURRENT FORMULAIC RESERVE CREDIT			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
10T	0.48	1.97	2.40	2.40	0.02	0.03	0.04	0.04	0.02	0.03	0.03	0.03
20T	0.46	3.13	5.40	6.41	0.04	0.07	0.08	0.09	0.05	0.09	0.10	0.11
30T	0.31	2.40	4.73	6.80	0.05	0.06	0.07	0.08	0.06	0.08	0.09	0.11

ALTERNATIVE 2

	VM-20 MINIMUM DIRECT				VM-20 REINSURANCE RESERVE CREDIT				CURRENT FORMULAIC RESERVE CREDIT			
ISSUE BLOCK	1 YR	V5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
10T	0.48	1.97	2.40	2.40	0.02	0.03	0.04	0.04	0.02	0.03	0.03	0.03
20T	0.46	3.13	5.40	6.41	0.04	0.07	0.08	0.09	0.05	0.09	0.10	0.11
30T	0.31	2.40	4.73	6.80	0.05	0.06	0.07	0.08	0.06	0.08	0.09	0.11

ASSET INFORMATION

	FIXED INCOME STARTING ASSETS				STARTING ASSET TO MODELED RESERVE (ALT 2)			
					SR		DR	
ISSUE BLOCK	GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE	1 YR	5 YR	1 YR	5 YR
10T	164.0	25.0	135.0	18	N/A	N/A	N/A	N/A
20T	164.0	25.0	135.0	18	N/A	N/A	N/A	N/A
30T	164.0	25.0	135.0	18	N/A	N/A	N/A	N/A

DISCUSSION

As a simplified issue product, the premium structure demonstrates a gross-to-net ratio of 200% on average for the 20- and 30-year term products, higher for the 10-year product. Because this block passes both exclusion tests, the modeled components of VM-20 are not required. Net premium reserves become the required minimum reserves for these policies. NPRs represent a material decrease in statutory reserves over current standards. Accidental death benefit coverages are reinsured through a bulk arrangement. The progression of net premium reserves to current formulaic reserves over the three level term periods are shown in Chart 2.1 on page 42. Note that the 10-year term plan, with a 10-year insurance period, produces NPRs aligning closely with current formulaic (due to absence of tail premiums) while the 20- and 30-year term plans produce NPRs considerably lower than current formulaic reserves.

CHART 2.1

RESERVES PER $1,000

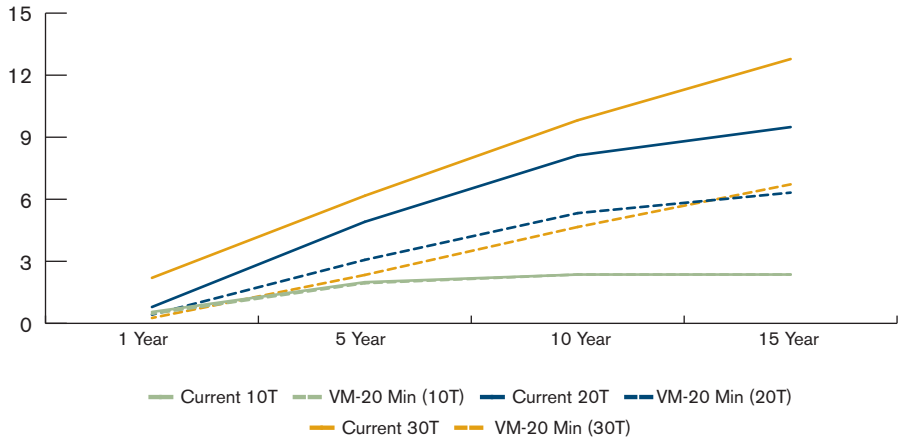


EXHIBIT 3: 20-YEAR LEVEL PREMIUM TERM

A 20-year level premium term to 95 was modeled by this company. The10- and 15-year issue blocks provided with Phase 2 Sensitivity 2 are included here. For this block, the NPR consistently defines the VM-20 minimum reserve, regardless of the number of issue years in the block. There is no reinsurance in force.

EXCLUSION TEST PANEL

	SET: ALT 1				SET: ALT 2				DET[14]			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
20T	0.86%	0.44%	1.12%	0.81%	1.38%	0.47%	1.22%	0.95%	F	F	F	F

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

STOCHASTIC RESERVES NOT PROVIDED.

ALTERNATIVE 1

	DETERMINISTIC				NPR				VM-20 MINIMUM			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
20T	(3.40)	(2.40)	2.05	3.81	0.39	2.33	5.74	8.30	0.39	2.33	5.74	8.30

ALTERNATIVE 2

	DETERMINISTIC				NPR				VM-20 MINIMUM			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
20T	(3.40)	(2.42)	1.96	3.74	0.39	2.33	5.74	8.30	0.39	2.33	5.74	8.30

PHASE I (NET), RATIOS TO CURRENT

	VM-20 MINIMUM ALT 1, ALT 2				CURRENT FORMULAIC				% CHANGE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
20T	0.39	2.33	5.74	8.30	1.59	6.80	12.31	15.49	-75%	-66%	-53%	-46%

OTHER RESERVES

	NET GAAP[15]			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR
20T	(0.83)	1.16	3.34	4.82

14 Fails over level premium term period with a gross-to-net premium ratio approximately 66%.

15 GAAP net of DAC was provided for comparative purposes by this contributing company.

ASSET INFORMATION

	FIXED INCOME STARTING ASSETS				STARTING ASSET TO MODELED RESERVE (ALT 2)			
	GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE	SR		DR	
ISSUE BLOCK					1 YR	5 YR	1 YR	5 YR
20T	155.2	50.0	109.0	14	Starting assets were set equal to current formulaic reserves and so bear no relationship to modeled DR			

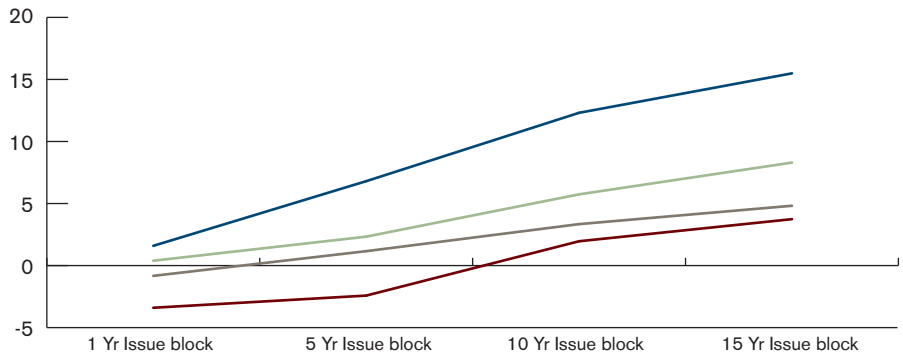
DISCUSSION

Company mortality experience is considered 100% credible. A 4% margin was assigned to the mortality assumption, and a 5% margin to the lapse assumption.

Chart 3.1 below tracks the four different issue year blocks across the various reserve methodologies.

CHART 3.1

RESERVES PER $1,000



	1 Yr Issue block	5 Yr Issue block	10 Yr Issue block	15 Yr Issue block
Current formulaic	1.59	6.8	12.31	15.49
NPR	0.39	2.33	5.74	8.3
DR	-3.40	-2.42	1.96	3.74
Net GAAP	-0.83	1.16	3.34	4.82

EXHIBIT 4: 10, 20, 30 YEAR LEVEL PREMIUM TERM & AGGR

Company calculated Aggregate results using an independent projection of aggregated cash flows.

Reinsurance is 90% YRT.

EXCLUSION TEST PANEL SET : DIRECT BASIS

	SET: ALT 1		SET: ALT 2		DET		SET: ALT 1		SET: ALT 2	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	67.7%	65.2%	60.4%	59.5%	NOT PROVIDED		4.0%	3.9%	3.5%	3.5%
20T	8.6%	15.6%	6.4%	13.2%	NOT PROVIDED		2.5%	2.1%	2.4%	2.4%
30T	79.7%	77.9%	72.7%	71.3%	NOT PROVIDED		10.2%	9.9%	9.3%	9.0%
AGGR	6.1%	5.2%	5.9%	4.8%	NOT PROVIDED		2.7%	2.7%	2.5%	2.5%

PHASE I (NET) , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM[16]		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	NOT PROVIDED		(3.46)	(2.14)	0.27	1.86	0.27	1.86	NPR	NPR
20T	NOT PROVIDED		(0.12)	2.41	0.12	2.11	0.12	3.47	NPR	DR
30T	NOT PROVIDED		1.76	4.01	0.05	1.33	1.76	4.57	DR	DR
AGGR	NOT PROVIDED		(0.68)	1.41	0.15	1.83	0.15	2.49	NPR	DR

ALTERNATIVE 2 — ALT 1/ALT 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	NOT PROVIDED		(3.33)	(2.01)	0.27	1.86	0.27	1.86	NPR	NPR	1.00	1.00
20T	NOT PROVIDED		(0.47)	2.02	0.12	2.11	0.12	3.08	NPR	DR	1.00	1.13
30T	NOT PROVIDED		0.89	3.00	0.05	1.33	0.89	3.56	DR	DR	1.98	1.28
AGGR	NOT PROVIDED		(1.02)	1.01	0.15	1.83	0.15	2.09	NPR	DR	1.00	1.19

16 Includes deferred premium adjustment on 5-year issue block ($1.53 for 10T; $1.06 for 20T; $0.56 for 30T; $1.08 for aggregate).

PHASE I (NET), RATIOS TO CURRENT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC[17] 1 YR	CURRENT FORMULAIC[17] 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
10T	0.27	1.86	(0.72)	2.88	138%	-35%
20T	0.12	3.47	3.37	7.19	-96%	-52%
30T	1.76	4.57	6.50	9.43	-73%	-52%
AGGR	0.15	2.49	2.87	6.39	-95%	-61%

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
10T	0.27	1.86	(0.72)	2.88	138%	-35%
20T	0.12	3.08	3.37	7.19	-96%	-57%
30T	0.89	3.56	6.50	9.43	-86%	-62%
AGGR	0.15	2.09	2.87	6.39	-95%	-67%

PHASE I (DIRECT; REINSURANCE CREDIT)

AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM DIRECT[18] 1 YR	VM-20 MINIMUM DIRECT[18] 5 YR	VM-20 REINSURANCE RESERVE CREDIT 1 YR	VM-20 REINSURANCE RESERVE CREDIT 5 YR	CURRENT FORMULAIC RESERVE CREDIT 1 YR	CURRENT FORMULAIC RESERVE CREDIT 5 YR
10T	2.73	4.82	2.46	2.96	2.21	2.68
20T	3.09	7.20	2.97	3.73	1.01	1.21
30T	3.78	6.95	2.02	2.38	0.44	0.51
AGGR	1.70	5.45	1.55	3.62	1.25	1.50

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM DIRECT[18] 1 YR	VM-20 MINIMUM DIRECT[18] 5 YR	VM-20 REINSURANCE RESERVE CREDIT 1 YR	VM-20 REINSURANCE RESERVE CREDIT 5 YR	CURRENT FORMULAIC RESERVE CREDIT 1 YR	CURRENT FORMULAIC RESERVE CREDIT 5 YR
10T	2.73	4.82	2.46	2.96	2.21	2.68
20T	2.52	6.61	2.40	3.53	1.01	1.21
30T	2.71	5.72	1.82	2.16	0.44	0.51
AGGR	1.53	4.77	1.38	2.68	1.25	1.50

17 On a net of reinsurance basis, both CRVM and NPR can be negative because of non-annual mode policies and annual mode reinsurance premiums.

18 VM-20 minimum reserve component on direct basis is determined as Max[NPR, DR], adjusted for deferred premium.

OTHER RESERVES

ISSUE BLOCK	NET GAAP 1 YR	NET GAAP 5 YR
10T	.98	2.64
20T	1.18	4.22
30T	.77	2.91
AGGR	1.00	3.37

ASSET INFORMATION

Not provided.

DISCUSSION

The exclusion test panel for this block looks materially different on a net of reinsurance basis as compared to a direct basis. The denominator of the SET ratio will reflect the proportionality of the insurance amounts ceded, but the numerator, which considers the direct and YRT premiums, will not reduce proportionately. This causes the ratio to look inflated on a net of reinsurance basis, whereas on a direct basis, it is not. In fact, the aggregate block passes the SET on a direct basis and fails on a net of reinsurance basis.

Using the Limited Fluctuation Method in assessing credibility, this block assumes 100% credibility for mortality experience. A 6% mortality margin was included for random fluctuation, 0% for company variation.

This participating company identified several practical issues in its efforts to produce the VM-20 results. Items 1, 2 and 3 below, relate to asset modeling, while items 4 and 5 are more general.

1. Assigning default charges at the individual asset level is burdensome, particularly if the asset cash flows are derived from a third-party vendor system and aggregated by class before use in the projection system. An alternative is to allow defaults to be calculated at a level higher than individual asset.

2. The requirements related to *spread related factor* and *maximum net spread adjustment factor*, when applied to in-force assets, may be problematic since statutory accounting for assets is from a book yield and amortized cost basis. Applying these factors to in-force assets add a level of complexity that may outweigh their benefit.

3. The requirements for *without NAIC rating* assets are inconsistent with the requirements for *with NAIC rating* assets and will be difficult to implement for each asset of this type. Obtaining the historical Treasury rates and determining the maturity structure for each of these assets at issue is a significant undertaking. If a company has a default study for these assets, these should be allowed for use, with appropriate documentation.

4. The company was unsure how YRT reinsurance should be treated with respect to the YRT premiums and the assumed mortality in the model. In the end, YRT premiums were increased by the mortality margin. This company suggests that more guidance surrounding reinsurance modeling is needed.

5. The primary reason stochastic reserves were not included in the submission has to do with the sensitivity of the result to the starting asset levels. For this block of policies, the initial runs were not within the 2% tolerance required by VM-20, and in addition, the results were not reasonable. Unfortunately, they did not have the resources to perform additional runs. The company suggests

the disconnect between the discount rates used by the Stochastic Reserve calculation and the asset earnings rates may explain the difficulty (and sensitivity) in getting within the 2% collar.

The progression of Deterministic and Net Premium Reserves by policy year as produced by Phase 2 Sensitivity 2 are shown below in Charts 4.1 and 4.2. The results depicted are generated using a system different to the system used to generate Phase 1 results. The 1-year issue block numbers will be inconsistent with those presented above.

CHART 4.1

NET RESERVES PER $1,000, ALT 2

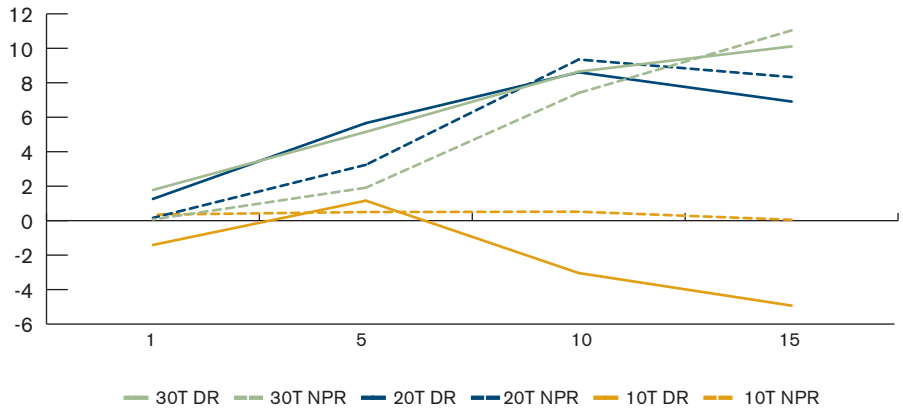


CHART 4.2

DIRECT RESERVES PER $1,000, ALT 2

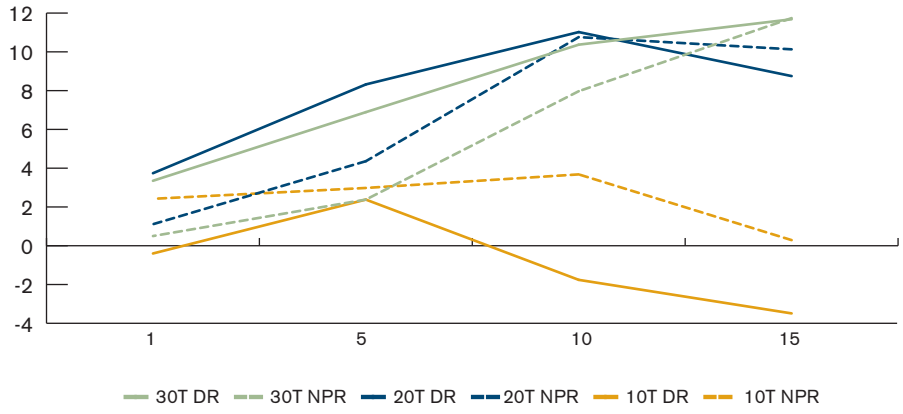


EXHIBIT 5: AGGREGATE TERM

This block includes 10-, 20-, and 30-year term to age 95 policies. It also has a 90% coinsurance treaty in place. Per $1,000 net of reinsurance amounts are normalized using the face amount net of coinsured amount.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	3.59%	3.47%	3.59%	3.47%	NOT PROVIDED	

PHASE I (NET) , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM[19]		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	NOT PROVIDED		(18.84)	(15.93)	.64	(1.09)	.64	(1.09)	NPR	NPR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	NOT PROVIDED		(18.66)	(15.93)	.64	(1.09)	.64	(1.09)	NPR	NPR	100%	100%

PHASE I (NET), RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	.64	(1.09)	1.59	(2.54)	-60%	57%

ALTERNATIVE 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	.64	(1.09)	1.59	(2.54)	-60%	57%

[19] For this exhibit, VM-20 Minimum is the larger of the available VM-20 components.

PHASE I (DIRECT; REINSURANCE CREDIT), AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM DIRECT[20] 1 YR	VM-20 MINIMUM DIRECT[20] 5 YR	VM-20 REINSURANCE RESERVE CREDIT[21] 1 YR	VM-20 REINSURANCE RESERVE CREDIT[21] 5 YR	CURRENT FORMULAIC RESERVE CREDIT[22] 1 YR	CURRENT FORMULAIC RESERVE CREDIT[22] 5 YR
AGGR	0.57	1.08	0.56	1.32	2.13	5.46

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM DIRECT 1 YR	VM-20 MINIMUM DIRECT 5 YR	VM-20 REINSURANCE RESERVE CREDIT 1 YR	VM-20 REINSURANCE RESERVE CREDIT 5 YR	CURRENT FORMULAIC RESERVE CREDIT 1 YR	CURRENT FORMULAIC RESERVE CREDIT 5 YR
AGGR	0.57	1.08	0.56	1.32	2.13	5.46

OTHER RESERVES (NET)

ISSUE BLOCK	NET GAAP 1 YR	NET GAAP 5 YR
AGGR	(7.46)	(5.76)

ASSET INFORMATION

ISSUE BLOCK	FIXED INCOME STARTING ASSETS GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE	STARTING ASSET TO MODELED RESERVE (ALT 2) SR 1 YR	SR 5 YR	DR 1 YR	DR 5 YR
AGGR	180.0	NOT PROVIDED	NOT PROVIDED	13.7	0	0	0	0

DISCUSSION

Certain net of reinsurance reserves (NPR; Current formulaic) are negative due to a difference in mode between direct and reinsurance premium payments. For example, reinsurance premium is paid on an annual basis while direct premium is collected primarily on a monthly basis. Since the annual mode reserve is greater than an otherwise similar non-annual mode reserve, the net of reinsurance basis emerges negative.

Although not shown here, the change in direct basis reserves from current formulaic to VM-20 minimum is -72% and -77% for the 1-year and 5-year blocks, respectively.

20 VM-20 minimum reserve component on direct basis assumes same reserve type as shown in Net of Reinsurance table.

21 Ceded reserve divided by ceded face amount in thousands.

22 Ceded reserve divided by ceded face amount in thousands.

Deterministic reserves are more deeply negative than even net GAAP reserves, suggesting that the deterministic reserve methodology recognizes profit up front while the GAAP net premium methodology smooths profits over the product lifetime. The relationship (DR < GAAP) reverses later on.

The pattern of reserves for a one year issue block from Phase 2 Sensitivity 2C is shown in Chart 5.1 below.

CHART 5.1

ONE YEAR OF ISSUES PROJECTED TO FUTURE YEARS
RESERVES PER $1,000, DIRECT AND NET

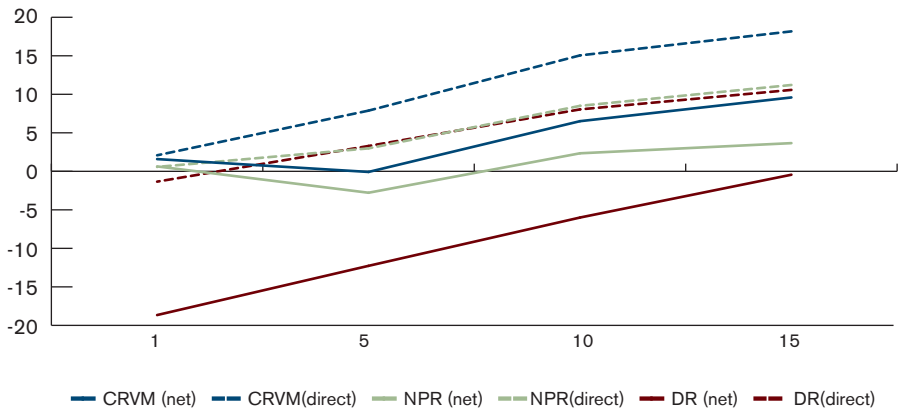


EXHIBIT 6: 10 & 20 YEAR LEVEL TERM MODELED IN AGGREGATE

This block includes 10- and 20-year level premium term to age 95 policies. It also has a reinsurance arrangement whereby approximately 33% of the direct face amount is ceded using a YRT treaty. Per $1,000 net of reinsurance amounts are normalized using the direct face amount. The company submitted stochastic reserves even though this policy group passes the SET.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET LEVEL TERM		DET LIFETIME	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR – DIRECT	0.8%	0.7%	0.7%	0.7%	F	F	F	F
AGGR - NET	1.9%	1.6%	1.8%	1.5%	--	--	--	--

PHASE I (NET) , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM[23]		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	5.82	7.89	5.61	7.50	0.97	1.73	5.61	7.50	DR	DR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGRV	5.39	7.60	5.16	7.18	0.97	1.73	5.16	7.18	DR	DR	109%	104%

PHASE I (NET), RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	5.61	7.50	3.75	6.52	50%	15%

ALTERNATIVE 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	5.16	7.18	3.75	6.52	38%	10%

[23] For this exhibit, VM-20 minimum is the larger of the NPR and DR, because SET ratio is less than 4.5%.

OTHER RESERVES (NET)

ISSUE BLOCK	NET GAAP 1 YR	5 YR
AGGR	(1.38)	0.46

PHASE I (DIRECT; REINSURANCE CREDIT), AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM DIRECT[24] 1 YR	5 YR	VM-20 REINSURANCE RESERVE CREDIT 1 YR	5 YR	CURRENT FORMULAIC RESERVE CREDIT 1 YR	5 YR
AGGR	6.40	8.44	0.79	0.94	0.70	2.11

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM DIRECT 1 YR	5 YR	VM-20 REINSURANCE RESERVE CREDIT 1 YR	5 YR	CURRENT FORMULAIC RESERVE CREDIT 1 YR	5 YR
AGGR	5.91	8.09	0.75	0.91	0.70	2.11

ASSET INFORMATION

	FIXED INCOME STARTING ASSETS				STARTING ASSET TO MODELED RESERVE (ALT 2)			
	GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE	SR		DR	
ISSUE BLOCK					1 YR	5 YR	1 YR	5 YR
1 YEAR ISSUE BLOCK	161.1	34.5	126.6	21.7	100%	99%	104%	105%
5 YEAR ISSUE BLOCK	210.9	30.8	180.1	13.5				

DISCUSSION

The company expected to pass the SET and to fail the DET and these expectations were met.

This policy block demonstrates a significant increase in statutory reserves during the first year from issue, a difference which is great enough to influence a 5-year issue block such that the aggregate reserve for a 5-year issue block is 10-15% greater than current formulaic minimums. The underlying pattern of reserves, as depicted in Sensitivity 2C graphics, clearly shows the relationship of the Deterministic Reserve and current formulaic reserves. The inequality reverses itself sometime between the first and fifth policy years. The Sensitivity 2C results (reserve pattern) and the Phase 1 results are consistent with each other.

The company has pointed out the significant difference between the GAAP reserves it would hold on such a block and the emerging Deterministic Reserves. One reason for this difference is the different

[24] VM-20 minimum reserve component on direct basis assumes same reserve type as shown in Net of Reinsurance table.

approaches to mortality assumptions. The company recognizes the VM-20 approach as significantly more conservative than the GAAP approach. To quantify the difference, a present value of death benefits was taken for each methodology. The VM-20 present value of death benefits is twice the size of a similar item from GAAP. For this company, VM-20 mortality is graded to the industry table in years 26-35. Mortality margins vary between 6% and 8.8%. Margins on lapse, expense and YRT premiums were also modeled, per this company's interpretation of VM-20.

The pattern of reserves from Sensitivity 2C is shown in Chart 6.1 below.

CHART 6.1

ONE YEAR OF ISSUES PROJECTED TO FUTURE YEARS (SENSITIVITY 2C)
RESERVES PER $1,000, DIRECT AND NET

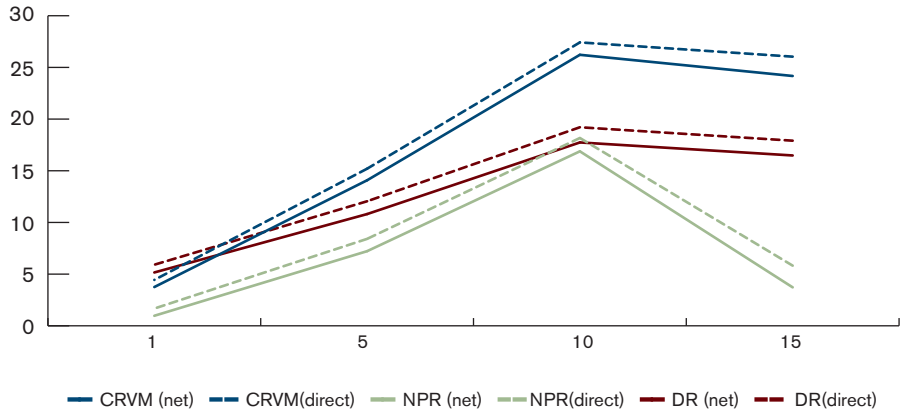


EXHIBIT 7: 10, 15, 20, 30 YEAR LEVEL PREMIUM TERM & ROP

10T, 15T, 20T, 30T are death benefit only. 15R, 20R and 30R products offer death benefit and return of premium benefit. An aggregate block was also modeled.

No reinsurance.

The Phase 1 submission focused only on the 5-year issue block, Alternative 2.

EXCLUSION TEST PANEL

ISSUE BLOCK	SET	DET LEVEL TERM PERIOD	DET LIFETIME
10T	0.3%	F	P
15T	0.6%	F	P
20T	2.5%	F	P
30T	7.9%	F	P
15R	4.6%	P	P
20R	7.4%	P	P
30R	42.0%	F	P
AGGR	4.0%	F	P

PHASE I (NET) , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

	ALTERNATIVE 2; 5 YEAR ISSUE BLOCK				
	SR	DR	NPR	VM-20 MINIMUM	TYPE[25]
10T	2.17	1.34	3.10	3.10	NPR
15T	1.50	0.89	2.52	2.52	NPR
20T	2.13	1.53	1.93	1.93	NPR
30T	1.97	1.59	1.38	1.97	SR
15R	9.87	5.92	5.86	9.87	SR
20R	5.73	4.22	2.52	5.73	SR
30R	3.12	2.80	0.95	3.12	SR
AGGR	1.99	1.56	1.97	1.97	NPR

PHASE I (NET), RATIOS TO CURRENT

	ALTERNATIVE 2; 5 YEAR ISSUE BLOCK		
	VM-20 MINIMUM	CURRENT FORMULAIC	% CHANGE
10T	3.10	7.75	-60%
15T	2.52	7.49	-66%
20T	1.93	6.16	-69%
30T	1.97	7.17	-73%
15R	9.87	27.31	-64%
20R	5.73	12.79	-55%
30R	3.12	8.47	-63%
AGGR	1.97	9.83	-80%

[25] The minimum is evaluated for each model segment individually, then in aggregate. The minimum reserve is determined based on the results in the exclusion test panel.

PHASE I (DIRECT; REINSURANCE CREDIT), AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

No reinsurance.

ASSET INFORMATION

	FIXED INCOME STARTING ASSETS					STARTING ASSET TO RESERVE (ALT 2; 5 YEAR ISSUE BLOCK)		
	GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE		SR	DR	NPR
10T	164.6	29.9	134.7	5.9	10T	142%	231%	100%
15T	164.6	29.9	134.7	5.9	15T	168%	283%	100%
20T	164.6	29.9	134.7	5.9	20T	100%	139%	110%
30T	164.6	29.9	134.7	5.9	30T	98%	122%	141%
15R	164.6	29.9	134.7	5.9	15R	100%	167%	169%
20R	164.6	29.9	134.7	5.9	20R	100%	135%	227%
30R	164.6	29.9	134.7	5.9	30R	100%	112%	331%
AGGR	164.6	29.9	134.7	5.9	AGGR	100%	78%	98%

DISCUSSION

As an aggregate group of policies, the SET is passed and only the NPR and Deterministic Reserves would be required calculations.

This exhibit demonstrates material decreases in statutory reserves for basic term policies, consistent with most of the other exhibits. It also demonstrates similar percentage decreases in statutory reserves for term policies with return of premium, likely due to the ability of the company to recognize its own experience in the VM-20 methodology.

In establishing starting asset levels, the company referred to VM-20 Section 7.D.1. "For each model segment, the company shall select starting assets such that the aggregate annual statement value of the assets at the projection start date equals the estimated value of the minimum reserve allocated to the policies in the appropriate model segment…." Each product block uses a starting asset amount that is within 98% to 102% of the resulting minimum reserve. The *minimum reserve* is at least equal to the NPR, therefore this is where the starting asset level should begin, with increases from that point to reflect a minimum reserve greater than the NPR.

Because the assets supporting these blocks of policies are managed in a single portfolio, the company uses the same starting asset model across all segments. Stochastic reserves were generated using 50 scenarios because of the time involved in processing the stochastic analysis.

EXHIBIT 8: 10, 20 YEAR LEVEL PREMIUM TERM

No reinsurance.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET LEVEL TERM PERIOD	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	3.50%	2.81%	3.43%	2.73%	F	F
20T	3.14%	1.71%	3.36%	1.84%	F	F

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	NOT PROVIDED		(3.10)	(2.01)	0.00	0.19	0.00	0.19	NPR	NPR
20T	NOT PROVIDED		(2.93)	(1.68)	0.00	0.78	0.00	0.78	NPR	NPR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	NOT PROVIDED		(3.03)	(1.96)	0.00	0.19	0.00	0.19	NPR	NPR	1.00	1.00
20T	NOT PROVIDED		(2.98)	(1.76)	0.00	0.78	0.00	0.78	NPR	NPR	1.00	1.00

PHASE I (NET), RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	0.00	0.19	0.01	2.94	-100%	-94%
20T	0.00	0.78	0.52	3.93	-100%	-80%

ALTERNATIVE 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	0.00	0.19	0.01	2.94	-100%	-94%
20T	0.00	0.78	0.52	3.93	-100%	-80%

OTHER RESERVES

ISSUE BLOCK	NET GAAP 1 YR	NET GAAP 5 YR
10T	(3.07)	(1.61)
20T	(2.68)	(1.45)

ASSET INFORMATION

Not provided.

DISCUSSION

The company found the VM-20 mortality assumption setting process difficult. Instead, for anticipated experience, pricing assumptions were used. For prudent estimate assumptions, a margin was added to the pricing assumptions.

The company expected to pass the SET and fail the DET, and its expectations were met.

The progression of Deterministic, Net Premium, GAAP, and CRVM Reserves by policy year for a 1-year issue block is shown in Chart 8.1 and 8.2 below.

CHART 8.1

10T, RESERVES PER $1,000
1-YR ISSUE BLOCK, ALT 2

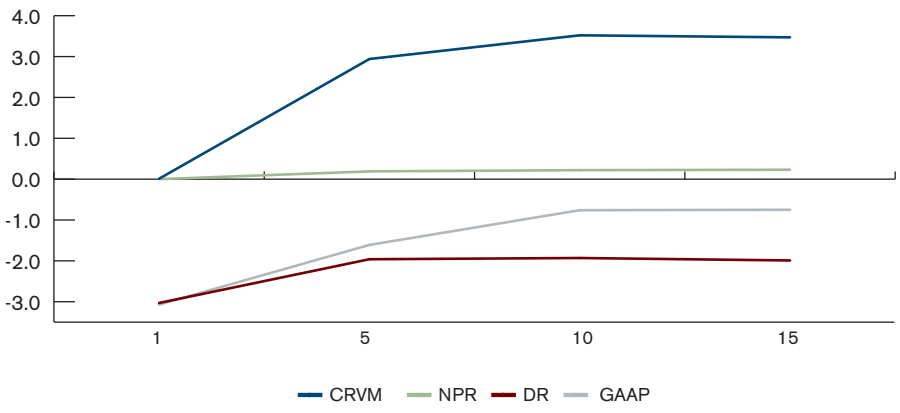


CHART 8.2

20T, RESERVES PER $1,000
1-YR ISSUE BLOCK, ALT 2

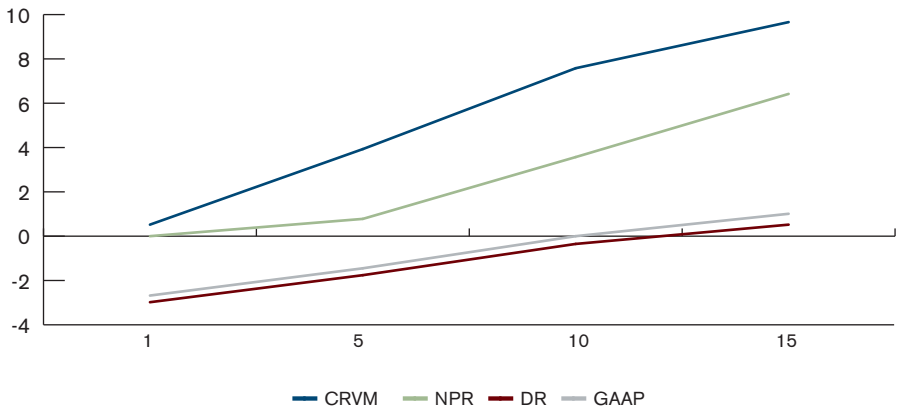


EXHIBIT 9: 10-, 20-, AND 30-YEAR LEVEL TERM MODELED IN AGGREGATE

This block includes 10-, 20-, and 30-year level premium term to age 95 policies. There is a YRT reinsurance arrangement in place. Per $1,000 net of reinsurance amounts are normalized using the direct face amount. The company submitted stochastic reserves even though this policy group passes the SET.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR – DIRECT	NOT PROVIDED		NOT PROVIDED		NOT PROVIDED	
AGGR - NET	2.8%	3.8%	2.9%	3.2%	NOT PROVIDED	

PHASE I (NET) , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM[26]		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	7.14	8.75	6.83	8.54	0.37	1.64	6.83	8.54	DR	DR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM[26]		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	6.53	8.19	5.87	7.59	0.37	1.64	5.87	7.59	DR	DR	116%	113%

PHASE I (NET), RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	6.83	8.54	3.13	6.25	118%	37%

ALTERNATIVE 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
AGGR	5.87	7.59	3.13	6.25	88%	21%

[26] For this exhibit, VM-20 minimum is the larger of the NPR and DR, because SET ratio is less than 4.5%.

OTHER RESERVES (NET)

ISSUE BLOCK	NET GAAP 1 YR	NET GAAP 5 YR
AGGR	NOT PROVIDED	

PHASE I (DIRECT; REINSURANCE CREDIT) , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM DIRECT[27] 1 YR	VM-20 MINIMUM DIRECT[27] 5 YR	VM-20 REINSURANCE RESERVE CREDIT 1 YR	VM-20 REINSURANCE RESERVE CREDIT 5 YR	CURRENT FORMULAIC RESERVE CREDIT 1 YR	CURRENT FORMULAIC RESERVE CREDIT 5 YR
AGGR	7.05	9.06	0.22	0.52	0.00	0.01

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM DIRECT[27] 1 YR	VM-20 MINIMUM DIRECT[27] 5 YR	VM-20 REINSURANCE RESERVE CREDIT 1 YR	VM-20 REINSURANCE RESERVE CREDIT 5 YR	CURRENT FORMULAIC RESERVE CREDIT 1 YR	CURRENT FORMULAIC RESERVE CREDIT 5 YR
AGGR	6.07	8.06	0.20	0.47	0.00	0.01

ASSET INFORMATION

	FIXED INCOME STARTING ASSETS GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE	STARTING ASSET TO RESERVE (ALT 2; 5 YEAR ISSUE BLOCK) SR	DR	NPR
ALT 1	40.7	0.0	40.7	17.7	99%	101%	103%	103%
ALT 2	132.6	17.0	108.2	17.7	98%	99%	109%	107%

DISCUSSION

The company used a credibility-blending approach in developing mortality assumptions. Credibility factors varied by underwriting category–from 27% to 83% for nonsmoker classes and 15% to 45% for smoker classes. The mortality margin ranged from 2% to 12% depending on class and age. It is likely the material increase in VM-20 minimum reserve over current formulaic is primarily due to mortality assumptions. Phase 2 results for Sensitivity 1 (mortality attribution analysis) demonstrate 137% increase when moving from a best estimate without improvement and with margin, to the granular level credibility that was used for Phase 1.

The company noted the Gross OAS for actual company reinvestment assumptions is 100.0 basis points, and the Net OAS is 85.0 basis points. Similar spreads for Alternative 1 are lower than actual and for Alternative 2 are higher than actual.

[27] VM-20 minimum reserve component on direct basis assumes same reserve type as shown in Net of Reinsurance table.

The pattern of reserves from Sensitivity 2C is shown in Chart 9.1 below. This company ran the sensitivity by projecting the 5-year issue block of business rather than the 1-year issue block of business.

CHART 9.1

FIVE YEAR OF ISSUES PROJECTED TO FUTURE YEARS
SENSITIVITY 2C, RESERVES PER $1,000

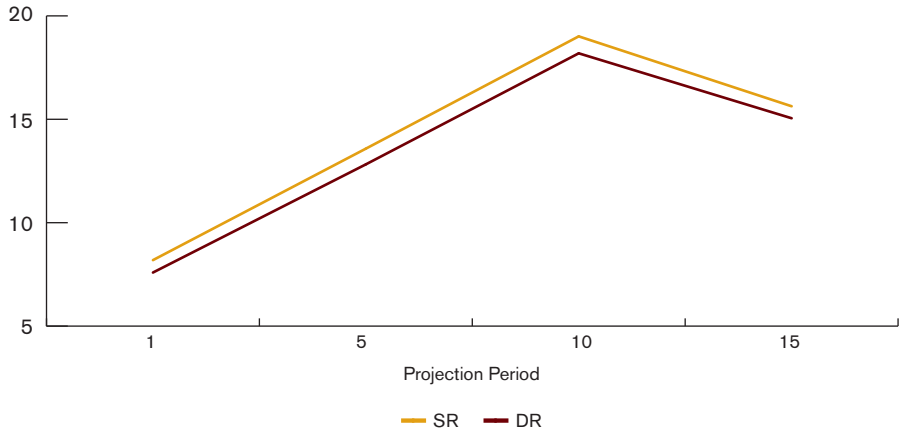


EXHIBIT 10: 10, 15, 20, 30 YEAR LEVEL PREMIUM TERM & AGGR

This block includes policies offering term insurance to attained age 95. Aggregate results are determined as an independent projection of aggregated cash flows. There is no reinsurance in force.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET LEVEL TERM		DET LIFETIME	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	0.9%	1.0%	0.7%	0.8%	P	P	P	P
15T	0.6%	0.6%	0.6%	0.5%	P	P	P	P
20T	3.2%	2.5%	3.0%	2.4%	P	P	P	P
30T	8.9%	8.0%	7.8%	7.0%	F	F	P	P
AGGR	3.6%	3.1%	3.2%	2.8%	P	F	P	P

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE[28]	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	0.00	0.21	(2.13)	(0.46)	0.73	1.52	0.73	1.52	NPR	NPR
15T	0.03	1.80	(1.84)	0.58	0.61	2.43	0.61	2.43	NPR	NPR
20T	0.99	3.05	0.20	2.23	0.41	1.98	0.41	1.98	NPR	NPR
30T	0.57	2.73	0.46	2.59	0.29	1.64	0.57	2.73	SR	SR
AGGR	0.01	1.80	(0.46)	1.57	0.47	1.84	0.47	1.84	NPR	NPR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10T	0.00	0.02	(2.07)	(0.40)	0.73	1.52	0.73	1.52	NPR	NPR	1.00	1.00
15T	0.00	1.62	(2.00)	0.36	0.61	2.43	0.61	2.43	NPR	NPR	1.00	1.00
20T	0.08	2.05	(0.23)	1.70	0.41	1.98	0.41	1.98	NPR	NPR	1.00	1.00
30T	0.01	1.44	(0.47)	1.44	0.29	1.64	0.29	1.64	NPR	NPR	1.96	1.66
AGGR	0.00	1.07	(0.90)	1.02	0.47	1.84	0.47	1.84	NPR	NPR	1.00	1.00

[28] The minimum reserve for each term is evaluated based on its exclusion test results. For example, the 20T Alt 1 SR result is greater than corresponding DR and NPR, yet the 20T passes both exclusion tests.

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
10T	0.73	1.52	2.45	5.28	-70%	-71%
15T	0.61	2.43	2.16	7.33	-72%	-67%
20T	0.41	1.98	2.86	7.02	-86%	-72%
30T	0.57	2.73	4.66	9.07	-88%	-70%
AGGR	0.47	1.84	3.21	7.27	-85%	-75%

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
10T	0.73	1.52	2.45	5.28	-70%	-71%
15T	0.61	2.43	2.16	7.33	-72%	-67%
20T	0.41	1.98	2.86	7.02	-86%	-72%
30T	0.29	1.64	4.66	9.07	-94%	-82%
AGGR	0.47	1.84	3.21	7.27	-85%	-75%

ASSET INFORMATION

	FIXED INCOME STARTING ASSETS				STARTING ASSET TO RESERVE (ALT 2; 5 YEAR ISSUE BLOCK)			
	GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE		SR	DR	NPR
ALT 1 – 10T	NOT PROVIDED				=NPR	=NPR	=NPR	=NPR
ALT 1 – 15T	NOT PROVIDED				=NPR	81%	=NPR	251%
ALT 1 – 20T	NOT PROVIDED				102%	101%	503%	138%
ALT 1 – 30T	NOT PROVIDED				98%	99%	121%	104%
ALT 1 – AGGR	NOT PROVIDED				=NPR	98%	=NPR	112%
ALT 2 – 10T	NOT PROVIDED				=NPR	=NPR	=NPR	=NPR
ALT 2 – 15T	NOT PROVIDED				=NPR	22%	=NPR	100%
ALT 2 – 20T	NOT PROVIDED				=NPR	98%	=NPR	118%
ALT 2 – 30T	NOT PROVIDED				=NPR	100%	100%	
ALT 2 – AGGR	NOT PROVIDED				=NPR	95%	=NPR	100%

DISCUSSION

If treated as an aggregated group of policies, the block would require calculation of only the Net Premium Reserve component. The SET appears to be working as intended, as the longer term period fails this exclusion test. The fact that the SET indicates the 30T product should be made to comply with stochastic modeling requirement is consistent with the Stochastic Reserve exceeding the Net Premium Reserve and Deterministic Reserve for the 30T.

Under VM-20 requirements, the minimum reserves for this block would be reduced from current levels by a material amount, anywhere from 67% to 95%.

The company's anticipated mortality experience is treated as 100% credible. A 5% mortality margin is used.

APPENDIX B

UNIVERSAL LIFE WITH SECONDARY GUARANTEE EXHIBITS

EXHIBIT 11: UNIVERSAL LIFE WITH SECONDARY GUARANTEE

This ULSG block includes products with secondary guarantees that depend on two shadow accounts. Which account operates depends on funding level. The secondary guarantee carries the product to A121. Premiums are assumed paid at the level stipulated at issue until either (a) the policy is fully funded, at which time the premiums cease, or (b) the policy lapses. YRT reinsurance treaty is modeled with no changes to the treaty premiums.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	27.5%	24.8%	26.0%	24.1%		
DIRECT	16.9%	15.5%	15.8%	14.7%	F	F

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	122.28	151.87	122.38	151.23	69.98	96.46	122.38	151.87	DR	SR
DIRECT	151.50	184.30	152.96	184.47	71.35	98.06	152.96	184.47	DR	DR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	93.51	122.01	93.04	120.70	69.98	96.46	93.51	122.01	SR	SR	1.31	1.24
DIRECT	117.90	149.42	117.90	148.99	71.35	98.06	117.90	149.42	SR	SR	1.30	1.23

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
NET OF REINS	122.38	151.87	73.78	90.32	66%	68%
DIRECT	152.96	184.47	75.15	91.92	104%	101%
REINSURANCE RESERVE CREDIT	30.58	32.60	1.37	1.60	2132%	1938%

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
NET OF REINS	93.51	122.01	73.78	90.32	27%	35%
DIRECT	117.90	149.42	75.15	91.92	57%	63%
REINSURANCE RESERVE CREDIT	24.39	27.41	1.37	1.60	1680%	1613%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
297.0	31.0	175.0	8

STARTING ASSETS TO MODELED RESERVE

ALTERNATIVE 1	SR 1 YR	SR 5 YR	DR 1 YR	DR 5 YR
NET OF REINS	101%	99%	101%	100%
DIRECT	81%	82%	80%	82%
ALTERNATIVE 2				
NET OF REINS	99%	100%	100%	101%
DIRECT	79%	81%	79%	82%

DISCUSSION

As the company expected, the block fails both exclusion tests. The SET ratio on a net of reinsurance basis appears materially higher than on a direct basis. The SET ratio is calculated as A/B where A is a difference between two reserve amounts (a maximum and a base reserve), and B is the present value of benefits less reinsurance. When comparing direct and net of reinsurance ratios, the numerator, A, changes very little because the difference in the two reserves does not change much. However, the denominator, B, changes materially, making the net of reinsurance ratio materially higher than the direct ratio.

It is also evident that the methodology behind the final (or minimum) net of reinsurance reserve and the direct reserve could be different. In this case study, under Alternative 1, the 5-year block net of reinsurance reserve is a Stochastic Reserve, and on a direct basis is a Deterministic Reserve. This condition appears consistent with VM-20 Section 8.D.2.a.

Because reinsurance treaty premiums are unchanged in the model, and the mortality used in the valuation exercise is more conservative than the mortality on which the treaty premiums were based, the reinsurance cash flows are a benefit to the projected aggregate cash flows. As a result, the percentage increase in VM-20 minimums over current minimums is unbalanced: nearly twice as high on a direct basis as on a net of reinsurance basis.

In this case study, the mortality assumption is credibility-adjusted per VM-20 requirements. The aggregate level credibility factor is 48.2% for non-tobacco risks and 49.9% for tobacco risks. Mortality rates are graded to industry rates over a five-year period beginning in duration 26. The mortality margin ranges from 7.5% to 13.8%

The company uses a 200 scenario set in determining the Stochastic Reserve. The graphs below depict:

Chart 11.1 The pattern of scenario reserves from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves, and the relation of the Deterministic Reserve, Net Premium Reserve and current formulaic reserves to the scenario reserve distribution. Using Alternative 2 would provide much the same relationships.

Chart 11.2 The pattern of reserve from one year of issues projected out 5, 10 and 15 years. This chart demonstrates the NPR component (or floor reserve) crossing over the modeled components (DR, SR) at about the 10th policy year.

CHART 11.1

RESERVES PER $1,000
5 YR BUS, ALT 1, NET OF REINS

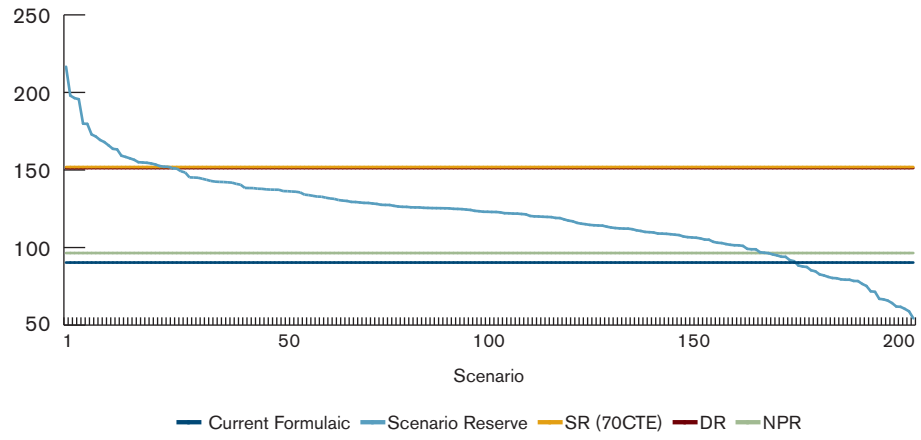


CHART 11.2

1-YEAR ISSUE BLOCK
PROJECTION OF RESERVES PER $1,000

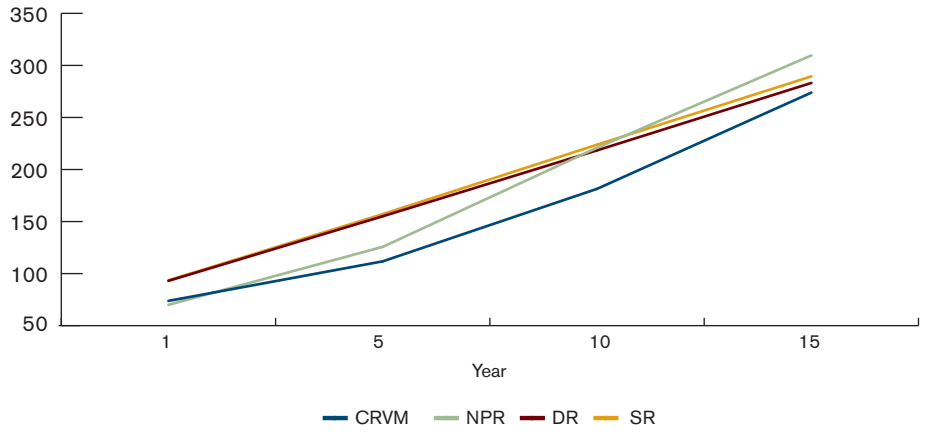


EXHIBIT 12: UNIVERSAL LIFE WITH SECONDARY GUARANTEE

This product has a secondary guarantee that depends upon a specified premium test. The reinsurance in force is YRT on excess amounts over $1 Million. Approximately 10% of the face amount is ceded in the model projections.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	7.2%	6.0%	6.4%	5.3%	F	F

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	66.02	79.52	45.79	62.79	38.45	62.72	66.02	79.52	SR	SR
DIRECT	66.29	79.88	46.02	63.09	38.50	62.78	66.29	79.88	SR	SR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	56.88	71.42	34.61	52.75	38.45	62.72	56.88	71.42	SR	SR	1.16	1.11
DIRECT	57.15	71.80	34.78	52.97	38.50	62.78	57.15	71.80	SR	SR	1.16	1.11

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	66.02	79.52	72.88	96.76	-9%	-18%
DIRECT	66.29	79.88	72.93	96.82	-9%	-17%
REINSURANCE RESERVE CREDIT	0.27	0.36	0.05	0.06	440%	500%

ALTERNATIVE 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	56.88	71.42	72.88	96.76	-22%	-26%
DIRECT	57.15	71.80	72.93	96.82	-22%	-26%
REINSURANCE RESERVE CREDIT	0.27	0.38	0.05	0.06	575%	533%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
209.0	32.0	177.0	20

STARTING ASSETS TO MODELED RESERVE

	SR		DR	
ALTERNATIVE 1	1 YR	5 YR	1 YR	5 YR
NET OF REINS	101%	101%	146%	127%
DIRECT	101%	100%	145%	127%
ALTERNATIVE 2				
NET OF REINS	100%	101%	164%	137%
DIRECT	99%	101%	163%	136%

DISCUSSION

This is the only product block in this report that is solely specified premium test for the secondary guarantee.

The company uses company experience credibility-weighted with industry tables. Credibility factors are applied to rate classes separately and range from 25% to 75%. The margin on mortality rate is 5%.

The stochastic reserve analysis is performed with 1,000 scenarios. Chart 12.1 below depicts the distribution of scenario reserves from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves and the relation of the Deterministic Reserve, Net Premium Reserve, and current formulaic reserves to the scenario reserve distribution. Using Alternative 2 in the graph would provide much the same relationships.

CHART 12.1

RESERVES PER $1,000
5 YR BUS, ALT 1, NET OF REINS

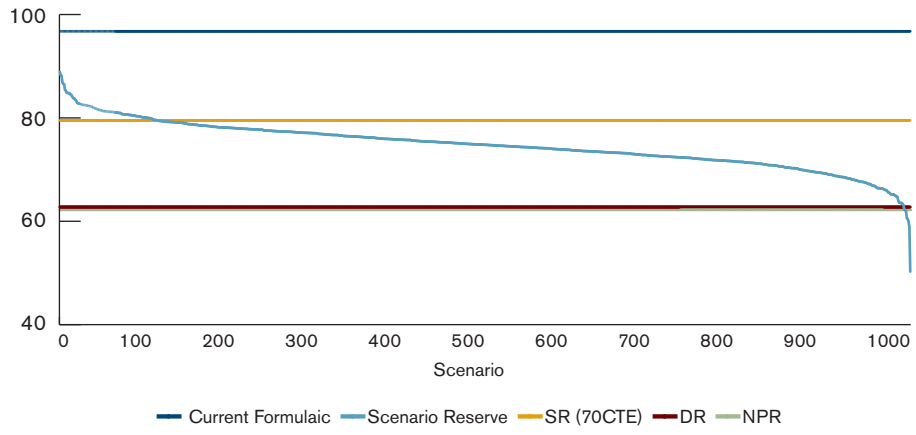


EXHIBIT 13: TERM UNIVERSAL LIFE WITH SECONDARY GUARANTEE

This ULSG product has a lifetime secondary guarantee with a multiple charge shadow account structure. Specifically, there is one shadow account with charges and credits that vary based upon the premium payment level. There are three plan designs corresponding to three level premium payment options over 10, 20, and 30 years. These options are designed to facilitate lower-level premiums for an initial coverage period followed by higher-level premiums for the remaining lifetime period. The product block was also tested as a combined segment (AGGR). There is YRT reinsurance in force on policies in excess of $1 million.

The Alternative 1 results are provided only for the AGGR plan segment as it was clear that this alternative would produce reserves significantly higher than Alternative 2 comparable reserves.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
10			9.1%	8.0%		
20	NOT PROVIDED		5.9%	6.0%	NOT PROVIDED	
30			4.1%	4.2%		
AGGR			5.9%	6.2%		

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR[29]		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS										
10				8.68						
20				8.84						
30				7.61						
AGGR	5.25	7.51	5.47	8.27	0.00	3.58	5.47	8.27	DR	DR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS												
10	1.35	4.20		4.30				4.30	DR			
20	4.61	5.64		6.50				6.50	DR			
30	3.98	4.78		6.19				6.19	DR			
AGGR	2.32	4.01	3.57	5.87	0.00	3.58	3.57	5.87	DR	DR	1.53	1.41

[29] For purposes of the Impact Study, policies were assumed issued at beginning of calendar year, to simplify the analysis. This is why the 1-year block NPR is $0.00.

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
NET OF REINS						
10		8.68	0.82	1.20		623%
20		8.84	1.11	1.87		373%
30		7.61	0.89	1.64		364%
AGGR	5.47	8.27	1.00	1.68	447%	392%

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
NET OF REINS						
10		4.30	0.82	1.20		258%
20		6.50	1.11	1.87		248%
30		6.19	0.89	1.64		277%
AGGR	3.57	5.87	1.00	1.68	257%	249%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
NOT PROVIDED			

STARTING ASSETS TO MODELED RESERVE

	PLAN TYPE 10	20	30	AGGR
ALTERNATIVE 1				
NET OF REINS				
1 YR				91%
5 YR				101%
ALTERNATIVE 2				
NET OF REINS				
1 YR	0%	38%	58%	69%
5 YR	0%	80%	107%	97%

DISCUSSION

Mortality was credibility-blended using an approach that determined credibility factors at the level of underwriting class, gender, and duration.

Chart 13.1 below depicts reserve projections this company developed during its analysis of VM-20. This chart includes the following reserve types:

- (NPR) Net premium reserve per Section 3 of VM-20.
- (CRVM) AG 38 reserve.
- (SR) CTE70 Stochastic reserve determined using VM-20 required assumptions including credibility blended mortality; Canadian Term to 100 lapse assumptions with shock lapse; net of reinsurance; Alt 2.
- (X-factor with pad) CTE70 Stochastic reserve determined using X-factor mortality and including a 10% mortality margin; Canadian Term to 100 lapse assumptions with shock lapse; net of reinsurance; Alt 2.
- (antic exp) 90th percentile stochastic reserve determined using the company's anticipated experience (X-factor mortality; no margin added, pricing lapse assumptions with shock lapse; net of reinsurance; Alt 2).

For this company, the Chart 13.1 analysis demonstrates the level of conservatism built into the VM-20 mortality assumption requirements as well as the conditional tail expectation methodology. The difference between X-factor with pad line and antic exp line quantifies the difference in a 90th percentile reserve without margin and a CTE70 reserve with 10% margin. The difference between the SR line and X-factor with pad line quantifies the conservatism in the VM-20 mortality requirement of credibility blending to an industry table. Lastly, for this product, the NPR does not appear to serve very well as a floor reserve, as seen by the NPR line.

This company also found their product very sensitive to the requirement of starting assets within a 2% tolerance of the modeled reserve. In fact, the requirement did not make sense for this product. The company found that as it tested the DR with iterations of starting assets, the ending surplus amount (at the very end of the projection) reacted wildly. It suggest an optional approach to the 2% collar on starting assets: a starting asset amount that resolves the projection to a near $0 ending surplus without negative interim surplus values.

CHART 13.1

1-YEAR ISSUE BLOCK, PROJECTION OF RESERVES PER $1,000

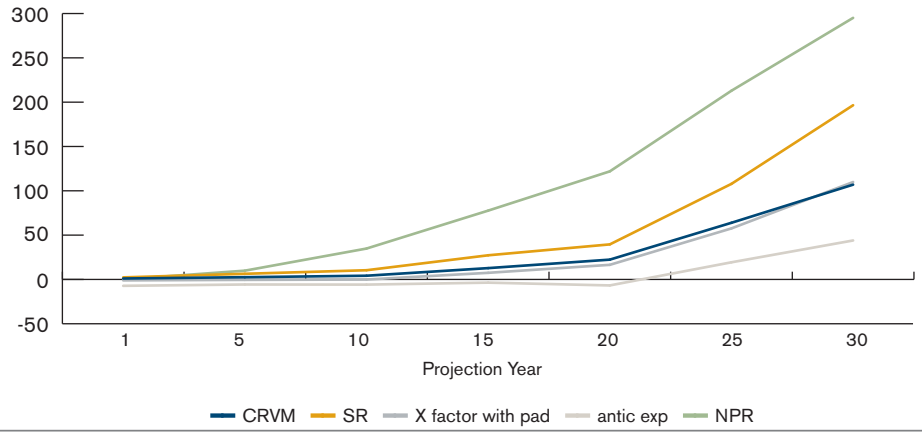


EXHIBIT 14: UNIVERSAL LIFE WITH SECONDARY GUARANTEE

The ULSG product has a lifetime secondary guarantee that depends upon the performance of a single shadow account.

There is YRT reinsurance in force on this block. The reinsurance is a 90/10 quota share arrangement.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	8.7%	6.8%	7.6%	6.5%		
DIRECT	11.8%	8.6%	9.4%	7.9%	F	F

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	17.83	51.46	19.41	41.59	37.79	65.64	37.79	65.64	NPR	NPR
DIRECT	36.15	63.57	31.89	54.40	38.12	66.02	38.12	66.02	NPR	NPR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	0.82	48.23	6.86	21.48	37.79	65.64	37.79	65.64	NPR	NPR	1.00	1.00
DIRECT	3.28	50.18	15.30	37.05	38.12	66.02	38.12	66.02	NPR	NPR	1.00	1.00

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	37.79	65.64	64.21	115.70	-41%	-43%
DIRECT	38.12	66.02	65.66	118.30	-42%	-44%
REINSURANCE RESERVE CREDIT	0.33	0.38	1.45	2.60	-77%	-85%

ALTERNATIVE 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	37.79	65.64	64.21	115.70	-41%	-43%
DIRECT	38.12	66.02	65.66	118.30	-42%	-44%
REINSURANCE RESERVE CREDIT	0.33	0.38	1.45	2.60	-77%	-85%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
		NOT PROVIDED	

STARTING ASSETS TO MODELED RESERVE

	SR		DR	
ALTERNATIVE 1	1 YR	5 YR	1 YR	5 YR
NET OF REINS	214%	86%	196%	100%
DIRECT	105%	86%	120%	100%
ALTERNATIVE 2				
NET OF REINS	4666%	86%	556%	100%
DIRECT	1163%	86%	249%	100%

Starting assets were set equal to the NPR (direct) for the 1-year issue blocks. Starting assets were set equal to the DR (direct or net, as appropriate) for the 5-year issue blocks.

DISCUSSION

This policy group exhibits an unusual characteristic in that it fails both exclusion tests yet Deterministic and Stochastic Reserves are both less than Net Premium Reserves. The company continues to look into these relationships, as it would expect the NPR to fall at or below the modeled reserve amounts. In its list of characteristics of the analysis that may have produced such a result, it includes the conditions listed below.

1. Mortality rates used in the Phase 1 modeled reserves are consistent with cash-flow testing assumptions (essentially company experience plus a margin); while the NPR is based on 2001 CSO.

2. Modeled reserves reflect some degree of cash-flow benefit from the YRT arrangement since YRT treaty premiums were unchanged.

3. The discount rate of the NPR methodology is fixed at 5% while for modeled reserves, depending on the reinvestment alternative (Alt 1 or Alt 2) the result is greater than 5%, particularly in the out years.

4. The starting asset amounts are too high in some of the runs.

Within the VM-20 modeled components, the Alt 1/Alt 2 ratios are quite high. For example, the ratio for the 5-year issue block, DR, direct is 147% (54.40/37.05). This result suggests the modeled components are highly sensitive to the reinvestment assumption.

Under VM-20, this block would experience a material decrease in minimum reserves from current levels of 41% to 44%, all of which comes from differences between NPR methods and current CRV methods.

The stochastic reserve analysis is performed with 200 scenarios. Chart 12.1 below depicts the distribution of scenario reserves from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves and the relation of the Deterministic Reserve, Net Premium Reserve, and current formulaic reserves to the scenario reserve distribution. Using Alternative 2 in the graph would provide much the same relationships.

CHART 14.1

RESERVES PER $1,000
5 YR BUS, ALT 1, NET OF REINS

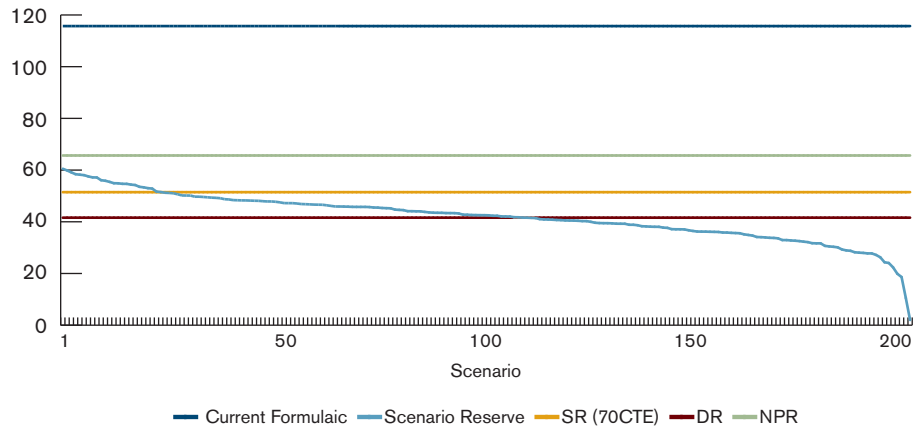


EXHIBIT 15: UNIVERSAL LIFE WITH SECONDARY GUARANTEE

The ULSG product included in this block has a secondary guarantee that depends upon the performance of multiple shadow accounts. Which shadow account is referenced depends upon funding level. There is both a single-life and a joint-life product in this block. There is reinsurance in force on these policies under a YRT treaty arrangement.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	26.8%	21.0%	23.8%	19.2%	NOT PROVIDED	
DIRECT	NOT PROVIDED		NOT PROVIDED		NOT PROVIDED	

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	74.80	107.88	73.73	104.91	56.08	101.58	74.80	107.88	SR	SR
DIRECT	93.68	134.75	103.64	135.76	56.33	101.87	103.64	135.76	DR	DR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	53.85	88.67	49.73	85.49	56.08	101.58	56.08	101.58	NPR	NPR	1.33	1.06
DIRECT	73.35	112.50	73.65	111.47	56.33	101.87	73.65	112.50	DR	SR	1.41	1.21

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	74.80	107.88	47.00	85.60	59%	26%
DIRECT	103.64	135.76	47.25	85.89	119%	58%
REINSURANCE RESERVE CREDIT	28.84	27.88	0.25	0.29	11436%	9514%

ALTERNATIVE 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	56.08	101.58	47.00	85.60	19%	19%
DIRECT	73.65	112.50	47.25	85.89	56%	31%
REINSURANCE RESERVE CREDIT	19.80	10.92	0.25	0.29	7820%	3666%

FIXED INCOME STARTING ASSETS			
GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
195	28	167	28

STARTING ASSETS TO MODELED RESERVE				
	SR		DR	
ALTERNATIVE 1	1 YR	5 YR	1 YR	5 YR
NET OF REINS	99%	101%	101%	104%
DIRECT	79%	81%	72%	80%
ALTERNATIVE 2				
NET OF REINS	99%	101%	107%	105%
DIRECT	72%	80%	72%	81%

DISCUSSION

The company modeling this block noted the material increase in VM-20 minimum reserves over current formulaic amounts. The floor reserve, NPR, also comes in higher than current formulaic. The company attributes the higher modeled reserves primarily to the mortality assumption required by VM-20. In determining the mortality, the company uses a credibility blending process where credibility is 85% which is held constant during the first 10 years of the projection, then graded to 0% credibility by projection year 20. The Underwriting Criteria Scoring tool is used to map into an industry table. The result of this mapping does not produce reasonable results, as company experience is well below what the mapped mortality table suggests. The company applies a mortality margin of 4.6% to 7.4% varying by issue age.

In the Phase 2 work, this company estimates that 18-19% of the Phase 1 modeled reserve can be attributed to the conservatism in the VM-20 mortality assumption.[30]

The block is sensitive to the reinvestment assumption, demonstrated by the Alt 1/Alt 2 ratios above.

Chart 15.1 below depicts the distribution of scenario reserves from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves and the relation of the Deterministic Reserve, Net Premium Reserve (direct), and current formulaic reserve to the scenario reserve distribution.

Chart 15.2 provides the company's Phase 2 Sensitivity 2c result per $1,000 of insurance amount. This sensitivity tracks one year of issue at valuation and through projected periods 5, 10, and 15 years out. The SR and DR track together fairly close. The NPR takes an unexpected trajectory well above both modeled reserves. The graphic includes direct reserves. The chart below the graphic provides direct, net of reinsurance, and the SET result as well, for both reinvestment alternatives. The SET trends lower as the block ages.

[30] By comparing Sensitivity 1a reserve to Phase 1 reserve.

CHART 15.1

RESERVES PER $1,000
5 YR BUS, ALT 1, NET OF REINS

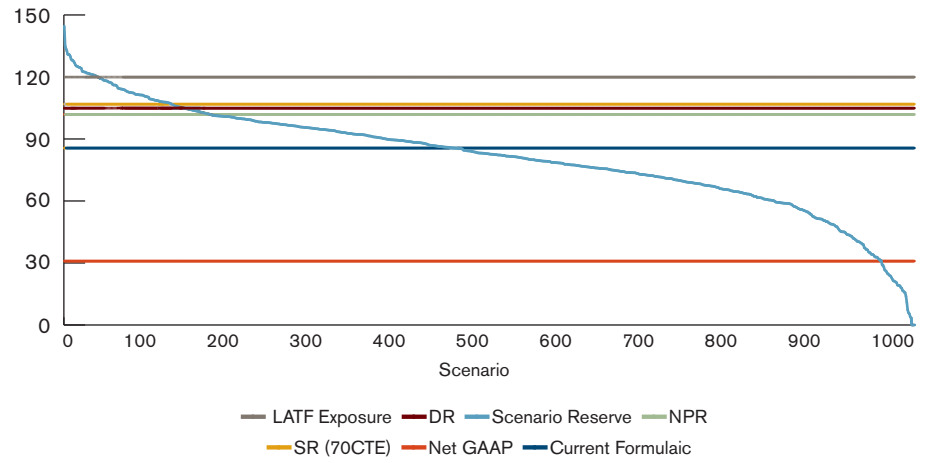


EXHIBIT 16: UNIVERSAL LIFE WITH SECONDARY GUARANTEE

The ULSG product included in this block has a multiple shadow account structure. It is a single life product. There is YRT reinsurance in force. Included with the Phase 1 results are the results of Sensitivity 2a, a 10-year issue block.

EXCLUSION TEST PANEL

	SET: ALT 1			SET: ALT 2			DET		
ISSUE BLOCK	1 YR	5 YR	10 YR	1 YR	5 YR	10 YR	1 YR	5 YR	10 YR
NET OF REINS	7.4%	5.0%	2.5%	6.8%	4.6%	2.4%			
DIRECT	NOT PROVIDED			NOT PROVIDED			F	F	F

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC			DETERMINISTIC			NPR		
ISSUE BLOCK	1 YR	5 YR	10 YR	1 YR	5 YR	10 YR	1 YR	5 YR	10 YR
NET OF REINS	105.49	136.11	162.10	109.05	140.12	166.07	73.21	95.45	135.59
DIRECT	112.16	143.43	171.01	116.35	147.63	175.17	73.67	95.91	136.05

	VM-20 MINIMUM			TYPE		
ISSUE BLOCK	1 YR	5 YR	10 YR	1 YR	5 YR	10 YR
NET OF REINS	109.05	140.12	166.07	DR	DR	DR
DIRECT	116.35	147.63	175.17	DR	DR	DR

ALTERNATIVE 2

	STOCHASTIC			DETERMINISTIC			NPR		
ISSUE BLOCK	1 YR	5 YR	10 YR	1 YR	5 YR	10 YR	1 YR	5 YR	10 YR
NET OF REINS	89.40	123.34	153.23	93.31	127.40	154.96	73.21	95.45	135.59
DIRECT	95.49	130.52	161.21	99.72	134.72	164.31	73.67	95.91	136.05

	VM-20 MINIMUM			TYPE		
	1 YR	5 YR	10 YR	1 YR	5 YR	10 YR
	93.31	127.40	154.96	DR	DR	DR
	99.72	134.72	164.31	DR	DR	DR

	ALT 1/ALT 2 VM-20 MINIMUM		
	1 YR	5 YR	10 YR
NET OF REINS	1.17	1.10	1.07
DIRECT	1.17	1.10	1.07

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	VM-20 MINIMUM 10 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	CURRENT FORMULAIC 10 YR	% CHANGE 1 YR	% CHANGE 5 YR	% CHANGE 10 YR
NET OF REINS	109.05	140.12	166.07	93.72	119.00	153.91	16%	18%	8%
DIRECT	116.35	147.63	175.17	94.51	120.18	155.44	23%	23%	13%
REINSURANCE RESERVE CREDIT	7.30	7.51	9.10	0.79	1.18	1.53	824%	536%	495%

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	VM-20 MINIMUM 10 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	CURRENT FORMULAIC 10 YR	% CHANGE 1 YR	% CHANGE 5 YR	% CHANGE 10 YR
NET OF REINS	93.31	127.40	154.96	93.72	119.00	153.91	0%	7%	1%
DIRECT	99.72	134.72	164.31	94.51	120.18	155.44	6%	12%	6%
REINSURANCE RESERVE CREDIT	6.41	7.32	9.35	0.79	1.18	1.53	711%	520%	511%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
223	19	204	25

STARTING ASSETS TO MODELED RESERVE

The book values of starting assets were not included in the submission; however, the company states that overall starting asset levels are within 2% of either the CTE70 Stochastic Reserve or the Deterministic Reserve.

DISCUSSION

This company determined mortality assumption using a credibility-blending approach. The aggregate level credibility factor is 80%. This factor is held level for the first 10 policy years, and graded to 0% credibility by the 20th year. We use the Limited Fluctuation Credibility Method. The use of the Underwriting Criteria Scoring tool was attempted but we are not comfortable with these results. Instead, we are using the RR100 mortality table as our industry table, even though our expectations for mortality are lower than RR100 for most periods and for most cells.

We use credibility factors that vary by risk class. The mortality in the analysis is influenced by our pricing mortality expectations and input from reinsurers. The mortality margin ranges from 4.2% to 6.7% depending on issue age.

Canadian Term to 100 lapse rates is our basis for lapse assumption, without any explicit margin, since we feel these rates are conservative in relation to the company's expectation for lapse activity.

The reinsurance cash flows assume reinsurance premiums equal to treaty premiums. We made no adjustments to reinsurance premiums for the VM-20 mortality assumption. Reinsurance cash flows are a net benefit in our projections.

Chart 16.1 below depicts the distribution of scenario reserves from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves and the relation of the Deterministic Reserve, Net Premium Reserve, and current formulaic reserve to the scenario reserve distribution.

CHART 16.1

RESERVES PER $1,000
5-YR BUS, ALT 1, NET OF REINS

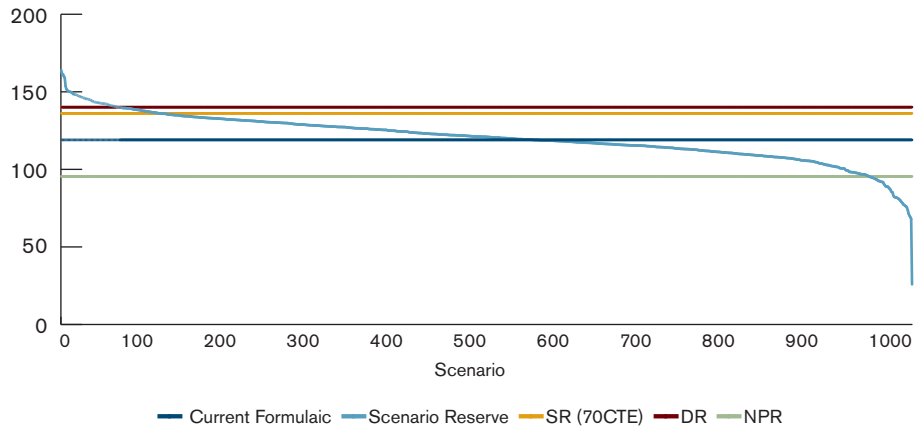


EXHIBIT 17: UNIVERSAL LIFE WITH SECONDARY GUARANTEE

The ULSG product included in this block has a secondary guarantee shadow account with dual cost of insurance charge structure. There is YRT reinsurance in force with premiums paid quarterly so there is no unearned premium on the valuation date. As a result, net and direct reserve values are the same.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	10.2%	7.6%	7.4%	5.7%	NOT PROVIDED	

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	32.51	52.26	31.17	49.25	NOT PROVIDED		32.51	52.26	SR	SR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	23.91	43.79	20.99	40.85	NOT PROVIDED		23.91	43.79	SR	SR	1.36	1.19

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	32.51	52.26	24.43	49.42	33%	6%

ALTERNATIVE 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	23.91	43.79	24.43	49.42	-2%	-11%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
NOT PROVIDED			

STARTING ASSETS TO MODELED RESERVE

	SR		DR[31]	
ALTERNATIVE 1	**1 YR**	**5 YR**	**1 YR**	**5 YR**
NET OF REINS	**100%**	**100%**	**78%**	**100%**
DIRECT	**100%**	**100%**	**78%**	**100%**
ALTERNATIVE 2				
NET OF REINS	**98%**	**101%**	**116%**	**121%**
DIRECT	**98%**	**101%**	**116%**	**121%**

DISCUSSION

The mortality assumption used is a credibility-blended approach using credibility factors that vary by risk class and policy year. Credibility factors for nonsmokers range from 61% in the initial policy years to 16% by the 25th year. For smokers, they range from 26% in the initial policy years to 6% by the 25th year. The margin on mortality ranges from 3% to 10%. The company feels the derived mortality assumption is conservative when compared to assumptions used in other of the company's modeling exercises.

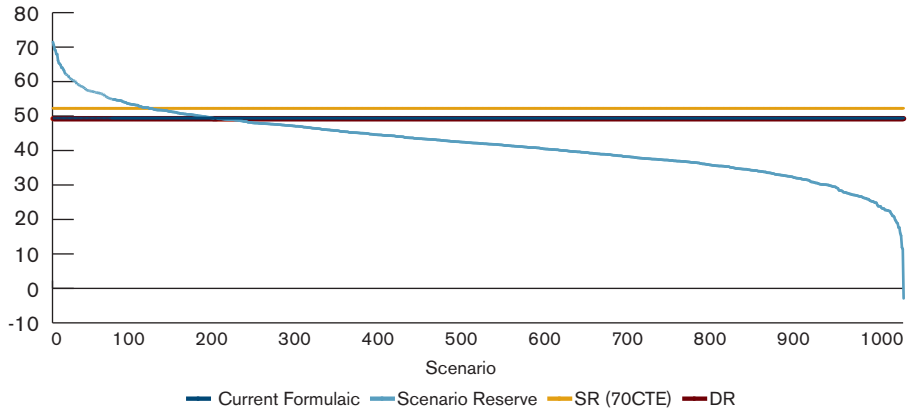
The company was unable to include the NPR calculations in its submission due to system constraints. The projection platform was unable to accommodate the NPR technical requirements for the company's product structure in time for including this element in its submission. In general, processing time for VM-20 components is incredibly long. The intense time commitment suggests that shortcuts may be necessary for quarterly reporting. The 2% collar on starting assets does not help the run-time problem at all.

The company feels its current formulaic reserves are generally among the more conservative in the industry.

Chart 17.1 below depicts the distribution of scenario reserves from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves and the relation of the Deterministic Reserve, and current formulaic reserve to the scenario reserve distribution.

CHART 17.1

RESERVES PER $1,000, 5 YR BUS, ALT 1, NET OF REINS



[31] Starting assets for the deterministic reserve runs were set equal to current formulaic reserve amounts.

EXHIBIT 18: UNIVERSAL LIFE WITH SECONDARY GUARANTEE

The ULSG product in this block has a lifetime secondary guarantee that depends on the performance of a single shadow account. The product was designed to be marketed as either an accumulation product or a death benefit protection product. To date, the in-force policies are primarily funded as death benefit protection. There is no reinsurance modeled on this block.

Results using reinvestment Alternative 1 were not submitted.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
DIRECT	NOT PROVIDED		9.0%	7.8%	F	F

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	NOT PROVIDED		NOT PROVIDED		NOT PROVIDED		NOT PROVIDED		NOT PROVIDED	

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
DIRECT	102.12	141.90	96.01	127.71	39.81	65.54	102.12	141.90	SR	SR

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
DIRECT	NOT PROVIDED		NOT PROVIDED		NOT PROVIDED	

ALTERNATIVE 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
DIRECT	102.12	141.90	53.64	101.35	90%	40%

FIXED INCOME STARTING ASSETS			
GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
223	25	198	20

STARTING ASSETS TO MODELED RESERVE				
	SR		DR	
ALTERNATIVE 1	1 YR	5 YR	1 YR	5 YR
	NOT PROVIDED			
ALTERNATIVE 2				
DIRECT	99%	98%	105%	109%

DISCUSSION

The Net Premium Reserves that emerge from this company's study are much lower than the company expected.

Because the company's initial assessment of its credibility indicated the credibility would be very low, the projections were completed using 100% of the 2008 VBT with no explicit margin on mortality. Lapses were projected as 90% of the company's anticipated experience, where -10% is the explicit margin. There are also no lapses if the policy's secondary guarantee is positive while the fund value is $0.

Chart 18.1 below depicts the distribution of scenario reserves from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves and the relation of the Deterministic Reserve, and current formulaic reserve to the scenario reserve distribution.

The company did not expect the outcome of the impact study to show a NPR amount as low as this, nor a SR component as high as the amounts that emerged. As a result, the company is reviewing the assumptions, which may be overly conservative. The company suggests that if revised assumptions were implemented, the change to modeled reserve amounts could be -10% to -20%. The company also indicated that if the mortality assumption had been defined as pricing plus a margin, the SR and DR could decrease by 10% to 15%.

CHART 18.1

RESERVES PER $1,000
5 YR BUS, ALT 2

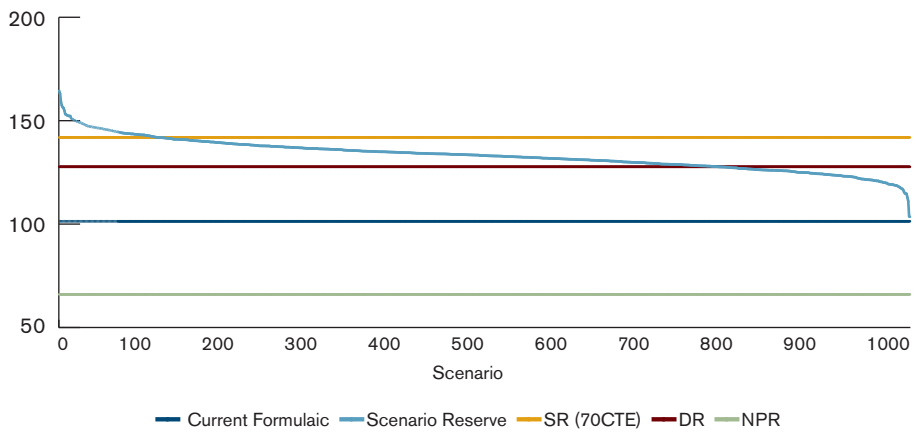


EXHIBIT 19: UNIVERSAL LIFE WITH SECONDARY GUARANTEE

This block includes a ULSG product that has a minimum premium for 10 years, followed by a lapse protection value to attained age 121. The lapse protection value (LPV) component is a two-tier cost of insurance structure shadow account. The secondary guarantee depends upon meeting the specified premium criteria during the first 10 policy years, then upon the performance of the LPV in the later policy years.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	13.9%	8.9%	14.2%	11.8%	NOT PROVIDED	
DIRECT	NOT PROVIDED		NOT PROVIDED		NOT PROVIDED	

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	87.79	135.79	72.52	108.38	69.55	NOT	87.79	135.79	SR	SR
DIRECT	94.16	143.37	79.22	115.19	69.55	PROVIDED	94.16	143.37	SR	SR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	74.45	119.19	53.14	86.10	69.55	NOT	74.45	119.19	SR	SR	1.18	1.14
DIRECT	80.73	127.68	58.70	91.86	69.55	PROVIDED	80.73	127.68	SR	SR	1.17	1.12

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	87.79	135.79	67.21	148.06	31%	-8%
DIRECT	94.16	143.37	67.33	148.31	40%	-3%
REINSURANCE RESERVE CREDIT	6.37	7.58	0.12	0.25	5208%	2932%

ALTERNATIVE 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	74.45	119.19	67.21	148.06	11%	-19%
DIRECT	80.73	127.68	67.33	148.31	20%	-14%
REINSURANCE RESERVE CREDIT	6.28	8.49	0.12	0.25	5133%	3296%

FIXED INCOME STARTING ASSETS

	GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
ALT 1	40.7	0	40.7	17.7
ALT 2	132.6	17	108.2	17.7

STARTING ASSETS TO MODELED RESERVE

	SR		DR	
ALTERNATIVE 1	1 YR	5 YR	1 YR	5 YR
NET OF REINS	99%	101%	121%	125%
DIRECT	100%	99%	111%	118%
ALTERNATIVE 2				
NET OF REINS	98%	99%	142%	141%
DIRECT	99%	100%	128%	132%

DISCUSSION

This company is surprised to find the modeled ULSG VM-20 reserves emerging as high as they are. The credibility-blending result together with the margin that must be included produces an assumption for VM-20 that is much higher than the company's current assumption for internal projections. Credibility factors vary by underwriting category: 55%-68% for standard nonsmoker classes, 12%-18% for preferred nonsmoker and super preferred nonsmoker classes, 24%-31% for standard smoker classes, and 0% for preferred nonsmoker classes. The credibility factors linearly reduce to zero between durations 11 and 20. The mortality margin ranged from 4% to 16% depending on class and age.

In Phase 2 work, the Stochastic Reserve for this block is shown to be 58% higher than an otherwise similar Stochastic Reserve calculated using best-estimate mortality (Sensitivity 1a.).

The company noted the Gross OAS for actual company reinvestment assumptions is 100.0 basis points, and the Net OAS is 85.0 basis points. Similar spreads for Alternative 1 are lower than actual and for Alternative 2 are higher than actual.

Chart 19.1 below depicts the distribution of scenario reserves over 1,000 scenarios from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves and the relation of the Deterministic Reserve, and current formulaic reserve to the scenario reserve distribution.

The pattern of reserves from Sensitivity 2C is shown in Chart 19.2 below. This company ran the sensitivity by projecting the 5-year issue block of business rather than the 1-year issue block of business.

CHART 19.1

RESERVES PER $1,000
5 YR BUS, ALT 1, NET OF REINS

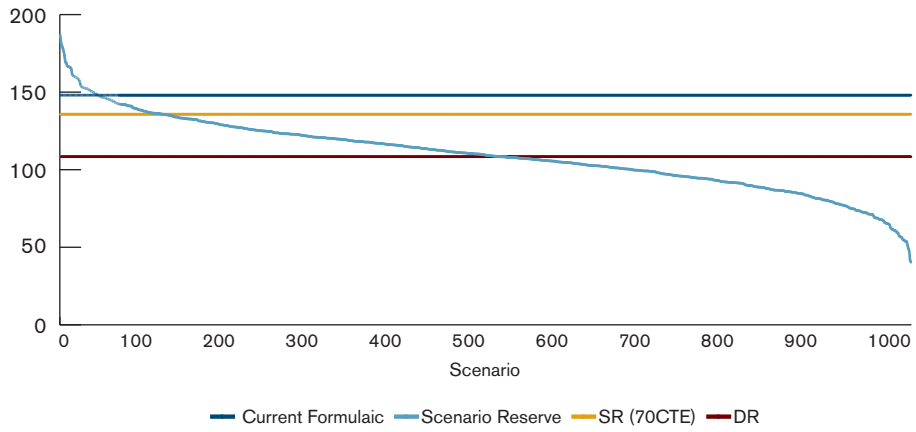
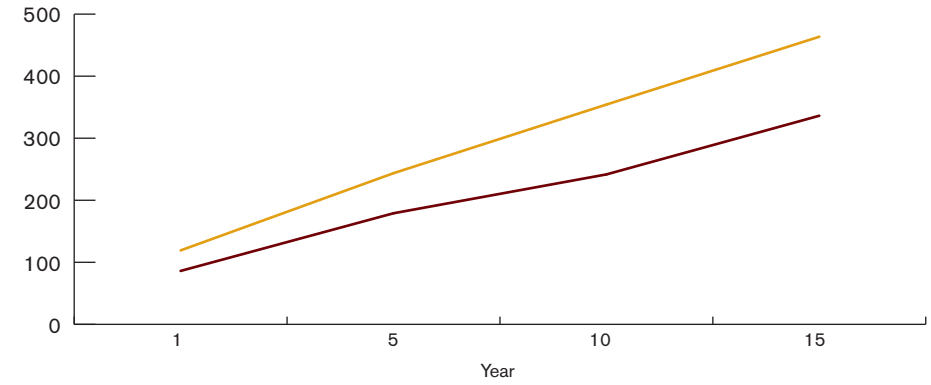


CHART 19.2

FIVE YEAR ISSUE BLOCK PROJECTED TO FUTURE YEARS
SENSITIVITY 2C, RESERVES PER $1,000



DR	86.10	179.05	241.66	336.22
SR	119.19	243.64	354.24	463.54

APPENDIX C

WHOLE LIFE INSURANCE EXHIBITS

EXHIBIT 20: SIMPLIFIED ISSUE WHOLE LIFE

Reinsurance on this block is for Accidental Death Benefits. Results are normalized using the direct amount of insurance, inclusive of ADB face amount.

EXCLUSION TEST PANEL

	SET: ALT 1				SET: ALT 2				DET
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1, 5, 10, 15 YR
NET OF REINS	4.3%	3.6%	3.2%	2.7%	3.8%	3.3%	2.9%	2.4%	P
DIRECT	NOT PROVIDED				NOT PROVIDED				NOT PROVIDED

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	NOT PROVIDED		NOT PROVIDED		0.27	9.30	0.27	9.30	NPR	NPR
DIRECT	NOT PROVIDED		NOT PROVIDED		0.34	9.40	0.34	9.40	NPR	NPR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	NOT PROVIDED		NOT PROVIDED		0.27	9.30	0.27	9.30	NPR	NPR	1.00	1.00
DIRECT	NOT PROVIDED		NOT PROVIDED		0.34	9.40	0.34	9.40	NPR	NPR	1.00	1.00

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
NET OF REINS	0.27	9.30	0.27	9.30	0%	0%
DIRECT	0.34	9.40	0.34	9.40	0%	0%
REINSURANCE RESERVE CREDIT	0.07	0.10	0.07	0.10	0%	0%

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
NET OF REINS	0.27	9.30	0.27	9.30	0%	0%
DIRECT	0.34	9.40	0.34	9.40	0%	0%
REINSURANCE RESERVE CREDIT	0.07	0.10	0.07	0.10	0%	0%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
164.0	25.0	135.0	18

DISCUSSION

The company expected this simplified issue whole life block to pass both exclusion tests and it did, resulting in VM-20 minimum reserves equal to NPR. In this whole life case study, NPRs are equivalent to current formulaic reserves, per Section 3 of VM-20. Reserves according to VM-20 would be no different than current statutory minimums. The progression of reserves for a 10- and 15-year issue block are depicted in the chart below. The 10- and 15-year issue blocks also satisfy both exclusion test results. The complete exclusion test panel for all four issue year blocks is shown above.

CHART 20.1

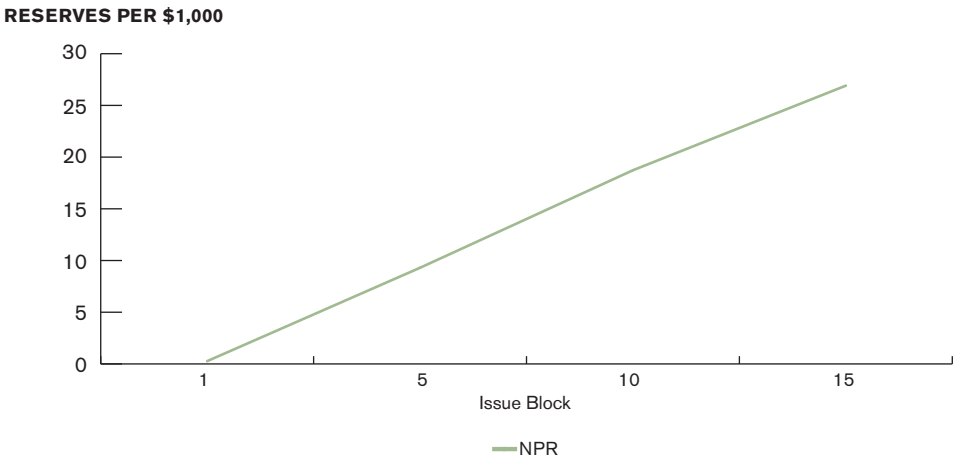


EXHIBIT 21: WHOLE LIFE

Traditional participating whole life policies. There is no reinsurance in force on this block.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
	2.0%	1.9%	1.8%	1.3%	P	P

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
	NOT PROVIDED		(9.22)	7.50	0.97	18.89	0.97	18.89	NPR	NPR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
	NOT PROVIDED		(9.96)	6.72	0.97	18.89	0.97	18.89	NPR	NPR	1.00	1.00

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM[32]		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
	0.97	18.89	0.97	18.89	0%	0%

ALTERNATIVE 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
	0.97	18.89	0.97	18.89	0%	0%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
153.0	36.0	117.0	8.6

[32] Before reduction for deferred premium asset.

STARTING ASSETS

In calculating the DR, starting assets were set at an amount approximating the NPR, equivalent to current formulaic reserves.

DISCUSSION

This is a group of participating traditional whole life policies. The modeling approach to adjusting non-guaranteed elements includes adjustments only to the interest component of dividends. Mortality experience of the block is fully credible. The margin on mortality is set at 4%.

EXHIBIT 22: WHOLE LIFE

Traditional participating whole life insurance. There is YRT reinsurance in force on this block. The company completed Sensitivity 2c of Phase 2 and those results are included in this exhibit (10-year issue block; 15-year issue block).

EXCLUSION TEST PANEL

	SET: ALT 1				SET: ALT 2				DET
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1, 5, 10, 15 YR
NET OF REINS	1.5%	1.1%	0.8%	0.6%	0.8%	0.7%	0.6%	0.6%	P
DIRECT	NOT PROVIDED				NOT PROVIDED				P

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC				DETERMINISTIC				NPR[33]			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
NET OF REINS	–	16.33	48.76	79.28	(8.29)	15.02	46.71	76.49	2.20	28.01	59.79	90.08
DIRECT	–	16.94	50.06	81.46	(8.26)	15.72	48.21	79.11	2.33	28.16	59.98	90.32

	VM-20 MINIMUM				TYPE				DEFERRED PREMIUM			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
NET OF REINS	2.20	28.01	59.79	90.08	NPR	NPR	NPR	NPR	0.77	3.39	3.72	3.80
DIRECT	2.33	28.16	59.98	90.32	NPR	NPR	NPR	NPR	0.77	3.39	3.72	3.80

ALTERNATIVE 2

	STOCHASTIC				DETERMINISTIC				NPR[33]			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
NET OF REINS	–	21.66	54.25	85.09	(3.47)	20.64	53.07	83.18	2.20	28.01	59.79	90.08
DIRECT	–	22.41	55.88	87.28	(3.43)	21.35	54.72	85.77	2.33	28.16	59.98	90.32

	VM-20 MINIMUM				TYPE				DEFERRED PREMIUM			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
NET OF REINS	2.20	28.01	59.79	90.08	NPR	NPR	NPR	NPR	0.77	3.39	3.72	3.80
DIRECT	2.33	28.16	59.98	90.32	NPR	NPR	NPR	NPR	0.77	3.39	3.72	3.80

[33] Equal current formulaic.

For this block, the Alternative 1-to- Alternative 2 VM-20 Minimum Reserve ratios are 100% at all points.

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM				CURRENT FORMULAIC				% CHANGE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
NET OF REINS	2.20	28.01	59.79	90.08	2.20	28.01	59.79	90.08	0%	0%	0%	0%
DIRECT	2.33	28.16	59.98	90.32	2.33	28.16	59.98	90.32	0%	0%	0%	0%
REINSURANCE RESERVE CREDIT	0.13	0.15	0.19	0.24	0.13	0.15	0.19	0.24	0%	0%	0%	0%

ALTERNATIVE 2

	VM-20 MINIMUM				CURRENT FORMULAIC				% CHANGE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
NET OF REINS	2.20	28.01	59.79	90.08	2.20	28.01	59.79	90.08	0%	0%	0%	0%
DIRECT	2.33	28.16	59.98	90.32	2.33	28.16	59.98	90.32	0%	0%	0%	0%
REINSURANCE RESERVE CREDIT	0.13	0.15	0.19	0.24	0.13	0.15	0.19	0.24	0%	0%	0%	0%

SECTION 3 NPR (PHASE 2 SENSITIVITY 6C)

ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR
NET OF REINS	0.76	22.40	NOT PROVIDED	
DIRECT	0.88	22.55	NOT PROVIDED	

SECTION 3 NPR AS % OF CURRENT FORMULAIC

NET OF REINS	35%	80%	NOT PROVIDED	
DIRECT	31%	80%	NOT PROVIDED	

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
160.0	52.0	126.0	15

STARTING ASSETS TO MODELED RESERVE (ALT 2)

ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR
DR-NET	N/A	105%	102%	103%
DR-DIRECT	N/A	101%	99%	99%
SR-NET	N/A	100%	100%	100%
SR-DIRECT	N/A	96%	97%	98%

DISCUSSION

Because the block passes both exclusion tests, the VM-20 minimum reserve requirements would be no different than the current formulaic requirement. The exclusion tests seem to produce a valid result, since the company's calculated DR and SR amounts do not exceed the NPR (current formulaic) for any of the issue blocks, 1, 5, 10 or 15.

In the modeled reserve components, the company used credibility-adjusted experience mortality rates, following the Normalized Method as outlined in the 2002 CIA Education Note on Expected Mortality. Company mortality experience was blended with industry mortality data at two levels. It is blended first at the mortality segment (smoking status, risk class) level, and next it is normalized such that the aggregate result reproduces credibility at the credibility segment level. The credibility segment is a total company viewpoint. In producing this assumption for mortality, the company experienced inconsistencies between the best-class and the second-best-class credibility-adjusted rates. The best-class experience has no credibility while the second-best-class has some credibility. The VM-20 approach resulted in the best class exhibiting higher mortality rates than the second best class. The company adjusted for this anomaly by capping the best-class rates at the second-best-class rates. It also capped female rates at the male rates. The margin used on mortality rates varied by issue age and class. Over the modeled block, the margin ranges from 3.8% to 13.3%.

In modeling YRT reinsurance, the premiums used in the model are simply the premiums specified by the treaty. The company did not adjust the reinsurance premiums to reflect VM-20 mortality levels. As a result, the YRT reinsurance cash flows are a net benefit to the total cash flows.

EXHIBIT 23: WHOLE LIFE

Traditional participating whole life insurance. There is no reinsurance in force on this block. The company completed Sensitivity 2c of Phase 2 and those results are included in this exhibit (10-year issue block; 15-year issue block) as well as Sensitivity 6c of Phase 2 which derives the NPR according to Section 3 of VM-20.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2				DET
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	10 YR	15 YR	1, 5, 10, 15 YR
	1.2%	1.5%	1.0%	1.3%	1.4%	1.4%	P

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC				DETERMINISTIC				NPR[34]			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
	NOT PROVIDED				NOT PROVIDED				2.02	20.08	40.57	64.02

	VM-20 MINIMUM				TYPE				DEFERRED PREMIUM			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
	2.02	20.08	40.57	64.02	NPR	NPR	NPR	NPR	0.72	2.19	2.20	2.12

ALTERNATIVE 2

	STOCHASTIC				DETERMINISTIC				NPR[34]			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
	NOT PROVIDED				NOT PROVIDED				2.02	20.08	40.57	64.02

	VM-20 MINIMUM				TYPE				DEFERRED PREMIUM			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
	2.02	20.08	40.57	64.02	NPR	NPR	NPR	NPR	0.72	2.19	2.20	2.12

[34] Equal current formulaic.

For this block, the Alternative 1-to- Alternative 2 VM-20 Minimum Reserve ratios are 100% at all points.

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

	VM-20 MINIMUM				CURRENT FORMULAIC				% CHANGE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
	2.02	20.08	40.57	64.02	2.02	20.08	40.57	64.02	0%	0%	0%	0%

ALTERNATIVE 2

	VM-20 MINIMUM				CURRENT FORMULAIC				% CHANGE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
	2.02	20.08	40.57	64.02	2.02	20.08	40.57	64.02	0%	0%	0%	0%

SECTION 3 NPR (PHASE 2 SENSITIVITY 6C)

ISSUE BLOCK	5 YR
	17.13
SECTION 3 NPR AS % OF CURRENT FORMULAIC	
	85%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
NOT PROVIDED			

STARTING ASSETS TO MODELED RESERVE

	SR		DR	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR
NOT APPLICABLE				

DISCUSSION

Because the block passes both exclusion tests, the VM-20 minimum reserve requirements would be no different than the current formulaic requirement.

The cash-flow model used for developing the SET results was the company's business planning and cash-flow-testing model. Dividends and other non-guaranteed elements were adjusted dynamically with each scenario. The company modeled dividend options according to company experience and did not assume the 50% cash, 50% PUA as suggested by Phase 1 instructions. The company did not zero out the dividend accumulation balance either, as this would not be reflective of actual experience.

Because the SR and DR were not required, the company did not need to implement a VM-20 mortality assumption, but if it had, it would assume 100% credibility, with appropriate VM-20 margins.

The modified deterministic reserve from Scenario 12 of the SET panel is compared to the current formulaic minimum and the VM-20 Section 3 NPR calculation. The Scenario 12 reserve does not include explicit margins. However, this comparison suggests that Deterministic Reserves, even with appropriate margins, would be a fraction of the current formulaic reserve, and also of the Section 3 NPR method reserve as well, if that method were extended to whole life products. This should not be surprising, since the NPR is driven by a cash value floor, and cash value requirements exceed the deterministic reserve.

RESERVE PER $1,000	
PROXY DR (MODIFIED DR, SCENARIO 12)	$4.69
CURRENT FORMULAIC	$20.08
SECTION 3 NPR	$17.13

EXHIBIT 24: FINAL EXPENSE WHOLE LIFE

Whole life insurance marketed through a guaranteed issue and/or simplified issue program. There is no reinsurance in force on this block. The company evaluated two iterations of the SET and both are presented in this exhibit. The VM-20 minimum reserves, however, are based on the original SET calculation result.

This exhibit provides a good demonstration of how the deferred premium asset factors into the determination of the VM-20 minimum reserve.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
ORIGINAL	6.1%	5.5%	5.4%	5.0%	P	P
REVISED	4.9%	4.1%	4.0%	3.6%	P	P

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		DEFERRED PREMIUM		VM-20 MINIMUM[35]		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
	18.43	49.04	17.46	40.03	5.14	54.52	4.93	16.15	23.36	65.19	SR	SR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		DEFERRED PREMIUM		VM-20 MINIMUM[35]		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
	12.29	41.05	8.39	29.72	5.14	54.52	4.93	16.15	17.22	57.20	SR	SR

ALT 1/ALT 2 VM-20 MIN	
1 YR	5 YR
136%	114%

[35] VM-20 minimum = NPR +[max(SR, DR) – (NPR-DPA)] where DPA is deferred premium asset.

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
	23.36	65.19	5.14	54.52	354%	20%

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
	17.22	57.20	5.14	54.52	235%	5%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
108.0	2.0	95.1	7.8

STARTING ASSETS TO MODELED RESERVE

ISSUE BLOCK	SR 1 YR	SR 5 YR	DR 1 YR	DR 5 YR
ALT 1	106%	124%	100%	101%
ALT 2	145%	139%	99%	101%

DISCUSSION

The product block failed the SET initially. The company believes the primary driver of this result is the reinvestment asset assumption. In the second attempt at the SET, the company chose longer assets and the SET ratio improved. The initial results assumed a straightforward set of asset types to support the testing exercise. On further reflection, the assets that would be purchased to support these liabilities are longer in duration than our first assumption demonstrated. We revised the assumption by reinvesting in longer maturities and including some BAA+ and A- credit rated bonds. While the 1-year issue block still fails the SET under this revised assumption, we feel that if we were more deliberate in our reinvestment assumption, both the 1-year issue and 5-year issue blocks would pass.

Gross-to-Net premium ratios from the DET are 144% for the 1-year issue block and 162% for the 5-year issue block.

The credibility method used in determining the mortality assumption for modeled reserves is the Limited Fluctuation Method. This method sets the standard for full credibility as being within 3% of the true value with 90% probability, assuming a Poisson distribution for the number of deaths and assuming no variation in net amount at risk. The credibility factor for the credibility segment is 26%. This weight is applied to the company experience rates. The company used the 1980 VBT mortality table as the industry table instead of the pre-need mortality table for industry experience for this final expense business. Since the 1980 VBT is considerably higher than company experience, the credibility-adjusted blended mortality used was significantly higher than company experience.

In determining the Stochastic Reserve, the company successfully set starting assets within 2% of the Stochastic Reserve. This exhibit demonstrates a policy block that potentially passes the exclusion tests, while at the same time, generates a Stochastic Reserve in excess of the NPR floor.

EXHIBIT 25: WHOLE LIFE

Traditional whole life insurance. There is no reinsurance in force on this block.

EXCLUSION TEST PANEL

ISSUE BLOCK	SET: ALT 1 1 YR	SET: ALT 1 5 YR	SET: ALT 2 1 YR	SET: ALT 2 5 YR	DET 1 YR	DET 5 YR
	3.5%	3.4%	2.3%	2.2%	NOT PROVIDED	

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

ISSUE BLOCK	STOCHASTIC 1 YR	STOCHASTIC 5 YR	DETERMINISTIC 1 YR	DETERMINISTIC 5 YR	NPR 1 YR	NPR 5 YR	DEFERRED PREMIUM 1 YR	DEFERRED PREMIUM 5 YR	VM-20 MINIMUM[36] 1 YR	VM-20 MINIMUM[36] 5 YR	TYPE 1 YR	TYPE 5 YR
	0.00	13.60	(21.57)	1.13	1.28	22.05	0.00	0.00	1.28	22.05	NPR	NPR

ALTERNATIVE 2

ISSUE BLOCK	STOCHASTIC 1 YR	STOCHASTIC 5 YR	DETERMINISTIC 1 YR	DETERMINISTIC 5 YR	NPR 1 YR	NPR 5 YR	DEFERRED PREMIUM 1 YR	DEFERRED PREMIUM 5 YR	VM-20 MINIMUM[36] 1 YR	VM-20 MINIMUM[36] 5 YR	TYPE 1 YR	TYPE 5 YR
	0.00	0.00	(22.64)	(0.29)	1.28	22.05	0.00	0.00	1.28	22.05	NPR	NPR

ALT 1/ALT 2 VM-20 MIN 1 YR	ALT 1/ALT 2 VM-20 MIN 5 YR
100%	100%

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
	1.28	22.05	1.28	22.05	0%	0%

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
	1.28	22.05	1.28	22.05	0%	0%

[36] VM-20 minimum = NPR +[max(SR, DR) – (NPR-DPA)] where DPA is deferred premium asset.

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
	NOT PROVIDED		

STARTING ASSETS TO MODELED RESERVE

For the 1-year issue block, starting assets were set equal to the NPR.

For the 5-year issue block, Alt 1, starting assets were set equal to the DR.

For the 5-year issue block, Alt 2, starting assets were set equal to the NPR.

DISCUSSION

The policy group passes the SET, and minimum reserves are set as the larger of Deterministic Reserves and Net Premium Reserves, which are equivalent to current formulaic reserves. There would be no change to statutory reserve levels for this block of policies under VM-20.

APPENDIX D

UNIVERSAL LIFE EXHIBITS

EXHIBIT 26: ACCUMULATION UNIVERSAL LIFE

The policies in this block are universal life with a cash value enhancement rider. The product design influences the net premium reserve and the current formulaic reserve such that the cash value becomes the ending reserve for both methods. Mortality risk is reinsured through a first-dollar quota share YRT arrangement. The company included a margin on the YRT reinsurance premiums.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	2.2%	2.3%	0.4%	0.5%	--	--
DIRECT	NOT PROVIDED		NOT PROVIDED		P	P

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	98.77	177.25	95.07	171.30	125.05	202.71	125.05	202.71	NPR	NPR
DIRECT	100.69	177.72	95.56	171.66	125.05	202.71	125.05	202.71	NPR	NPR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	98.27	178.00	96.94	176.05	125.05	202.71	125.05	202.71	NPR	NPR	1.00	1.00
DIRECT	101.46	178.83	100.60	176.34	125.05	202.71	125.05	202.71	NPR	NPR	1.00	1.00

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
NET OF REINS	125.05	202.71	125.05	202.71	0%	0%
DIRECT	125.05	202.71	125.05	202.71	0%	0%
REINSURANCE RESERVE CREDIT	0	0	0	0	0%	0%

ALTERNATIVE 2

ISSUE BLOCK	VM-20 MINIMUM 1 YR	VM-20 MINIMUM 5 YR	CURRENT FORMULAIC 1 YR	CURRENT FORMULAIC 5 YR	% CHANGE 1 YR	% CHANGE 5 YR
NET OF REINS	125.05	202.71	125.05	202.71	0%	0%
DIRECT	125.05	202.71	125.05	202.71	0%	0%
REINSURANCE RESERVE CREDIT	0	0	0	0	0%	0%

FIXED INCOME STARTING ASSETS

	GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
1- YEAR	210.0	49.5	143.2	13
5-YEAR	210.0	48.5	144.2	11

STARTING ASSETS TO MODELED RESERVE

ALTERNATIVE 1	SR 1 YR	SR 5 YR	DR 1 YR	DR 5 YR
NET OF REINS	99%	98%	103%	101%
DIRECT	97%	98%	101%	101%

ALTERNATIVE 2

NET OF REINS	99%	98%	103%	101%
DIRECT	97%	98%	101%	101%

DISCUSSION

Chart 26.1 below depicts the distribution of scenario reserves over 500 scenarios from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves and the relation of the Deterministic Reserve, and current formulaic reserve to the scenario reserve distribution. In this case study, the cash value enhancement rider produces a Net Premium Reserve (equivalent to current formulaic) in excess of the current account value.

In developing the mortality assumption, the company uses an assumption similar to its GAAP valuation assumptions, with margins for adverse deviation. In GAAP valuation, the mortality assumption is a credibility blended with the Tillinghast Older Age Mortality Study.

CHART 26.1

RESERVES PER $1,000
5-YR BUS, ALT 1, NET OF REINS

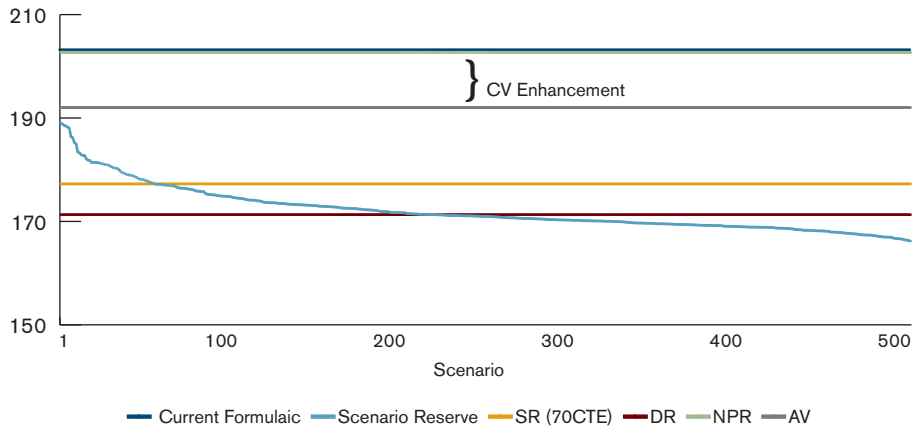


EXHIBIT 27: ACCUMULATION UNIVERSAL LIFE

This block includes universal life policies without any secondary guarantee. Non-guaranteed elements include cost of insurance charges, expense loads, and declared excess interest credits. There is no in force reinsurance.

EXCLUSION TEST PANEL

	SET: ALT 1				SET: ALT 2				DET			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
DIRECT	1.2%	1.2%	1.6%	1.9%	1.5%	1.5%	2.0%	2.2%	P	P	P	P

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

STOCHASTIC RESERVES NOT PROVIDED.

ALTERNATIVE 1

	DETERMINISTIC				NPR[37]				VM-20 MINIMUM			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
DIRECT	(13.24)	20.43	69.32	109.56	8.96	30.67	64.70	98.39	8.96	30.67	64.70	98.39

ALTERNATIVE 2

	DETERMINISTIC				NPR[37]				VM-20 MINIMUM			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
DIRECT	(13.24)	19.94	68.21	107.79	8.96	30.67	64.70	98.39	8.96	30.67	64.70	98.39

	TYPE			
	1 YR	5 YR	10 YR	15 YR
	NPR	NPR	NPR	NPR

PHASE I (NET), RATIOS TO CURRENT

	VM-20 MINIMUM ALT 1, ALT 2				CURRENT FORMULAIC				% CHANGE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
DIRECT	8.96	30.67	64.70	98.39	8.96	30.58	64.65	98.35	0.00%	0.01%	0.00%	0.00%

OTHER RESERVES

	NET GAAP[38]			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR
	(12.02)	16.68	52.78	84.82

37 Using the Section 3 NPR in this case.

38 GAAP net of DAC was provided for comparative purposes by this contributing company.

FIXED INCOME STARTING ASSETS

	GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
1 YR	134.0	40.0	94.0	12
5 YR	134.0	45.0	89.0	12

STARTING ASSETS TO MODELED RESERVE

	SR		DR	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR

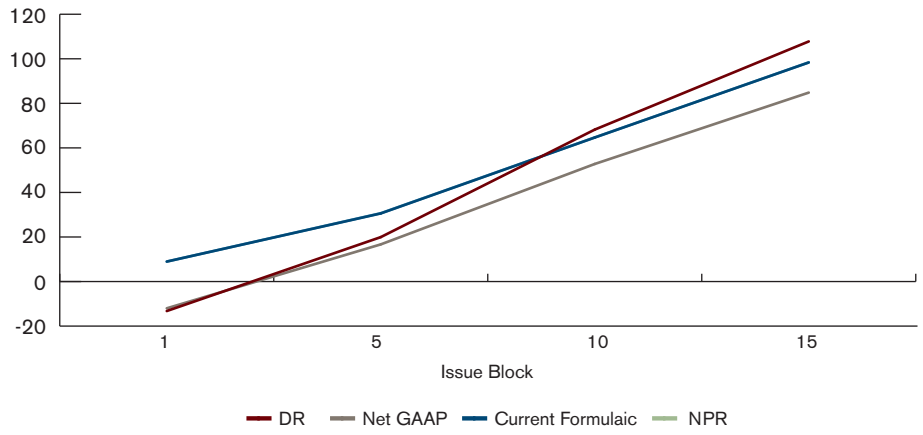
STARTING ASSETS WERE SET EQUAL TO THE NPR AMOUNT.

DISCUSSION

The company expected this accumulation universal life block to pass both exclusion tests and it did. The nonguaranteed elements inherent in the product allow the company's sources of profit to adjust with unfolding experience, to some degree. The Net Premium Reserve (per Section 3 of VM-20) is very close to current formulaic reserves. Mortality assumptions are based on company experience with a 4% margin. Lapse assumptions are based on company experience with a 5% margin and dynamic adjustments.

Chart 27.1 below graphs the Phase 1 results for each of the four issue year blocks. The three level premium methods (NPR, GAAP, current formulaic) follow similar slopes, while the DR, which is a present value of cash flows method, has a steeper slope.

CHART 27.1



APPENDIX E

VARIABLE UNIVERSAL LIFE EXHIBITS

EXHIBIT 28: VARIABLE UNIVERSAL LIFE

This variable universal life (VUL) product has a death benefit guarantee. Included in the charts below are the company's Phase 1 and Phase 2 Sensitivity 2 results for 1-, 5-, 10-, and 15-year issue blocks. For this work, the company interpreted the net premium reserve as equivalent to the current formulaic reserve.

There is YRT reinsurance in force, which cedes 90% of the mortality risk.

EXCLUSION TEST PANEL

	SET: ALT 1				SET: ALT 2				DET
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	
DIRECT	6.2%	16.2%	19.4%	21.5%	5.8%	12.5%	14.3%	17.4%	NOT PROVIDED

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC RESERVE				DETERMINISTIC RESERVE				NPR (CURRENT FORMULAIC)[39]			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
NET OF REINS	0.01	3.78	10.36	17.43	3.71	17.29	26.42	35.94	10.42	15.54	18.66	23.74
DIRECT	0.09	8.24	16.20	25.02	5.03	24.10	35.26	44.09	11.31	16.60	21.16	26.80
REINS CREDIT									0.89	1.06	2.50	3.05

	VM-20 MINIMUM				TYPE				% CHANGE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
NET OF REINS	10.42	17.29	26.42	35.94	NPR	DR	DR	DR	0%	11%	42%	51%
DIRECT	11.31	24.10	35.26	44.09	NPR	DR	DR	DR	0%	45%	67%	65%
REINS CREDIT	0.89	6.80	8.84	8.15					0%	541%	254%	168%

ALTERNATIVE 2

	STOCHASTIC RESERVE				DETERMINISTIC RESERVE				NPR (CURRENT FORMULAIC)[39]			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
NET OF REINS	0.02	3.95	10.39	17.20	4.41	15.46	23.18	31.78	10.42	15.54	18.66	23.74
DIRECT	0.13	7.97	15.67	23.80	5.63	20.40	31.31	40.03	11.31	16.60	21.16	26.80
REINS CREDIT									0.89	1.06	2.50	3.05

	VM-20 MINIMUM				TYPE				% CHANGE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
NET OF REINS	10.42	15.54	23.18	31.78	NPR	NPR	DR	DR	0%	0%	24%	34%
DIRECT	11.31	20.40	31.31	40.03	NPR	DR	DR	DR	0%	23%	48%	49%
REINS CREDIT	0.89	4.86	8.12	8.25					0%	358%	225%	170%

	ALT 1/ALT 2 VM-20 MINIMUM			
	1 YR	5 YR	10 YR	15 YR
NET OF REINS	1.00	1.11	1.14	1.13
DIRECT	1.00	1.18	1.13	1.10

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
NOT PROVIDED			

STARTING ASSETS TO MODELED RESERVE

In initial iterations of the SR, the company determined that the amount of assets required as starting assets is less than the block's separate account total assets. As a result, the model holds negative cash at the start of the projection.

[39] Company interprets NPR as current formulaic.

DISCUSSION

The unusual outcome for this block is the relationship between SR and DR. SR is considerably lower than DR for all four issue blocks. The company continues to look into this relationship.

Margins were included on mortality (10%), lapse (10%), expense (10%) and premium persistency (5%). The impact of reinsurance was larger than expected. The company recognizes this is due to the spread between VM-20 mortality and the reinsurance premiums.

In this product, the death benefit guarantee is requiring a substantial premium which the company believes results in very little risk. The block is expected to fail the SET due to the death benefit guarantee risk and it does.

Chart 28.1 below depicts the distribution of scenario reserves from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves and the relation of the Deterministic Reserve and Net Premium Reserve (equal to current formulaic). The scenario reserves were floored at zero in the CTE calculation of the stochastic reserve, which is why the distribution shown in Chart 28.1 appears one-sided.

CHART 28.1

RESERVES PER $1,000
5 YR BUS, ALT 1, NET OF REINS

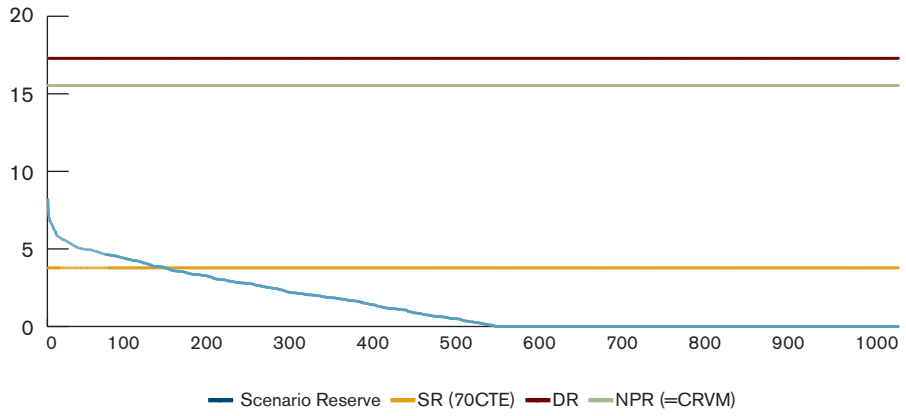


EXHIBIT 29: VARIABLE UNIVERSAL LIFE

This variable universal life (VUL) product has no secondary guarantee provisions. There is no reinsurance in force.

EXCLUSION TEST PANEL

	SET: ALT 1				SET: ALT 2				DET
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	
	41.6%	40.3%	32.6%	35.5%	41.7%	37.2%	49.9%	34.2%	NOT PROVIDED

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC RESERVE				DETERMINISTIC RESERVE				NPR (CURRENT FORMULAIC)			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
	(2.05)	(2.87)	(3.74)	(4.63)	(127.02)	(87.67)	(80.11)	21.41	3.81	63.62	210.95	452.11

	VM-20 MINIMUM				TYPE				% CHANGE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
	3.81	63.62	210.95	452.11	NPR	NPR	NPR	NPR	0%	0%	0%	0%

ALTERNATIVE 2

	STOCHASTIC RESERVE				DETERMINISTIC RESERVE				NPR (CURRENT FORMULAIC)			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
	(1.92)	(2.74)	(3.63)	(4.52)	(109.93)	(89.61)	(48.48)	13.23	3.81	63.62	210.95	452.11

	VM-20 MINIMUM				TYPE				% CHANGE			
ISSUE BLOCK	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR	1 YR	5 YR	10 YR	15 YR
	3.81	63.62	210.95	452.11	NPR	NPR	NPR	NPR	0%	0%	0%	0%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
	NOT PROVIDED		

STARTING ASSETS TO MODELED RESERVE

Starting assets are set equal to the general account reserve, which is negative for both the 1-year and 5-year issue blocks.

DISCUSSION

Maintaining current formulaic standards for VUL products without secondary guarantees is something this company can support. As expected, both the SR and DR are lower than current formulaic reserves. The company remarked that it seems odd that VM-20 requires discounting separate account assets at the general account earned rate. A better methodology, as suggested by this company, would be to perform all the principle-based calculations net of the separate account assets and separate account liabilities. This product, which does not have any secondary guarantees, fails the SET ratio test, even though it is shown that the SR is negative for all issue block groupings. The company attributes the negative modeled reserves to a product block that is consistently profitable across scenarios. The SET is failed because there is variance among the SET scenarios, and this works to generate a numerator in the SET ratio significant enough to produce a failed ratio. In this situation, the company would likely use an alternative demonstration in supporting excluding the block from the SR.

This company also recommends clarification to the language of VM-20 Section 2.G. which says that the stochastic general account reserve be floored at $0. Its interpretation of this implies elimination of the CRVM allowance. The company does not think this is the intention of VM-20, though the language could be misconstrued in this manner. This section should be reworded or clarified to ensure the CRVM allowance is maintained for VUL products.

Chart 29.1 below depicts the distribution of scenario reserves from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves. Because the NPR and DR are considerably higher and lower, respectively, than the SR, these are omitted from the graph.

CHART 29.1

RESERVES PER $1,000
5 YR BUS, ALT 1, NO REINS

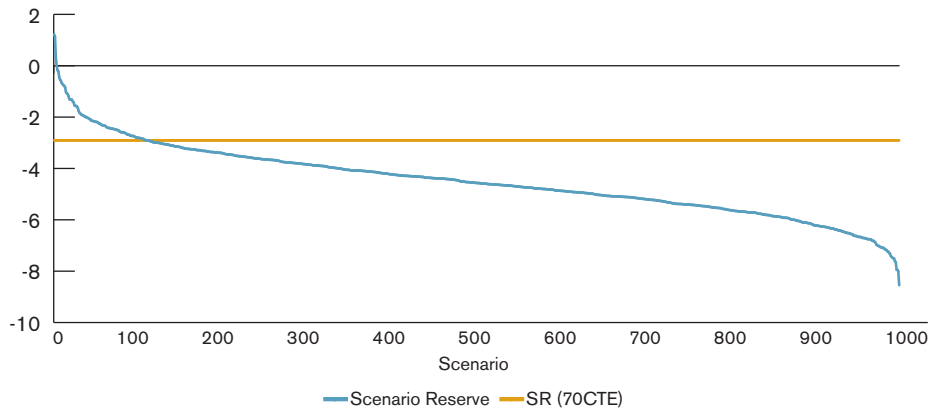


EXHIBIT 30: VARIABLE UNIVERSAL LIFE

This variable universal life (VUL) product has no secondary guarantee provisions. There is YRT reinsurance in force and the reinsurance premium mode is such that there is no reinsurance reserve credit on the December 31, 2009, valuation date of the Study. This case study highlights an inconsistency in the SET scenarios versus the scenarios used in determining the SR.

EXCLUSION TEST PANEL

	SET: ALT 1		SET: ALT 2		DET	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
	2.6%	2.7%	1.9%	2.1%	NOT PROVIDED	

PHASE I , AMOUNTS PER $1,000 OF DIRECT FACE AMOUNT

ALTERNATIVE 1

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE[40]	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
	32.08	54.67	24.91	45.74	29.54	47.47	29.54	47.47	NPR	NPR

ALTERNATIVE 2

	STOCHASTIC		DETERMINISTIC		NPR		VM-20 MINIMUM		TYPE[40]		ALT 1/ALT 2 VM-20 MIN	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
	28.13	50.97	23.18	43.92	29.54	47.47	29.54	47.47	NPR	NPR	1.00	1.00

PHASE I, RATIOS TO CURRENT

ALTERNATIVE 1, 2

	VM-20 MINIMUM		CURRENT FORMULAIC		% CHANGE	
ISSUE BLOCK	1 YR	5 YR	1 YR	5 YR	1 YR	5 YR
NET OF REINS	29.54	47.47	29.54	47.47	0%	0%

FIXED INCOME STARTING ASSETS

GROSS OAS	DEFAULT IN BPS	NET OAS	WEIGHTED AVERAGE LIFE
NOT PROVIDED			

[40] Taken as Max[DR, NPR] because DET is not provided.

STARTING ASSETS TO MODELED RESERVE

	SR		DR	
	1 YR	5 YR	1 YR	5 YR
ALTERNATIVE 1	100%	99%	128%	119%
ALTERNATIVE 2	100%	98%	121%	114%

DISCUSSION

This policy group exhibits an unusual characteristic in that it passes the SET, yet Stochastic Reserves are higher than the Net Premium Reserve floor. There are characteristics about the product and the VM-20 analysis that may help explain this outcome.

1. The distribution of scenario reserves (shown in Chart 30.1) has a very steep left tail. These tail scenarios are scenarios with aggressive equity growth rates. As the separate account grows with the performance of the market, correspondingly, the death benefit is determined by the cash value corridor, and is now greater than the initial face amount.

2. In the later years of the product, the cost of insurance charge spread is negative. The extreme growth in the net amount at risk (as explained in 1.) exacerbates this negative spread, resulting in losses to the cash flow projection. There are enough of these types of scenario that, in the total analysis, the CTE70 metric is influenced by this product condition.

3. It appears as though the SET scenarios do not expose this similar economic condition. As a result, the segment demonstrates passing the SET.

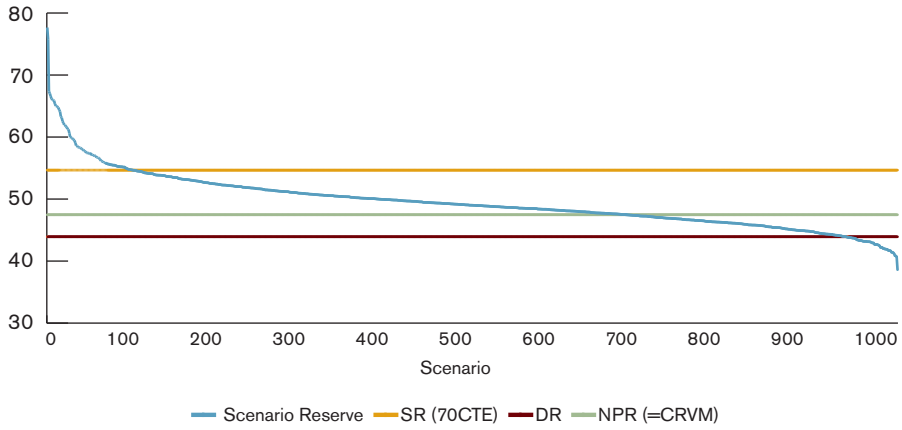
The mortality spread is dependent upon the cost of insurance (COI) charge, a non-guaranteed element. VM-20 allows for changes in non-guaranteed elements in Section 7.C. However, the language in Section 7.C., and particularly 7.C.3. and 7.C.4.[41] is difficult to interpret with respect to mortality since the mortality assumption in the VM-20 projections is credibility-blended with industry tables, and is not the same mortality expectation that the company uses in its NGE determination or risk management practices. A circular argument is created: Why bother with the task of developing a credibility blended mortality assumption if you simply turn around and adjust COI charges to accommodate the increased mortality (to the extent one can)? This company did not adjust the COI charges in its analysis.

[41] Section 7.C.3: "Projected NGE shall be established based on projected experience consistent with how actual NGE are determined." Section 7.C.4: "Projected levels of NGE in the cash flow model must be consistent with the experience assumptions used in each scenario."

The stochastic reserve analysis is performed with 1,000 scenarios. Chart 30.1 below depicts the distribution of scenario reserves from Phase 1, 5-year issue block, at valuation date. This provides the reader with a view of the distribution of the scenario reserves and the relation of the Deterministic Reserve, Net Premium Reserve (equal to current formulaic reserves) to the scenario reserve distribution. Using Alternative 2 in the graph would provide much the same relationships.

CHART 30.1

RESERVES PER $1,000
5-YR BUS, ALT 1, NET OF REINS



5-Year Issue Block, Alt 2

		TERM																							
	Exhibit	1	1	1	1	2	3	4	4	4	4	5	6	6	7	7	7	7	8	8	9	9	10	10	Ave Chg as Pct of Base
	Description	10T	20T	30T	Aggr		20T (Note 1)	10T	20T	30T	Aggr	Aggr (Note 2)	Aggr		10T	15T	20T	30T	10T	20T	AGGR		20T		DR	SR
	Reference						(0.84)								DR	DR	DR	DR			DR	SR	DR	SR		
Sens. 1	a) best estimate mortality	1.57	4.95	2.95	3.68		(1.36)					(1.82)	1.47		(0.44)	(1.38)	(0.90)	(1.81)			1.71	2.04	0.85	1.19		
	b) remove improvement	1.91	5.70	3.56	4.18							(1.72)	2.09		0.78	0.34	1.06	1.10			2.72	3.10			87%	26%
	c) include margin	3.68	7.87	5.19	5.87		(0.84)					(1.62)	2.88		*1.34*	*0.89*	*1.53*	*1.59*			3.20	3.57	1.88	2.17	131%	79%
	d) total co. level credibility	6.47	11.04	9.55	9.36		(0.84)					(1.59)	*7.18*								6.35	6.89			190%	
	e) granular level credibility	6.08	11.04	9.55	7.99		0.52					(1.48)	8.44								*7.59*	*8.19*			216%	301%
	Phase 1	*3.69*	*7.26*	*6.57*	*6.18*		*(2.42)*	*(0.35)*	*3.42*	*3.52*	*2.23*	*(1.54)*	*7.18*	*7.60*	*1.34*	*0.89*	*1.53*	*1.59*	*(1.96)*	*(1.76)*	*7.59*	*8.19*	1.70	2.05		
Sens. 1.5	a) No explicit margins	3.89	6.88	5.17	6.17		(1.34)	(4.55)	0.22	1.86	(0.89)	(1.69)	4.93		0.73	0.22	0.85	0.64			4.09	6.16			-117%	
	b) Double explicit margins	8.27	14.08	14.57	11.50		(0.35)	2.60	5.84	4.68	4.50	(1.49)	10.39		2.00	1.62	2.29	2.66			8.24	8.83			115%	
Sens 2	Included in Phase 1 sections																									
Sens 3	Impact of compressing model	3.77	7.20	6.51	5.96		(1.31)	(0.51)	3.69	3.92	2.40	(1.39)	7.20								8.26	8.93			-5%	9%
													DR	SR					DR	SR	DR	SR	DR	SR		
Sens 4	a) Plus 100 bps	3.59	6.67	5.76	5.60		(0.93)					(1.56)	6.98	7.39	1.34	0.78	1.32	1.19	(1.88)	(1.75)	6.78	7.30	1.41	1.53	-8%	-10%
	b) Minus 100 bps	3.79	7.75	7.25	6.67		(0.75)					(1.60)	7.35	7.71	1.34	0.98	1.72	1.89	(1.99)	(1.73)	8.46	9.26	1.97	2.42	7%	9%
	c) Inverted	3.75	7.44	6.71	6.33		(0.87)					1.59	7.28	7.79	1.34	0.89	1.50	1.40	(1.80)	(1.55)	8.62	9.46	1.89	2.77	16%	16%
Sens 5	a) Long rate MR + 100 bps	5.96	3.70	7.09	6.14		(0.90)					(1.58)	7.28	7.62	1.35	0.88	1.47	1.24			7.54	8.29	1.64	2.12	-2%	2%
	b) Long rate MR - 100 bps	6.44	3.69	7.46	7.07		(0.78)					(1.59)	7.23	7.54	1.34	0.91	1.63	1.99			7.64	8.21	1.76	1.86	7%	-3%
	c) 150% Long rate vol	6.30	3.69	7.34	6.81		(0.81)					(1.58)	7.20	7.69	1.34	0.90	1.58	1.79			7.61	8.49	1.73	2.04	5%	1%
	d) 150% volatility of stoch vol	5.60	3.70	6.67	5.76		(0.84)					(1.58)	7.04	7.66	1.34	0.89	1.53	1.59			7.59	8.40	1.70	2.16	-1%	3%
Sens 6	*NPR from Phase 1*	*4.01*	*4.15*	*2.64*	*3.53*		*2.33*	*0.45*	*1.34*	*0.77*	*0.91*	*(0.11)*	*1.73*		*3.10*	*2.52*	*1.93*	*1.38*	*0.19*	*0.78*			*1.98*			
	6a) ULSG change lapse																									
	6b) 4% val rate (from 5% baseline)	4.00	4.33	2.89	3.70		2.43	0.44	1.45	0.90	0.99	(0.09)	1.76						0.18	0.84			2.08		6%	
Sens 7	10% permanent incr in mortality	5.63	9.82	8.50	8.34		0.50	(0.03)	3.65	3.63	2.46	(1.45)	8.62		3.19	2.76	3.22	3.27					3.14	3.42	68%	67%
Sens 8	8a) 80% of baseline lapse rates	3.91	8.11	7.92	7.08		(0.84)	(0.34)	4.02	4.54	2.75	(1.64)	7.82		1.26	0.74	1.29	1.04	(2.08)	(1.73)			2.16	2.53	4%	23%
	8b) 120% of baseline lapse rates	3.49	6.49	5.41	5.40		(0.96)	(0.36)	2.88	2.64	1.78	(1.55)	6.62		1.43	1.06	1.81	2.22	(1.84)	(1.77)			1.30	1.56	-4%	-24%
Sens 9	NOT APPLICABLE TO TERM																									
Sens 10	No Tail profit for term with Tail	4.89	7.78	6.79	6.71		(0.84)	2.43	4.46	3.58	3.58	(1.61)	7.27		2.72	1.80	1.85	1.59	(1.96)	(1.76)			2.08		66%	
Sens 11	11a) increase SA by 10%	3.69	7.25	6.56	6.17		(0.84)						7.19						(1.96)	(1.76)				1.90	0%	-7%
	11a) decrease SA by 10%	3.72	7.27	6.59	6.20		(0.81)						7.16						(1.96)	(1.76)				2.29	1%	12%
Sens 12	12a) Sell assets	3.69	7.26	6.57	6.18		(0.84)																		0%	
	12b) Borrow assets	3.98	7.19	6.54	6.08		(0.84)						7.19												1%	
	12c) Use negative assets	3.93	7.23	6.56	6.17		(0.84)																		1%	
Sens 13	NOT APPLICABLE TO TERM																									
Sens 14	Expenses - Increase by 10%	3.74	7.34	6.64	6.26		(0.62)					(1.40)	7.23						(1.89)	(1.67)					5%	
Sens 15	15a) Lower initial credit spread						(0.72)												(1.95)	(1.76)					5%	
	15b) Lower Ultimate credit spread																		(2.01)	(1.68)					1%	
Sens 16	NOT APPLICABLE TO TERM																									
Sens 17	Double Defaults						(0.75)					(1.62)	7.35						(1.96)	(1.76)					2%	

1) Reference reserve for Phase 2 differs from Phase 1 for this Exhibit due to corrections made.
2)Exhibit 5 has 90% coinsurance

5-Year Issue Block, Alt 2

		ULSG											
	Exhibit	11	11	14	14	15	15	16	16	19	19	*Ave Chg as Pct of Base*	
TY		DR	SR	DR	SR	DR	SR	DR	SR	DR	SR	*DR*	*SR*
Sens. 1	a) best estimate mortality	94.68	94.67	22.52	59.06	71.64	75.44	97.95	92.63	40.63	75.36	*0%*	*0%*
	b) remove improvement	102.03	101.39			73.11	77.10	103.74	98.57	47.77	82.94	*8%*	*6%*
	c) include margin	106.31	106.57			74.35	78.67	106.56	101.51	51.83	86.49	*13%*	*10%*
	d) total co. level credibility	120.70	122.01			85.49	88.67	127.40	123.34	79.76	115.60	*43%*	*33%*
	e) granular level credibility			20.75	52.01	90.49	94.46	130.87	126.44	86.10	119.19	*57%*	*40%*
	Phase 1	*120.70*	*122.01*	*21.48*	*48.23*	*85.49*	*88.67*	*127.40*	*123.34*	*86.10*	*119.19*		
Sens. 1.5	a) no margins	111.40	111.27	22.52	59.06	57.78	61.85	89.89	88.43	67.15	104.44	*-17%*	*-11%*
	b) double margins	130.68	131.72	20.64	45.69	102.30	107.59	137.28	132.90	98.70	132.02	*9%*	*9%*
Sens 2	Included in Phase 1 sections												
Sens 3	Impact of compressing model					86.37	90.24			83.65	121.54	*-1%*	*2%*
Sens 4	a) Plus 100 bps	117.92	124.82	16.68	34.66	77.45	82.71	115.56	116.38	73.45	106.11	*-12%*	*-10%*
	b) Minus 100 bps	125.88	128.97	27.43	62.14	93.19	98.92	127.42	128.68	100.43	138.91	*12%*	*13%*
	c) Inverted	118.10	117.61	30.00	59.05			127.67	128.91	100.82	139.03	*14%*	*10%*
Sens 5	a) Long rate MR + 100 bps	113.38	116.68	20.96	43.15	82.21	85.14	119.83	121.40	82.18	116.24	*-5%*	*-5%*
	b) Long rate MR - 100 bps	128.87	129.72	22.36	54.75	89.15	90.06	122.47	125.15	90.37	126.84	*3%*	*6%*
	c) 150% Long rate vol	124.18	126.15	21.96	51.85	87.29	91.07	122.54	124.29	88.13	122.78	*1%*	*3%*
	d) 150% volatility of stoch vol	120.44	122.94	21.55	68.43	85.49	89.49	121.64	123.70	86.19	122.79	*-1%*	*9%*
Sens 6	*NPR from Phase 1*	*96.46*						*95.45*					
	6a) ULSG change lapse	80.88										*-16%*	
	6b) 4% val rate (from 5% baseline)	118.68						112.41				*20%*	
Sens 7	10% permanent incr in mortality	126.12	128.58	21.12	46.84	88.05	93.91	133.89	130.19			*3%*	*3%*
Sens 8	8a) 80% of baseline lapse rates	125.97	127.45	22.73	52.95	88.37	93.88	133.53	128.75			*5%*	*6%*
	8b) 120% of baseline lapse rates	116.09	116.50	20.46	44.18	82.68	85.06	122.45	118.32			*-4%*	*-5%*
Sens 9	9a) Premium acceleration, +25%	119.65	120.97	12.74	26.29	91.54	94.53	109.62	104.37			*-12%*	*-14%*
	9b) Premium deceleration, -25%	111.18	111.78	19.13	35.89	50.67	54.70	126.75	122.69			*-15%*	*-18%*
	9c) Premium to maintain NLG	-----	-----	-----	-----	94.31	100.30					*10%*	*13%*
Sens 10	No Tail profit for term with Tail												
Sens 11	11a) increase SA by 10%	120.68	103.49	21.44	45.22	85.32	77.67	133.71	120.58			*1%*	*-9%*
	11b) decrease SA by 10%	121.32	145.19	21.59	51.40	85.80	102.97	122.60	127.81			*-1%*	*11%*
Sens 12	12a) Sell assets	120.77	120.75	-----	-----	-----	-----					*0%*	*-1%*
	12b) Borrow assets	120.77	120.54	-----	-----	85.35	91.01					*0%*	*1%*
	12c) Use negative assets	-----	-----	-----	-----	-----	-----						
Sens 13	Does not apply												
Sens 14	Expenses - Increase by 10%	122.13	122.63			85.62	91.17					*1%*	*2%*
Sens 15	15a) Lower initial credit spread	-----	-----	-----	-----	-----	-----						
	15b) Lower Ultimate credit spread	-----	-----	-----	-----	-----	-----						
Sens 16	16a) Double dynamic lapse	117.87	118.68	-----	-----	-----	-----					*-2%*	*-3%*
	16b) Halve dynamic lapses	122.48	122.42	-----	-----	-----	-----					*1%*	*0%*
Sens 17	Double Defaults	128.97	129.86	-----	-----	91.16	97.00					*7%*	*8%*

5-Year Issue Block, Alt 2

		WL					
	Exhibit	22	22	23	23	*Ave Chg as Pct of Base*	
TY		DR	SR	DR	SR	*DR*	*SR*
Sens. 1	a) best estimate mortality	15.34	16.57			*0%*	*0%*
	b) remove improvement	-	-				
	c) include margin	17.18	18.27			*12%*	*10%*
	d) total co. level credibility	20.98	21.55			*37%*	*30%*
	e) granular level credibility	23.89	24.74			*56%*	*49%*
	Phase 1	20.64	21.66				
Sens. 1.5	a) no margins	17.68	18.74	Co. 27 demonstrated SRET passed under all sensitivities.		*-14%*	*-14%*
	b) double margins	23.78	24.76			*15%*	*14%*
Sens 2	Included in Phase 1 sections						
Sens 3		20.20	21.25			*-2%*	*-2%*
Sens 4	a) Plus 100 bps	20.52	21.32			*-1%*	*-2%*
	b) Minus 100 bps	20.79	22.05			*1%*	*2%*
	c) Inverted	20.49	21.45			*-1%*	*-1%*
Sens 5	a) Long rate MR + 100 bps	20.02	21.22			*-3%*	*-2%*
	b) Long rate MR - 100 bps	21.35	22.21			*3%*	*3%*
	c) 150% Long rate vol	20.88	22.70			*1%*	*5%*
	d) 150% volatility of stoch vol	20.64	22.32			*0%*	*3%*
Sens 6	*NPR from Phase 1*	*22.40*		*17.89*			
	6a) ULSG change lapse						
	6b) 4% val rate (from 5% baseline)			17.13		*-4%*	
Sens 7	10% permanent incr in mortality	23.37	24.31			*13%*	*12%*
Sens 8	8a) 80% of baseline lapse rates	22.07	23.27			*7%*	*7%*
	8b) 120% of baseline lapse rates	19.49	20.48			*-6%*	*-5%*
Sens 9	9a) Premium acceleration, +25%						
	9b) Premium deceleration, -25%						
	9c) Premium to maintain NLG						
Sens 10	No Tail profit for term with Tail						
Sens 11	11a) increase SA by 10%	20.65	18.42			*0%*	*-15%*
	11b) decrease SA by 10%	20.63	27.81			*0%*	*28%*
Sens 12	12a) Sell assets						
	12b) Borrow assets						
	12c) Use negative assets						
Sens 13	Does not apply						
Sens 14	Expenses - Increase by 10%	21.92	23.07			*6%*	*6%*
Sens 15	15a) Lower initial credit spread						
	15b) Lower Ultimate credit spread						
Sens 16	16a) Double dynamic lapse						
	16b) Halve dynamic lapses						
Sens 17	Double Defaults	21.48	22.35			*4%*	*3%*

5-Year Issue Block, Alt 2

		Accum UL			
	Exhibit	26	26	*Ave Chg as Pct of Base*	
TY		DR	SR	*DR*	*SR*
Sens. 1	a) best estimate mortality				
	b) remove improvement				
	c) include margin				
	d) total co. level credibility				
	e) granular level credibility				
	Phase 1	*176.05*	*178.00*		
Sens. 1.5	a) no margins	-	-		
	b) double margins	215.90	192.70	*23%*	*8%*
Sens 2	Included in Phase 1 sections				
Sens 3	Impact of compressing model				
Sens 4	a) Plus 100 bps	177.55	178.22	*1%*	*0%*
	b) Minus 100 bps	175.86	177.35	*0%*	*0%*
	c) Inverted	175.93	177.44	*0%*	*0%*
Sens 5	a) Long rate MR + 100 bps	176.15	178.33	*0%*	*0%*
	b) Long rate MR - 100 bps	177.58	178.43	*1%*	*0%*
	c) 150% Long rate vol	176.47	180.79	*0%*	*2%*
	d) 150% volatility of stoch vol	176.06	179.77	*0%*	*1%*
Sens 6	*NPR from Phase 1*				
	6a) ULSG change lapse				
	6b) 4% val rate (from 5% baseline)				
Sens 7	10% permanent incr in mortality				
Sens 8	8a) 80% of baseline lapse rates				
	8b) 120% of baseline lapse rates				
Sens 9	9a) Premium acceleration, +25%				
	9b) Premium deceleration, -25%				
	9c) Premium to maintain NLG				
Sens 10	No Tail profit for term with Tail				
Sens 11	11a) increase SA by 10%				
	11b) decrease SA by 10%				
Sens 12	12a) Sell assets				
	12b) Borrow assets				
	12c) Use negative assets				
Sens 13	Equity rates_specific to VUL				
Sens 14	Expenses - Increase by 10%				
Sens 15	15a) Lower initial credit spread				
	15b) Lower Ultimate credit spread				
Sens 16	16a) Double dynamic lapse				
	16b) Halve dynamic lapses				
Sens 17	Double Defaults				

5-Year Issue Block, Alt 2

		VUL					
	Exhibit	28	28	29	29	*Ave Chg as Pct of Base*	
TY		DR	SR	DR	SR	*DR*	*SR*
Sens. 1	a) best estimate mortality	15.83	3.80				
	b) remove improvement	-	-				
	c) include margin	15.63	3.85			*-1%*	*1%*
	d) total co. level credibility	-	-				
	e) granular level credibility	15.46	3.95			*-2%*	*4%*
	Phase 1	*15.46*	*3.95*	*(89.61)*	*(2.74)*		
Sens. 1.5	a) no margins	15.42	1.97			*0%*	*-50%*
	b) double margins	15.61	5.64			*1%*	*43%*
Sens 2	Included in Phase 1 sections						
Sens 3	Impact of compressing model	6.22	0.26			*-60%*	*-93%*
Sens 4	a) Plus 100 bps	14.94	4.38	(19.66)	(2.54)	*37%*	*9%*
	b) Minus 100 bps	16.00	3.79	(29.46)	(2.66)	*35%*	*0%*
	c) Inverted	15.59	5.46	(51.19)	(2.58)	*22%*	*22%*
Sens 5	a) Long rate MR + 100 bps		4.32				*9%*
	b) Long rate MR - 100 bps		3.45				*-13%*
	c) 150% Long rate vol		3.99				*1%*
	d) 150% volatility of stoch vol		3.79				*-4%*
Sens 6	*NPR from Phase 1*	*15.54*					
	6a) ULSG change lapse						
	6b) 4% val rate (from 5% baseline)						
Sens 7	10% permanent incr in mortality	15.32	4.04	(89.61)	(2.70)	*0%*	*2%*
Sens 8	8a) 80% of baseline lapse rates	17.19	2.29	(70.47)	(2.61)	*16%*	*-19%*
	8b) 120% of baseline lapse rates	14.24	5.14	(128.64)	(2.88)	*-26%*	*13%*
Sens 9	9a) Premium acceleration, +25%						
	9b) Premium deceleration, -25%						
	9c) Premium to maintain NLG						
Sens 10	No Tail profit for term with Tail						
Sens 11	11a) increase SA by 10%		3.84	(84.29)	(2.57)	*6%*	*2%*
	11b) decrease SA by 10%		4.02	(80.07)	(2.91)	*11%*	*-2%*
Sens 12	12a) Sell assets						
	12b) Borrow assets						
	12c) Use negative assets						
Sens 13	Equity rates_specific to VUL						
Sens 14	Expenses - Increase by 10%	15.73	4.26	(69.14)	(2.71)	*12%*	*4%*
Sens 15	15a) Lower initial credit spread	-----	-----	(104.31)	(2.85)	*-16%*	*-4%*
	15b) Lower Ultimate credit spread	17.31	3.72	(112.67)	(2.73)	*-7%*	*-3%*
Sens 16	16a) Double dynamic lapse						
	16b) Halve dynamic lapses						
Sens 17	Double Defaults	15.92	3.83	(85.24)	(2.77)	*4%*	*-2%*

APPENDIX G

ACLI REQUEST NO. 2: ULSG QUESTIONNAIRE

The reader should note that this questionnaire was completed by only those companies modeling ULSG products in the Impact Study. Summarized below are the questions, with detailed responses on the following pages.

Q1: What category best describes the ULSG product used in the Study?

Q2: When statutory reserves are calculated, are there multiple segments in the segmented method, or one single segment?

Q3: How would you rank the strength of the secondary guarantee? (a) Lifetime guarantee intended to compete with term products and other similar ULSG products (i.e. upper quartile); (b) reasonably strong guarantee intended to match 2nd or 3rd quartile competitive position; (c) not a strong secondary guarantee, falls in lowest quartile.

Q4: If YRT reinsurance is applicable for this segment, were the modeled reinsurance premiums simply the premiums specified by the treaty or were the premiums adjusted to reflect increased VM-20 mortality?

Q5: In the VM-20 analysis, is YRT reinsurance a net cost or net benefit to the income statement?

Q6: Describe the level of premium payment and the projected pattern of premium payment assumed as anticipated experience.

Q7: Describe the changes, if any, made to projected non-guaranteed elements, specifically cost of insurance charges.

Q8: Comment on your rationale supporting the determination of the margin assigned to the policy holder behavior for premium payment.

Q1: What category best describes the ULSG product used in the Study?

EXHIBIT	RESPONSE
11	Shadow Account - with two sets of COIs depending on funding level.
13	Double shadow account, lifetime guarantee, designed to facilitate lower level premiums for an initial coverage period followed by higher level premiums for remaining lifetime.
14	The ULSG product used for this study is a shadow account product, with lifetime guarantees.
15	The ULSG products tested for the impact study include both a single life product and joint life product. Both products can be described as having multiple shadow accounts and a lifetime guarantee. Most policies are expected to have a general account value that is lower than the shadow account value.
16	Double shadow account.
17	The ULSG product is a multiple shadow account with a dual charge structure.
18	The ULSG product tested has a shadow account.
19	This product is a secondary guarantee product with a level minimum premium guarantee for 10 years followed by a lapse protection value (LPV) guarantee that continues to A121. The LPV guarantee is a 2-tier COI structure shadow account. The goal of the product is to be in the top first or second quartile in all premium payment patterns.

Q2: When statutory reserves are calculated, are there multiple segments in the segmented method, or one single segment?

EXHIBIT	RESPONSE
11	One segment.
13	There are multiple segments when AG38 reserves are calculated.
14	When AG 38 reserves are calculated, for the majority of policies, one segment emerges.
15	Single segment.
16	One single segment.
17	Generally only one segment under AG 38 step 1 & 2.
18	For AG38 reserves, there is one single segment.
19	Generally expected to have no segment breaks, although if a segment break occurs, it is recognized in the AG 38 calculations.

Q3: How would you rank the strength of the secondary guarantee? (a) Lifetime guarantee intended to compete with term products and other similar ULSG products (i.e. upper quartile); (b) reasonably strong guarantee intended to match 2nd or 3rd quartile competitive position; (c) not a strong secondary guarantee, falls in lowest quartile.

EXHIBIT	RESPONSE
11	Category a), but not really intended to compete with term products. Strong at guarantee to age 100 or 121, but weak for 10 or 20 year guarantees.
13	In the (a) category; lifetime guarantee intended to compete with term products and similar ULSG products.
14	The product has a lifetime guarantee.
15	Category (a); lifetime guarantee intended to compete with term products and other similar ULSG products.
16	None of the above. Our ULSG product is priced to have a strong competitive guarantee and is positioned to be in the top quartile in the majority of cells when compared with other guaranteed whole life products. But it is not intended to compete with 20/30-year-term products.
17	The secondary guarantee is up to lifetime, and falls into category (b): reasonably strong guarantee in 2nd or 3rd quartile position.
18	The ULSG product was designed to compete with similar ULSG products in the upper quartile of competitors.
19	Category (a); lifetime guarantee intended to compete with term products and other similar ULSG products (i.e. upper quartile). However, the 2-tier COI structure of this product was not meant to minimize AG 38 reserves. They were set to help minimize deficiency reserves and maximize basic reserves.

Q4: If YRT reinsurance is applicable for this segment, were the modeled reinsurance premiums simply the premiums specified by the treaty or were the premiums adjusted to reflect increased VM-20 mortality?

EXHIBIT	RESPONSE
11	Premiums specified by the treaty, if you look at Phase I results with and without reinsurance you can see fairly dramatic impacts.
13	Reinsurance premiums were simply the premiums specified by the treaty.
14	Modeled reinsurance premiums are those specified by the treaty.
15	Reinsurance premiums were increased by 5% as one of the assumption margins. The rates were not further increased to reflect the higher VM20 mortality.
16	Premiums specified by the treaty.
17	Premiums specified by the treaty.
18	We have YRT reinsurance on the ULSG product tested with a retention limit of $5m. Given the insignificant amount of reinsurance on the block, we did not include the impact of reinsurance for the testing.
19	YRT Reinsurance premiums did not reflect VM-20 mortality.

Q5: In the VM-20 analysis, is YRT reinsurance a net cost or net benefit to the income statement?

EXHIBIT	RESPONSE
11	In our internal models YRT reinsurance is a cost, but using VM-20 mortality - YRT reinsurance is a significant benefit.
13	N/A
14	YRT reinsurance is a net benefit.
15	A net benefit. The reinsurance benefits are significantly higher than the reinsurance premiums in the VM20 runs.
16	A net benefit.
17	Using the VM-20 mortality assumption, YRT reinsurance is a net benefit. Using the company's experience mortality, the YRT reinsurance is a net cost.
18	N/A
19	Net benefit.

Q6: Describe the level of premium payment and the projected pattern of premium payment assumed as anticipated experience.

EXHIBIT	RESPONSE
11	We start with the current shadow account balance and assume premiums are paid at the stipulated level until the policy is either fully-funded, or the policy lapses. No policy will ever be over-funded. Our sensitivities have shown that increasing or decreasing premiums from our baseline assumption results in lower reserves.
13	(i) A minimum level premium payment that assumes the product will stay in force, with an initial level term of 10, 15, 20 or 30 years. (ii) Then, a minimum level premium payment that assumes the product will stay in force until age 105. (iii) Then, a minimum level premium payment that assumes the product will stay in force until age 120.
14	Premium payments are the premiums paid over the previous 12 months, adjusted to be billed premium if dump-ins or 1035 exchange amounts have been paid.
15	The premiums used in the projection were based upon target premiums. Policy cells were labeled as *Low*, *Med*, and *High* depending on how much AV the policy had compared to a target premium. The premium assumption was calculated to get a *Lapse without Value* that was reasonable. The premiums were then increased with a 10% margin. With this margin the average *Lapse without value* was 44bp on the 1yr, Alt2 block over the first 30 years. In addition, the model automatically prevents over-funding by stopping premiums once a policy is fully funded.
16	Modeled premiums are based on 100% of billed premium until the time when the policy value has accumulated the minimum amount sufficient to maintain the no-lapse guarantee. For any policy with insufficient funds (i.e., shadow fund value less than zero) and an attained age of 80 through 94, a lump sum premium is assumed to fund the policy to maturity; policies where the insured would otherwise lapse due to insufficient funds after attained age 94 remain in force until maturity without an infusion of premium.
17	Modeled premium payments reflect the planned premiums from the administration system for each policy. If such premium over funds the guarantee, the model assumes no further premium once the guarantee is fully funded to the maximum duration.
18	The expected future premium pattern is assumed to be a minimum level premium payment to fund the secondary guarantee to maturity.
19	The models currently have premium payment assumptions based on the level of funding the policy exhibits at any point in the future. At issue, pay billed premium with a persistency adjustment by duration. Future premiums are based on two possible long term events: 1) the policy is about to lapse dur to insufficient account value or shadow value, and 2) the policy becomes overfunded. If a policy falls into 2) the premiums cease. If the policy falls into 1) then future modeled premiums reflect the amount necessary to maintain the secondary guarantee.

Q7: Describe the changes, if any, made to projected non-guaranteed elements, specifically cost of insurance charges.

EXHIBIT	RESPONSE
11	No changes made.
13	We did not make any changes to projected non-guaranteed elements for the Impact Study.
14	No changes were made to projected non-guaranteed elements other than the reflection of the interest rate environment in credited rates.
15	No changes were made to the non-guaranteed elements.
16	No changes are projected. We assumed a flat credited rate at the minimum guarantee of 3% for all policies and all policy years.
17	The model assumes no changes to non-guaranteed elements other than interest crediting rates. We model management of the interest crediting rates based on the scenario earned rates less the target spread which varies by duration. The modeled credited rate is floored at the guaranteed minimum crediting rate.
18	We did not model any changes to non-guaranteed elements including cost of insurance charges.
19	No changes made.

Q8: Comment on your rationale supporting the determination of the margin assigned to the policy holder behavior for premium payment.

EXHIBIT	RESPONSE
11	No margin applied as we could not determine a margin that would be "a margin" / more conservative than our current approach.
13	We did not include a premium margin in our field study testing. Reducing anticipated premium will result in insufficient funding, and cause the policy to lapse.
14	Premium persistency assumptions and the level of initial premium paid were based on 2009 CFT assumptions. No additional margins were added for this analysis.
15	We checked with the pricing team to make sure that the premium assumption in general was causing a reasonable amount of policies lapsing without value. We have found that increasing the premium increases the reserve. For this test we assumed a 10% margin (increase) on the premium payment. This actually caused the lapse without value rates to be far lower than we would expect to see, but felt that using anything lower than 10% would raise questions and could be hard to defend.
16	We deem the overall margin we assigned to the policyholder behavior for premium payment to be reasonably conservative for the following reasons: 1) We used the combined single-life and last-survivor Canadian lapse rates as described in our response to ACLI request no. 3 below even though we are modeling only our single-life block. 2) As described above, modeled premiums are based on 100% of billed premium until the time when the policy value has accumulated the minimum amount sufficient to maintain the no-lapse guarantee. This is above the actual experience that we see emerging. 3) As stated above, for any policy with insufficient funds (i.e. shadow fund value less than zero) and an attained age of 80 through 94, a lump sum premium is assumed to fund the policy to maturity. Policies where the insured would otherwise lapse due to insufficient funds after attained age 94 remain in force until maturity without an infusion of premium.
17	It is difficult to assign a margin to planned premiums since these are modeled at the contract level. We assume no premium cessation in the model. For in-force policies the company experience is such that about 5% of policies are not paying premiums. The rest are either paying the planned amount or were sold as a single pay. As a result, there is a margin of conservatism in the lack of a premium cessation assumption.
18	We did not include an explicit margin on premium payment. However, we do model the assumption that no policy will lapse if it is *in-the-money*. We know that this assumption has a direct impact on modeled cash flows and would therefore directly impact the modeled reserve.
19	No margin was assigned to the policyholder behavior for premium payments.

APPENDIX H

ACLI REQUEST NO. 3: GENERAL QUESTIONNAIRE

The reader should note that this questionnaire was presented to all the companies regardless of product type modeled in the Impact Study. As a result, a single company may have submitted a response applicable to more than one product or line of business. The exhibit number used to identify each company's remarks is the number associated with its ULSG product, if it modeled ULSG, or if not, the exhibit number associated with the non-ULSG product type. If two or more such product types were modeled, then the lowest exhibit number is used, unless the data was distinct by product type.

Summarized below are the questions, with detailed responses on the following pages.

Q1: Please describe your mortality assumption development approach (i.e., simplified, credibility blended, other, etc.)

Q2: Please describe the level of mortality credibility used in margin determination (i.e., the aggregate credibility factor).

Q3: Please describe the level at which credibility was determined for purposes of blending company experience with the industry table.

Q4: Did you use the Underwriting Criteria Scoring system to identify the industry tables to use? Comment on the ease or difficulty of this tool. Did it point to a Relative Risk table that was reasonable, or did you need to adjust this table to better align with company expectations?

Q5: Describe what was done with the credibility of the mortality segments on a durational basis.

Q6: What adjustments were made, if any, to the credibility adjusted mortality rates?

Q7: Is future mortality improvement a part of the company's anticipated experience assumption for the tested business in models other than the VM-20 model?

Q8: (a) Provide the range of the mortality margin across the model. (b) In the margin development, what was the assumed random fluctuation risk factor?

Q9: For modeled reserves, what is the general level of lapse assumption and general level and direction of lapse margin?

Q10: Briefly describe your approach to asset modeling, in particular, did you model actual assets, or assume cash at valuation date; was PIMR incorporated in the modeling; did you model a comprehensive or simplistic reinvestment strategy?

Q11: Is your liability model a seriatim model or a compressed model? Did you use different set-ups for different VM-20 calculations?

Q12: If YRT reinsurance is applicable for this segment, were the modeled reinsurance premiums simply the premiums specified by the treaty or were the premiums adjusted to reflect increased VM-20 mortality?

Q13: In the VM-20 analysis, is YRT reinsurance a net cost or net benefit to the income statement?

Q1: Please describe your mortality assumption development approach (i.e., simplified, credibility blended, other, etc.)

EXHIBIT	RESPONSE
3	We used 100% company experience rates.
4	We assume experience is fully credible, since we expect it to be in the near future.
11	Credibility-adjusted experience rates.
13	Credibility-adjusted approach.
14	Mortality assumptions used for Phase 1 were cash flow testing assumptions. The VM-20 credibility adjusted tables were used for Phase 2.
15	A recent experience study was used to blend from current experience to the VBT2008 tables between years 11-20. Preferred plus was grouped with standard preferred non-smokers to calculate an A/E ratio. Standard smokers were grouped with Preferred smokers.
16	Credibility-adjusted experience rates.
17	Credibility-adjusted experience rates.
18	We used a simplified mortality assumption development approach.
19	Credibility-adjusted experience rates.
22	We developed credibility-adjusted experience rates.
26	Existing CGAAP mortality assumptions were used rather than following the specific steps laid out in VM-20.

Q2: Please describe the level of mortality credibility used in margin determination (i.e., the aggregate credibility factor).

EXHIBIT	RESPONSE
3	Data was fully credible based on the credibility standards and credibility segments chosen.
4	Using the Limited Fluctuation Method, our credibility segment is approximately 88% credible. For practical reasons we have considered the segment to be fully credible, since we expect it to be so in the near future.
11	Non-Tobacco = 48.2%, Tobacco = 49.9%.
13	Not mentioned.
14	Varied by cell.
15	The credibility factor was 85% on ULSG which was held constant for the first 10 years of the projection.
16	Aggregate level credibility factor = 80%.
17	Nonsmoker = 100%; Smoker = 59%.
18	Based on a preliminary review of mortality credibility, we assumed that we had close to 0% credibility and used 100% of the 2008 VBT table for the mortality assumption for Stochastic/ Deterministic reserve calculations.
19	Used same credibility factor as used in credibility blending approach, so at the Mortality segment level.
22	For margin determination, we applied the aggregate level credibility factor, defined at the Credibility Segment level (*company level*).
26	In concept, the mortality assumptions used for CGAAP valuation are set in the same way as under VM-20, whereby the assumptions are set based on the company's experience credibility-weighted with an industry table.

Q3: Please describe the level at which credibility was determined for purposes of blending company experience with the industry table.

EXHIBIT	RESPONSE
3	Sex and tobacco usage.
4	Credibility segment defined as those policies under preferred underwriting scheme excluding rated, converted, lapsed, other non-standard underwriting classes and second-to-die policies. The credibility segment consists of six underwriting classes. For Phase 1, we followed a method of determining credibility at the underwriting class and gender (mortality segment) level with a true up to credibility weighted experience in aggregate (credibility segment). We believe a true up to aggregate credibility-weighted experience is important to prevent companies with adverse mortality experience from minimizing credibility by determining credibility assumptions at a very granular level.
11	Aggregate gender and smoking (tobacco use) status.
13	Underwriting class, including gender, smoking and underwriting status.
14	By Sex/Underwriting Class/Smoking status.
15	We used experience from the ULSG block in aggregate and the Limited Fluctation Method to determine the credibility factor.
16	Credibility was determined at the Total Company level including all permanent life insurance: ULSG, current assumption UL and variable UL.
17	Credibility level varies by smoking class, not underwriting class, and by duration.
18	Our credibility segments were defined by underwriting eras.
19	Determined credibility factors at the risk class level (gender/smoke status/underwriting status). The factor was held constant for N policy years, then graded to 0% in the 20th and later policy years.
22	For the purposes of blending the company experience with industry table, we follow the Normalized Method, as outlined in the July 2002 CIA Educational Note on Expected Mortality. We blend the company experience with the industry table at two levels. First, we blend it at the mortality segment level (or risk class level). Then, we *normalize* the resulting rates for the credibility at the credibility segment (or company) level.

Q4: Did you use the Underwriting Criteria Scoring system to identify the industry tables to use? Comment on the ease or difficulty of this tool. Did it point to a Relative Risk table that was reasonable, or did you need to adjust this table to better align with company expectations?

EXHIBIT	RESPONSE
3	No. We used 100% company experience rates.
4	We had previously scored our underwriting classes a few years ago when the tool first became available. Therefore we cannot comment on the current version of the tool, but from our prior experience, we felt the tool was cumbersome. While we believe it should be allowable that the UCS tool be used to identify the industry tables, we also believe that other options should be explored. One such option is similar to the 2001 Interim Solution which used a 5-year lifetime present value test, based on anticipated mortality assumptions as supported by company experience studies.
11	Yes. Our company underwriting practices do not fit well within UCS so some judgment was used in determining the appropriate VBT RR tables.
13	Not mentioned.
14	Not mentioned.
15	We used the UCS to determine which industry table should be used. These factors had been calculated years earlier when the tool first was developed. We did not take the time to recalculate the scores. The system was easy to use; however, it is felt that it did not produce reasonable results. Experience is coming in far below what the UCS tool would suggest. Also, the UCS tool did not vary the factors by types of business. For example, traditional business would have the same results as ULSG business.
16	Because of the issues we encountered, we continued to use the resulting RR100 table (after attempting to use the UCS as well as we can) as the base mortality rate for VM-20 testing even though our company expectations for mortality are lower than the resulting Relative Risk table of RR100 for most periods and for most cells.
17	Yes. The USC system was used to map our risk classes to industry tables. We worked with our underwriting department on this task, and it went pretty smoothly. We adjusted one risk class by 1 point to better align the resulting industry table with our expectations for that class.
18	N/A
19	Yes. The scoring was completed by company's mortality risk management division. No problems noted.
22	No response.

Q5: Describe what was done with the credibility of the mortality segments on a durational basis.

EXHIBIT	RESPONSE
3	We determined that mortality was fully credible at the credibility segment level and did not make adjustments at the level of individual durations.
4	Our mortality assumptions are level ratios of the industry table, with criteria for *wear-off* of our experience according to the following rules: (1) wear-off begins at A80 and is complete by A105; (2) wear-off will not occur before ten years from issue, except for item 3, and (3) wear-off will always begin by A95. Our company first introduced its preferred underwriting classification structure in 2000. Our experience study includes the first ten policy years. Referring to VM-20 Section 9.C.4.c., we believe it is appropriate to hold our mortality assumptions level for durations past our experience durations given the language in Section 9.C.4.c.which says a company may grade into a "modified industry mortality table where the modification is based on the credible experience in the earlier policy years." The experience for the credibility segment is considered 100% credible. Therefore, we believe it is appropriate to continue the mortality assumptions past the durations where we have credible experience, since the assumptions are based on a modified industry table based on the credible experience in the earlier policy years. Furthermore, the assumptions eventually grade back into the industry tables as noted in the rules above.
11	We assumed company data was credible (48.2% for example) for 25 year and graded to zero credibility by year 30.
13	Not mentioned.
14	Factors were developed for each face amount band/duration group based on the experience of that group relative to the experience of all face amounts and durations combined. Each of these factors were tempered based on the credibility of that face amount/duration group. These factors were multiplied by the credibility adjusted mortality that was calculated for each sex/underwriting class/smoking status.
15	We assumed company data on ULSG was 85% credible during first 10 years and then straight-line graded to 0% credible in year 20.
16	We assumed company data was 80% credible for the first 10 policy years then blended with industry rates according to the Limited Fluctuation Credibility Theory (using 3007 deaths for 100% credibility). This resulted in a factor of 82.5% applied to the 2008 VBT Primary table [Smoker/Non-Smoker] for the first 10 policy years. The 80% credibility factor was graded to 0% in the 20th policy year. By the 20th policy year, we are using industry rates.
17	We blended company data with industry rates for the first 30 durations. By the 27th to 30th duration (varies by NS/S), we used industry rates. The credibility for each duration was calculated as follows: (1) Group mortality experience into quinquennial policy years by NS/S. (2) Calculate credibility factors for each group. (3) Extrapolate and smooth credibility factor for each duration so that a) the average of the five credibility factors is close to the credibility for the group and b) the second differences of the credibility factors are minimized.
18	N/A

Q5: Continued

EXHIBIT	RESPONSE
19	Credibility factor held constant for first N policy years, then graded off to 0% in the 20th and later policy years.
22	On a durational basis, we blend the credibility adjusted experience rates into the industry rates at very young ages and at very old ages. We developed an algorithm that reduces the credibility factor to zero by attained age 95 and by attained age 10. The credibility factor goes to zero over a 5-year period. The factor does not go down linearly over the 5-year period. Instead, the speed at which it goes to zero depends on the number of cells with no exposures in the neighborhood of the 5-year period. This means, if we have very little exposures in the very old and the very young ages, then the factor will go down to zero quickly. If we have high amount of exposures in those ages, then the factor goes down to zero slowly.

Q6: What adjustments were made, if any, to the credibility adjusted mortality rates?

EXHIBIT	RESPONSE
3	We developed factors that varied by risk class. The differences between the factors were determined based on our mortality pricing assumptions and input from reinsurers. After determining the relative values of the factors, the absolute values were determined by applying a conservation of deaths approach. As an alternative approach, we also attempted to develop the relative values of the factors using the UCS process, but we were not comfortable with the relative values that the UCS process generated.
4	No adjustments were made.
11	None.
13	Not mentioned.
14	The credibility and characteristic (e.g., face amount/duration) adjusted mortality rates were smoothed using Whittaker-Henderson graduation, and those rates were manually adjusted to ensure that the relationships of rates between risk classes, etc. were appropriate.
15	No adjustments were made.
16	No adjustments were made to the credibility adjusted mortality rates.
17	None.
18	N/A
19	Resulting prudent estimate mortality assumptions were subject to minimal adjustments before using in models. Small adjustment made to align rates with increasing duration and attained ages.
22	There are inconsistencies between our best-class and the second-best-class credibility-adjusted rates. Our best class has virtually no credibility whereas our second best class has some credibility. This results in our best class having higher rates than our second best class in many cells. To resolve this inconsistency we took a simple and conservative approach of capping the best-class rates to the second-best-class rates. We also capped our female rates at the male rates.

Q7: Is future mortality improvement a part of the company's anticipated experience assumption for the tested business in models other than the VM-20 model?

EXHIBIT	RESPONSE
3	In general, no. In some cases we do assume mortality improvement on large face amounts.
4	We currently only use future mortality improvement for limited purposes.
11	Yes
14	Yes, where allowed, but not for cash-flow testing.
15	Yes
16	Yes
17	Yes, in certain limited purpose situations, models for ULSG busienss sometimes assume mortality improvement.
18	We do not assume future mortality improvements for Cash Flow Testing or Asset Adequacy analysis.
19	No
22	No

Q8: (a) Provide the range of the mortality margin across the model.
(b) In the margin development, what was the assumed random fluctuation risk factor?

EXHIBIT	RESPONSE
3	We increased our experience mortality rates 4%. We use a 4% margin for other analysis we do.
4	(a) 6%: consisting of 6% random fluctuation and 0% company variation (since fully credible) (b) A 6% random fluctuation risk margin in the level premium paying period.
11	(a) The mortality margin varied by issue age. Over the model block, the margin ranged from 7.5% to 13.8%. This is specific margin required by VM-20 - not the margin over our internal anticipated experience mortality. (b) 6%
13	(a) Used the Appendix 3 table for company variation based on a 97% credibility factors. A range would be 5% to 5.5% approximately. (b) Random fluctuation risk factor is 5%.
14	(a) 3-10% margin. (b) Not provided.
15	(a) For ULSG block, the margin varied by issue age ranging from 7.4% to 5.6%. (b) The random fluctuation risk factor was assumed to be 5% for all cells.
16	(a) The mortality margin ranged from 6.7% to 4.2% depending on issue age. (b) The assumed random fluctuation risk factor is 3%.
17	(a) The mortality margin varied by mortality segment and issue age. Over the model block, the margin ranged from 15% to 7%. (b) The random fluctuation risk factors varied by mortality segment, which is by underwriting method, gender and risk class. The range is 3% to 10% and varies by mortality segment.
18	(a) We assumed no mortality margin above the 2008 VBT. (b) N/A
19	(a) The mortality margin varied by mortality segment and ranged from approximately 2% to 12%, depending on risk class and age. (b) In developing the random fluctuation risk factor, we looked at (1) the credibility for each class and (2) the standard deviation of the A-to-E ratios over the exposure years in the study. Higher standard deviations got higher assigned random fluctuation factors (between 2% and 8%). I did this twice, once from a conservative perspective, once from aggressive perspective. The final result was the average of this exercise.
22	(a) The mortality margin varies by issue age and class. Over the model block, the margin ranges from 3.8% to 13.3%. (b) This margin varies by risk class. It ranges from 1.5% to 10%. For risk classes with zero credibility, we set the random fluctuation margin to 10%. For the risk classes that have some credibility, the margin ranges from 1.5% to 6.3%. The margin depends on the amount of volatility that a particular risk class contributes to the overall volatility in A/E ratios.

Q9: For modeled reserves, what is the general level of lapse assumption and general level and direction of lapse margin?

EXHIBIT	RESPONSE
3	For the term product we increase experience lapse rates by 5%.
4	In durations 1-8, rates range roughly from 2% to 20%, and are in the 5% range in aggregate. The company does not have credible experience for durations 8 and later. By duration 11, rates grade to 2.5%, 3.0%, or 4.5%, depending on risk class. This is consistent with a recent LIMRA study which showed ultimate rates in the 4.0% range. A 5% margin was added to the duration in which the level premium period ends and the two durations immediately after. We did not add a lapse margin to other durations, since the impact of higher or lower lapse rates is not consistent across durations. The lapse rate was capped at 99.5%.
11	Base lapse assumption was 3% grading to 1.5% over 5 years. We also have dynamic lapses that decrease lapse to 0% if no premium is required or 0.5% if a premium is required. Our margin decreased these lapses by 15%.
13	Pricing lapses for starting lapse rates, and over 5 years grade to the Canadian Term-to-100 rates, which have a 1% ultimate lapse rate. We use pricing shock lapse assumptions.
14	The lapse assumption was 2%. The direction of the margin was to lower the lapse rates by approximately 20% from best estimate.
15	Base surrender rates vary by age, duration and funding level. In total, the 1yr Alt2 block had an average surrender and Lapse without value rate of 1% over the first 30 years. The margin reduced surrenders by 25%
16	We used the Canadian Term-to-100 (October 2007 CIA Report)– Table 1a *By Amount* on page 6 for all durations (we used the average weighted rate for durations 20+). Note that this table was created using both single and joint life policies–we modeled only single life policies (which are expected to have higher lapse rates). Therefore, we are being conservative by using this table given that ULSG is a lapse-supported product. The lapse rates vary from 5.7% to 0.5% depending on the policy year. No lapse margin was reflected since we consider the Canadian table to be conservative in relation to our expected projected lapse rate experience.
17	The general level of lapse assumption varied from 1-3%. The direction of the lapse margin was a decrease to the ultimate lapse rate assumed.
18	For the modeled reserve, the general lapse assumption is 4.5% grading off to 0% by age 80. We also model a dynamic lapse assumption which sets the lapse assumption to 0% if a policy is *in-the-money*. For the Stochastic/Deterministic reserve calculations, we assumed 10% lower lapses.
22	The lapse assumption is based on our internal experience studies. The general level of margin is 5% and the direction is a reduction in lapse best-estimate assumption.
27	A 5% reduction to experience lapse rates.
30	The general level of lapse assumption is 5-6%. The direction of the margin was a decrease to the rate.

Q10: Briefly describe your approach to asset modeling. In particular, did you model actual assets, or assume cash at valuation date; was PIMR incorporated in the modeling; did you model a comprehensive or simplistic reinvestment strategy?

EXHIBIT	RESPONSE
3	Actual assets were modeled at valuation date, including PIMR and a comprehensive reinvestment strategy.
4	Model actual assets, but used a 9/30/09 file because it was readily available. Included existing IMR (Not converted to pre-tax), which is small and did not model developing IMR as the model does not sell assets. Reinvestment strategy followed CFT.
11	We used actual assets in our portfolio block that were scaled to match the starting reserve. We did not incorporate PIMR but did use a comprehensive reinvestment strategy.
13	Basic asset modeling. For reinvestments, 5 year bonds with rates and spreads consistent with the VM-20 requirement. We included PIMR.
14	The model assumed cash at the valuation date. PIMR was not incorporated. We used the 2009 reinvestment strategy.
15	Actual assets in the portfolio backing these products were modeled. The 2009 issues were backed by assets purchased during that year while the 5-year block used a pro-rata amount of the entire portfolio backing this line of business. The model used a simplistic reinvestment strategy. Amortization of IMR from past sales was not used, but future IMR was incorporated in the model.
16	We modeled in-force assets as of 11/30/2009 based on existing portfolio; this was scaled down proportionately for the stochastic runs. No initial PIMR was modeled; future PIMR was modeled. We used a simplistic reinvestment strategy of pro-rata basis.
17	We modeled actual assets. PIMR was not incorporated in the modeling because the relevant products are so new that no IMR has arisen from the supporting assets. The reinvestment assumptions were similar to those used in asset adequacy analysis in terms of the number of different qualities and durations and asset types assumed. These only represent a subset of the actual assets available for investment under our product portfolio investment guidelines, so we would characterize the reinvestment assumptions as simplified (but not simplistic).
18	We modeled two proxy bonds to approximate the actual in-force assets. We did not incorporate PIMR in the model. We modeled our reinvestment strategy the way we model it for cash-flow testing.
22	We mostly model actual assets. For some assets, we use proxy assets. We do not incorporate PIMR in the modeling. We model a simplistic reinvestment strategy, wherein assets are purchased in a mixture of 4 assets: Investment Grade Bonds, Private Placement Bonds; Higher Yield Bond; Fixed Rate Mortgages.

Q11: Is your liability model a seriatim model or a compressed model? Did you use different set-ups for different VM-20 calculations?

EXHIBIT	RESPONSE
4	Seriatim model.
11	We used a compressed model. We started with seriatim and did testing to confirm results were not materially different. For internal purposes we sometimes model using seriatim and sometimes compressed. In addition–we typically utilize 1000 stochastic scenarios but for all of these runs we chose 200 to keep runtime reasonable.
15	The model used a compressed liability file. The same liability file was used for all VM-20 calculations with the exception of the sensitivity for compressing the liability file.
16	Seriatim model.
17	Seriatim model.
30	Grouped model.

Q12: If YRT reinsurance is applicable for this segment, were the modeled reinsurance premiums simply the premiums specified by the treaty or were the premiums adjusted to reflect increased VM-20 mortality?

EXHIBIT	RESPONSE
3	No reinsurance.
4	We started with the premiums from the treaty but then increased them to reflect our mortality margins. We felt that adding a mortality margin without also increasing the premiums would minimize the impact of the margin and create disconnect between the mortality and the reinsurance rates. The increased mortality would be reinsured away for the same rate and would only cause a small increase of reserves net of reinsurance. Because of this, we chose to apply the margin to the reinsurance rates. This increased the reinsurance premiums 6% during the level period and 20% for the tail period.
11	Reinsurance premiums were not increased.
15	Reinsurance premiums were increased 5%.
16	Reinsurance premiums were not increased.
17	Reinsurance premiums were not increased.
22	The modeled reinsurance premiums are simply the premiums specified by the treaty. We do not adjust the reinsurance premiums to reflect the increased VM-20 mortality.
30	Reinsurance premiums were not increased.

Q13: In the VM-20 analysis, is YRT reinsurance a net cost or net benefit to the income statement?

EXHIBIT	RESPONSE
4	Net benefit.
11	Net benefit.
15	Net benefit.
16	Net benefit.
17	Net benefit.
22	In the VM-20 analysis, the YRT reinsurance is a net benefit to the income statement.
30	The YRT reinsurance is a net benefit using the Phase 1 mortality that included blending with the VBT and margins for conservatism. If we use company experience mortality, the YRT reinsurance is a net cost.

GLOSSARY

VM-20
Valuation Manual Chapter 20: Requirements for Principle-Based Reserves for Life Products. Participants used the October 16, 2010, exposure draft version of this document, though subsequent revisions are currently available.

Phase 1
This phase resulted in submissions of the deterministic reserve, stochastic reserve, net premium reserve, and comparable current statutory reserves for a 1-year block of issues and a 5-year block of issues.

Alt 1
Reinvestment Strategy Alternative 1: refer to VM-20 Sections 7 and 9. This strategy reflects an approach to defining asset credit spreads such that the asset's net yield at purchase is equal to 104% of the then current U.S. Treasury rate plus 25 basis points.

Alt 2
Reinvestment Strategy Alternative 2: refer to VM-20 Sections 7 and 9. This strategy reflects an approach where gross asset spreads initially reflect current market spreads and grade over a four-year period to long-term average gross asset spreads. Default cost factors are determined explicitly.

VM-20 Minimum Reserve
Defined as the aggregate net premium reserve plus the excess, if any, of the greater of the aggregate deterministic reserve and the stochastic reserve over the difference between the aggregate net premium reserve and any deferred premium asset (DPA) held on account of the policies.

$$\textit{Minimum Reserve} = NPR + E$$
$$\textit{where } E = \max[DR; SR] - (NPR - DPA) \not< 0$$

Net Premium Reserve
A formulaic reserve component designed to serve as a floor to the VM-20 minimum reserve. For product types other than term and universal life with secondary guarantees of more than five years, the net premium reserve is equal to the current CRVM method reserve. Net premium reserve detail is found in VM-20 Section 3.

Deterministic Reserve
A reserve amount produced using a cash flow model and calculated under a defined scenario (the deterministic scenario) and a single set of assumptions.

Scenario Reserve
A reserve amount produced using a cash flow model and determined on an aggregated basis over a given scenario. This reserve amount, along with all other scenario reserves in the distribution of scenarios, is used in the determination of the stochastic reserve.

Stochastic Reserve
Using the distribution of scenario reserves ranked lowest to highest, this is the average of the highest 30% in the distribution, or CTE70.

Stochastic Reserve Exclusion Test (SET)
A company is permitted to forego calculation of the stochastic reserve if the group of policies demonstrates passing this test. Although there are several methods allowed to demonstrate passing, the ratio test is the test used in the Study. See VM-20 Section 6B for definition of this ratio.

Deterministic Reserve Exclusion Test (DET)
A company is permitted to forego calculation of the deterministic reserve if the group of policies demonstrates passing this test. There is one method for the test. Policies pass the test if the sum of guaranteed gross premiums for the policies is greater than the sum of the valuation net premiums for the policies. A group of policies that has failed the SET is not eligible for the DET.

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