2017 Principle-Based Reserves (PBR) Review Report

10/19/18

Prepared by the Valuation Analysis (E) Working Group

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Section I. Executive Summary

This report provides a summary of the major observations and findings from the Valuation Analysis (E) Working Group's review of the 2017 VM-20 Reserves Supplement in the Annual Supplement Blanks (Supplement) and PBR Actuarial Reports. **The PBR Actuarial Reports are considered to be confidential information under Section 14A of the Standard Valuation Law (Model #820), and may only be disclosed by a commissioner pursuant to Section 14B of Model #820. This report does not contain any company-specific or other company-identifiable information, and any information contained herein has been aggregated in order to protect the confidentiality of the information. The purpose of this report is to provide observations and findings to aid state insurance regulators in their PBR reviews, and provide companies with feedback intended to assist with the preparation of future PBR Actuarial Reports and the VM-20 Reserves Supplement.**

Principle-based reserving applies to all individual life policies issued on or after January 1, 2017 that fall within the scope of VM-20 in the Valuation Manual. During a 3-year transition period, companies may elect to establish minimum reserves using VM-A and VM-C in the Valuation Manual for business otherwise subject to VM-20. A total of 215 companies elected to do this, and their reserves were reported in Part 2 of the Supplement. A total of 23 companies spread across 17 states of domicile opted to establish PBR in 2017 for some or all of their life insurance business issued on or after January 1, 2017. These reserves were reported in Part 1 of the Supplement. A variety of products were implemented, including Level Term, Annual Renewable Term, Universal Life with Secondary Guarantees (ULSG, including Variable Universal Life and Indexed Universal Life), and Non-Participating Whole Life. Table 1 below shows some statistics on these policies.

Table 1: 2017 Life Insurance PBR Statistics (Reserves Shown are Post-Reinsurance Ceded)

Product Category	Number of Companies	Number of Policies	Face Amount (in millions)	Post-Reins Reported Reserve ($)	Average Policy Size ($)	Average Reserve per Policy ($)	Average Reserve per $1,000 ($)
Term	20	309,448	153,253	73,953,847	495,248	239	0.48
ULSG	6	7,388	4,297	140,879,000	581,588	19,069	32.79
Non-Par WL	3	17,906	270	592,000	15,074	33	2.19
Total	23*	334,742	157,820	215,424,847	471,468	644	1.37

*Some companies implemented PBR for several product categories.

The Valuation Analysis (E) Working Group of the Financial Condition (E) Committee (VAWG) was formed to work with the NAIC Resources to support states in the review of PBR and uniformly address questions and issues arising from application of PBR. The term "NAIC Resources" refers to NAIC actuaries responsible for reviewing PBR Actuarial Reports and supporting states and the VAWG as requested. The VAWG was given a charge to develop and implement a plan with the NAIC Resources to identify outliers/concerns regarding PBR. This report outlines the review approach used for the 2017 PBR filings to fulfill this charge and provide information to regulators to support their review of PBR.

Findings for the Supplement included concerns about incomplete/inaccurate reporting, stemming at least partially from confusion regarding requirements. Findings for the PBR Actuarial Reports included concerns regarding A) organization and communication, B) information required by VM-31 in the Valuation Manual that was not provided, C) additional information not provided but needed to evaluate PBR implementation, and D) other methodology, modeling, or assumption issues. This report concludes with a list of reporting considerations for companies for their 2018 PBR filings.

Section II. PBR Review Approach for 2017 Filings

Parts 1 and 2 of the 2017 Supplement were reviewed by NAIC Resources. The intent was to identify any reporting issues, and summarize key reserve relationships by product group. This included comparisons of the Net Premium Reserve (NPR), Deterministic Reserve (DR), and Stochastic Reserve (SR), pre- and post-reinsurance for all 23 companies.

Detailed reviews of the 2017 PBR Actuarial Reports were performed by NAIC Resources and the California Department of Insurance (VAWG member). NAIC Resources reviewed the reports with the goal of gathering statistics on the range of PBR practices and reporting across companies in selected areas (e.g. materiality standards, assumptions and margins, exclusion tests, and other topics). The California review was conducted by the Office of Principle-Based Reserving (OPBR), which is part of the Financial Surveillance Branch of the California Department of Insurance. All PBR Actuarial Reports filed were reviewed by a team of actuaries, actuarial analysts, and IT specialists, and results were shared and discussed with the domestic regulators of each company pursuant to Section 14B(3) of Model #820. The OPBR and some domestic regulators then sent letters to companies with a substantial number of questions and requests for information, ranging from general topics such as governance to detailed requests when points weren't clear. The responses were very helpful in understanding each company's assumptions, methodology, and governance process.

Observations and findings from the detailed reviews of the 2017 Supplements and PBR Actuarial Reports and the responses from companies were summarized in a confidential PBR review paper prepared by NAIC Resources with input from the OPBR. The VAWG held meetings including the regulators with domestic PBR submissions to discuss the findings. The VAWG meetings were held in regulator-only session conducted pursuant to paragraph 3 of the *NAIC Policy Statement on Open Meetings*; i.e., the discussion contemplated included information with respect to specific companies, entities or individuals, including, but not limited to, collaborative financial analysis. These meetings were also confidential under Section II.B "Confidentiality" of the *VAWG Process & Procedures Manual*.

The PBR review completed to date has been successful in identifying outliers, implementation issues, possible Valuation Manual changes, and potential areas for further review. Sections IV, V, and VI of this paper summarize components of company submissions that were considered outliers to regulatory expectations. The OPBR is conducting on-site visits with roughly half the companies that have implemented PBR, and there may be additional findings. The VAWG has discussed recommendations and referrals of issues to LATF, and will be providing these to LATF for development of possible amendments to the Valuation Manual.

Section III. Limitations

The analysis presented relies on the information submitted by companies in their Supplement and PBR Actuarial Reports. Due to reporting issues, the data submitted in the Supplement was adjusted for some companies to help ensure that statistics shown would be calculated on a consistent basis. Review of the PBR Actuarial Reports required actuarial judgment. Although the analysis is intended to be based on a clear read of the reports, there is some risk of misinterpretation. Most reports had sections that were not completely clear to the reviewers, and in some cases, relevant information could not be easily found. This report summarizes many, but not all observations and findings from the PBR Actuarial Reports.

Section IV. Major Observations and Findings from Review of the VM-20 Reserves Supplement

Major observations and findings from the review of the Supplement were as follows:

1. All 23 companies that implemented PBR filed Part 1 of the Supplement, which provides details on the components of the PBR reserve (i.e. NPR, DR, and SR), as well as policy counts and face amounts by type of life policy. For Term insurance, the NPR was the highest reserve for 70% of the companies, and the DR was highest for the rest. The Term DR was negative for a number of companies. For ULSG products, the highest reserve was split between NPR, DR, and SR. For both Term and UL, there was a wide range in the NPR and DR per $1,000 across companies. PBR did not apply for Non-Participating Whole Life, since these products passed the Stochastic and Deterministic Exclusion Tests. Reported reserves were higher post-reinsurance than pre-reinsurance for some companies, and in some cases, the highest reserve changed between reserve methods pre- and post-reinsurance (e.g. DR highest pre-reinsurance, NPR highest post-reinsurance).

2. Many companies did not complete the Supplement completely and accurately. Some companies reported reserves or face amounts in the wrong units in Part 1 of the Supplement, and this was an issue in Part 2 for many companies. There may have been some confusion due to differences in the reporting requirements for Exhibit 5. Exhibit 5 requires reserves reported in dollars, whereas the Supplement requires reserves reported in thousands.

3. A few companies did not show the final reported reserve, or showed only the final reported reserve without completing the columns indicating whether it was the NPR, DR, or SR.

4. Many companies showed negative DR as $0 or left the DR column blank. It is important to report the actual DR amount regardless of whether it is positive or negative. This allows regulators to: a) see that the DR was calculated, b) assess reserve relationships between NPR, DR, and SR, and c) see the baseline DR for sensitivity tests shown in the PBR Actuarial Report.

5. Many companies reported an unreasonably high number of policies in Part 2 of the Supplement, suggesting that there was some confusion on the requirements and/or typographical errors. Part 2 should be completed only for business issued on or after 1/1/17 that would have been subject to

VM-20 in the absence of the optional 3-year transition period. The high number of policies reported suggests that many companies completed Part 2 for most or all of their inforce business.

6. For some companies, the reserves in the Supplement did not match Exhibit 5.

7. The due and deferred premium asset appeared large or was not added to the DR correctly for some companies. Also, since the column is labeled "Deferred Premium Asset", some companies reported only this amount. The Supplement was intended to capture both due and deferred premiums.

The following actions are in progress:

- Companies are being asked to resubmit the Supplement if it is found to be incomplete or inaccurate.

- NAIC Resources have begun analyzing the reporting issues to identify annual statement cross-checks that can be put in place, as well as potential changes to the Supplement design and instructions to make reporting requirements clearer. Any recommendations will be submitted to the Life Actuarial (A) Task Force (LATF) and the Blanks (E) Working Group.

Section V. Major Observations from Review of the PBR Actuarial Reports

Major observations from the review of the PBR Actuarial Reports were as follows:

1. All 23 companies that implemented PBR completed a PBR Actuarial Report. With a few exceptions, the reports followed the order of the requirements and corresponding headers provided in VM-31.

2. There was a wide range in the length of the PBR Actuarial Reports and the level of detail provided. The typical length was 40-60 pages, but some reports were much shorter or longer. No single report was fully complete; however, some reports provided significantly more information than others. Although the OPBR and some domestic regulators sent all companies a substantial list of questions and requests for information in this first year of PBR implementation, those reports with less detail generated more regulator follow-up questions.

Section VI. Major Findings from Review of the PBR Actuarial Reports

Major findings for the PBR Actuarial Reports included concerns in the following areas:

A) Organization and communication
B) Information required by VM-31 that was not provided
C) Additional information not provided but needed to evaluate PBR implementation
D) Other methodology, modeling, or assumption issues

A. Organization and Communication

With few exceptions, the PBR Actuarial Reports followed the order of the requirements and corresponding headers provided in VM-31. However, the organization of information in many reports made it difficult to gain a complete understanding of certain topics, since material on a single topic was dispersed across multiple sections of the report. For example, to find all the modeling systems used, the reader sometimes needed to look in the Modeling Systems section, the asset section, and the appendices. Ideally, the modeling systems would all be listed in the Modeling Systems section.

In some cases, final assumptions and key points weren't obvious because communication was unclear. For example, in the mortality section of the reports, Actual to Expected (A/E) ratios were often difficult to interpret since the expected basis used in the denominator was not defined.

B. Information Required by VM-31 but Not Provided

All of the PBR Actuarial Reports were missing some of the information required by VM-31. Table 2 below summarizes the missing items, along with the applicable sections of VM-31 that state the requirements. Items are listed in the order in which they appear in VM-31.

Table 2: Missing Information Required by VM-31

Item #	Missing Items and Comments on Issues Noted During PBR Review (items with an asterisk indicate 5 or more companies missed the requirement)	2018 VM-31 Section
1	Page numbers	3.B
2	Materiality standard* VM-31 requires companies to set a materiality standard and state what it is.	3.C.3.a
3	Deterministic Reserve for Term Business DR must be calculated for Term business.	3.C.5
4	Summary of valuation assumptions and margins, including a listing of the final prudent estimate valuation assumptions and margins for the major risk factors.* Companies seemed to interpret Section 3.D.1 to require a high-level description of assumptions rather than a listing showing the actual assumptions. It was particularly hard to tell what the assumptions were when companies described them as being based on pricing. The expectation is for companies to provide a complete listing of anticipated experience assumptions, margins, and final prudent estimate assumptions, ideally in a spreadsheet.	3.D.1
5	Model validation details* Many PBR Actuarial Reports did not provide a clear indication of the degree of rigor actually applied in validating models. Ideally, reports would contain tables showing numerical static and dynamic validation results, and include comments on these results. A thorough discussion on how the company became comfortable with the model (e.g. specific model controls, independent reviews performed, etc.) should also be included.	3.D.2.e
6	Source of mortality data, if an alternative data source was used, and how rates were graduated and smoothed.*	3.D.3.d

Item #	Missing Items and Comments on Issues Noted During PBR Review (items with an asterisk indicate 5 or more companies missed the requirement)	2018 VM-31 Section
7	Amount of starting assets	3.D.6.a
8	Method used and rationale for selecting assets*	3.D.6.b
9	Asset type, duration, and quality*	3.D.6.d
10	Maximum net spread adjustment factor*	3.D.6.h
11	Disinvestment strategy	3.D.6.r
12	Documentation supporting the appropriateness of the model investment strategy compared to the actual investment policy of the company.* This was an issue for many companies when the model investment strategy was the alternative investment strategy. See items 19 and 20 in Table 3 for additional comments on the use of the alternative investment strategy.	3.D.6.r
13	The rationale for the number of scenarios used for the SR Several companies did not provide a rationale or documentation to support the number of scenarios used in the SR calculation.	3.D.6.t
14	Details on reinsurance agreements (counterparties, portion of business reinsured, qualification for reinsurance credit, etc.).* VM-31 requires a number of details regarding reinsurance agreements. Many reports were missing at least one of the required items.	3.D.8.a
15	For Level Term products, the premium scale used in the model during the post-level term period (guaranteed premiums or a lower premium scale).* Regulators would like to gain an understanding of management's practices and intentions, since some companies may intend to charge a lower premium scale after the level term period.	3.D.9
16	Stochastic Exclusion Test for Term Business This test must be performed and passed to avoid calculating the SR.	3.D.10
17	Stochastic Exclusion Ratio Test Results (PV benefits not shown)	3.D.10.c
18	When the Certification Method was used as the type of Stochastic Exclusion Test, support for the certification including supporting analysis and tests.	3.D.10.e
19	Use of a date preceding the valuation date to calculate reserves: Adjustment to reserves, and justification for use of an earlier date.* See item 25 in Table 3 for comments on this.	3.D.11.g
20	Reliance statements*	3.D.12
21	Certification from investment officer*	3.D.13.a

C. Additional Information Not Provided but Needed to Evaluate PBR Implementation

The information listed in Table 3 below was not included in many of the PBR Actuarial Reports. These items are not explicitly listed as requirements in VM-31, but it has been concluded they are necessary for a regulator to assess a company's implementation of PBR. VM-31 Section I (Purpose) states that "these requirements establish the minimum requirements for policies or contracts subject to principle-based valuation under the Standard Valuation Law." As part of these minimum requirements, VM-31 Section 2.A states that "the PBR Actuarial Report must include documentation and disclosure sufficient for another actuary qualified in the same practice area to evaluate the work." Further, it should be recognized that Actuarial Standards of Practice (ASOP) apply to PBR work and communication. In particular, information beyond the minimum VM-31 requirements may be needed to satisfy ASOP 41.

In the table below, each item of information is shown along with the rationale for its inclusion in the PBR Actuarial Report and comments on any issues noted during the review. The general VM-31 location where each item would appear is shown in the table.

Table 3: Missing Information Needed to Evaluate PBR Implementation

Item #	Missing Item	2018 VM-31 Section	Rationale for Inclusion in PBR Actuarial Report, and Comments on Issues Noted During Review
1	A statement that documentation on overall governance is readily available upon request.	2.D	This statement would help give regulators some assurance that governance processes are in place. VM-31 currently requires only a Senior Management certification. It was found during the review that some companies did not have a fully developed governance process.
2	Description of all riders and supplemental benefits, whether there is a separate premium, and the reserve approach used, i.e. calculated as part of the base policy, or separately	3.C.2	VM Section II prescribes how reserves for riders and supplemental benefits are to be determined. It isn't possible to judge whether reserves are appropriate without this information. Many companies provided little or no information on riders and supplemental benefits.
3	Breakdown of modeled business by direct and assumed, target market, distribution channel, and product features	3.C.2	This is needed to evaluate lapse and mortality assumptions, as well as aggregation of mortality experience.
4	The scope/volume of business subject to each underwriting approach (full, accelerated, simplified issue, guaranteed issue), and how the underwriting approach was reflected in the mortality assumptions and margins.	3.C.2	This is needed to evaluate mortality assumptions and margins, as well as aggregation of mortality experience. Ideally, the report would include a thorough treatment of accelerated underwriting, including a description of the process and the level of additional margin, if any, to reflect any increased uncertainty.
5	Date of most recent experience study for each major risk factor, and years of data included in the	3.D.1	This would allow regulators to see the data periods on which the assumptions are based and how often the company is updating their experience.

Item #	Missing Item	2018 VM-31 Section	Rationale for Inclusion in PBR Actuarial Report, and Comments on Issues Noted During Review
	study.		Note that VM-20 Section 9.C.2.e requires mortality assumptions to be reviewed and updated as needed at least every 3 years. This review requires an experience study.
6	Summary of all asset and liability modeling software used, including proprietary company-developed models and spreadsheets, in one section of the report.	3.D.2.a	This information was dispersed throughout many of the 2017 PBR Actuarial Reports and was not complete in some cases.
7	Version of actuarial modeling software used (for vendor-supplied models).	3.D.2.a	It is important to keep modeling software up to date with current VM-20 requirements. Providing the version number would give regulators some comfort that modeling results reflect requirements as of the valuation date. A proposed amendment (Amendment Proposal Form 2018-50) has been exposed to address this.
8	Proportion of business rated substandard, and whether it was included in the company's mortality study.	3.D.3	This is needed to determine whether treatment of substandard policies is appropriate. The treatment of substandard business wasn't discussed or wasn't clear in many of the PBR Actuarial Reports. In some cases, companies did not include justification for scalar factors, margins, adjustments, or other treatment used in modeling substandard business for DR and/or SR.
9	Details on the company's credibility calculations using the Buhlmann or Limited Fluctuation Method.	3.D.3.f	Without details that allow regulators to follow the calculations, it cannot be determined whether credibility was determined appropriately.
10	Description and rationale for the approach taken to aggregate mortality experience	3.D.3.f	Aggregation of mortality experience can have a major impact on the reserve since it impacts credibility, margins, and grading. A proposed amendment developed by the American Academy of Actuaries Life Reserves Working Group (Amendment Proposal Form 2018-17) is under discussion to address this.
11	The mortality improvement start date and end date, for both industry and company experience.	3.D.3.i	The mortality improvement start date was unclear or incorrect for some companies. Note that the 2019 VM-20 Section 9.C.3.g clarifies that 7/1/15 is the correct start date for the 2015 VBT, and VM-20 Sections 9.C.2.g and 9.C.3.g allow mortality improvement up to the valuation date.
12	Definition of expected basis used in all Actual to Expected (A/E) ratios	3.D.3.m and 3.D.4.d	A/E ratios provided in the PBR Actuarial Reports were confusing and difficult to interpret since the expected basis was often not provided, and some companies

Item #	Missing Item	2018 VM-31 Section	Rationale for Inclusion in PBR Actuarial Report, and Comments on Issues Noted During Review
	shown in the PBR Actuarial Report		provided multiple sets of A/E ratios. It wasn't always clear what companies were trying to communicate when they showed these ratios.
13	Documentation of testing performed to determine whether there were post level term profits, including the assumptions used (premiums and anti-selective mortality and lapses) in the post level term period.	3.D.4	Nearly all companies assumed a 100% shock lapse at the end of the level term period, since VM-20 does not allow post-level term profits. However, testing must be done to determine that this is an appropriate assumption. Many companies either did not perform this testing or did not document it. The intent of VM-20 Section 9.D.6 is to disallow post-level term profits, and to require companies to check for and reflect post-level term losses.
14	Evidence that the lapse margin increases the reserve	3.D.4.e	A number of companies stated that testing was performed to determine the direction of margins that would increase reserves, but results were not shown (or not shown clearly) in the PBR Actuarial Report. The margin must be in the direction that increases the reserve. For a few companies, the margin decreased the reserve. Further, for several companies, the development and/or direction of the lapse margin was not clear. For some Term business, the direction of the margin did not make intuitive sense because it increased lapses and increased the reserve. Evidence is needed to show that this would increase the reserve.
15	Results of testing performed to determine the direction of the lapse margin by duration	3.D.4.e	The intent of VM-20 is to require the lapse margin to be set by policy duration if this has a material impact on the modeled reserve (VM-20 Section 9.D.1.a). Many companies did not test lapse margin directionality by duration or vary their lapse margins by duration. Generally, for Term business, a pattern of increased lapses in the early durations and decreased lapses thereafter would tend to increase the reserve (due to non-recovered acquisition costs in the early years, and higher death claims thereafter).
16	Inflation assumption	3.D.5	Many companies did not provide inflation assumptions in their PBR Actuarial Report. Note that the expectation is for companies to provide the inflation assumption and its source. The 2019 VM-31 Section 3.C.5.c requires this.

Item #	Missing Item	2018 VM-31 Section	Rationale for Inclusion in PBR Actuarial Report, and Comments on Issues Noted During Review
17	A statement confirming that expenses were fully allocated	3.D.5	VM-20 Section 9.E.1.i requires fully allocated expenses. Many PBR Actuarial Reports were unclear on whether this requirement was met.
18	Whether acquisition costs and commissions are included in the expense assumptions	3.D.5	Treatment of acquisition costs and commissions was not clear for many companies. VM-20 Section 9.E.1.m requires acquisition costs to be included for business inforce as of the valuation date. VM-20 Section 7.B.1.e requires commissions to be included in the projected cash flows. If there are no acquisition costs or commissions, this should be shown as $0 in the PBR Actuarial Report.
19	Asset maturities used in the alternative investment strategy, and whether these are in line with the company's actual reinvestment strategy	3.D.6.r	VM-31 Section 3.D.6.r currently requires documentation supporting the appropriateness of the model investment strategy compared to the actual investment policy of the company. The asset maturities used in the alternative investment strategy must be in line with the company's actual reinvestment strategy. Several companies modeled the alternative strategy using assets with longer maturities than their actual company strategy, which would tend to lower the reserve. For several other companies, asset maturities used in the company strategy were not provided, so it was unclear whether this issue applies. A proposed amendment (Amendment Proposal Form 2018-53) has been exposed to address this.
20	Documentation showing whether the company investment strategy or the alternative strategy produces a higher reserve	3.D.6.s	Most companies used the alternative investment strategy to model their DR and SR. Many companies used the alternative strategy without testing whether the company investment strategy would produce a higher reserve, or without showing the results of that testing. It is important to note that the alternative investment strategy is not a safe harbor. Many companies appear to have interpreted VM-20 Section 7.E.1.g and VM-31 Section 3.D.6.s to mean that companies may choose to use the alternative investment strategy, even if using the company strategy would produce a higher reserve. This is not the case.
21	Details on how the difference between pre- and post-reinsurance minimum reserves are allocated to policies	3.D.8	This topic is currently being reviewed by LATF for a potential amendment to the Valuation Manual. The VM is not clear on this and there are many possible ways to allocate, so it is advisable for companies to be clear about this in the PBR Actuarial Report.
22	Details on assumed YRT reinsurance premium	3.D.8	This topic is currently being reviewed by LATF for a potential amendment to the Valuation Manual.

Item #	Missing Item	2018 VM-31 Section	Rationale for Inclusion in PBR Actuarial Report, and Comments on Issues Noted During Review
	increases		Modeling of YRT reinsurance premiums varied substantially across companies.
23	SERT results both pre- and post-reinsurance	3.D.10.c	Most companies either did not perform or did not report SERT results pre- and post-reinsurance. In nearly all cases, one SERT result was provided, and it wasn't clear whether it was calculated pre- or post-reinsurance. VM-20 requires both SERT tests (see VM-20 Sections 6.A.2.b and 8.D.2). VM-31 Section 3.D.10.c requires "results of the 16 scenarios and the test ratio". This may have caused some confusion on the reporting requirement.
24	Statement on whether sensitivity testing was done using prudent estimate or anticipated experience assumptions	3.D.11.d	VM-31 Section 3.D.11.d does not specify whether margins are to be included in sensitivity testing. An explanation of the assumptions the company used should be provided.
25	Date(s) used to calculate NPR, DR, and SR, along with the date of the assets, liabilities, yield curve, spreads, and default costs	3.D.11.g	Many companies did not provide most of this information, and when it was provided, it was difficult to find. Ideally, this would be located in one place in the PBR Actuarial Report. Most companies stated that their valuation date was 12/31/17, but many companies did not provide the date they used to calculate reserves. For companies that did disclose dates, there were a number of cases where assets, liabilities, starting yield curve, spreads, and/or default costs did not line up with the valuation date. Disclosure of these items would allow regulators to: 1) see that the correct prescribed assumptions were used, 2) see that reserve calculations were done as of an allowed date (no earlier than 3 months prior to the valuation date), and 3) check whether the required adjustment to reserves was made if the calculations were done prior to the valuation date. For a valuation performed as of 12/31/XX, assets and liabilities should be as of 12/31/XX, and the starting yield curve, spreads, and default costs should all be those in effect as of 12/31/XX so that the DR and SR are as of 12/31/XX. However, companies may calculate the DR and SR as of an earlier date if the requirements of VM-20 Section 2.E are met. This Section states that "the company may calculate the deterministic reserve and the stochastic reserve as of a date no earlier than three

Item #	Missing Item	2018 VM-31 Section	Rationale for Inclusion in PBR Actuarial Report, and Comments on Issues Noted During Review
			months before the valuation date, using relevant company data, provided an appropriate method is used to adjust those reserves to the valuation date." For example, if a company chose to calculate the DR and SR as of 9/30/XX for a 12/31/XX valuation date, assets and liabilities should be as of 9/30/XX, and the starting yield curve, spreads, and default costs should all be those in effect as of 9/30/XX so that the DR and SR are as of 9/30/XX. The company would then need to use an appropriate method to adjust those reserves to the valuation date of 12/31/XX.

D. Other Methodology, Modeling, and Assumption Issues

1. Materiality

A number of companies set a materiality standard based on a percentage of total company reserves or surplus. Although the current VM-31 language allows these as considerations, effectively it means that an item impacting PBR would not be considered material unless the dollar impact was much greater than the PBR reserve itself. An amendment has been exposed by the Life Actuarial (A) Task Force that would require companies to set their materiality standard at a level appropriate for the PBR reserve.

2. Simplifications, Approximations, and Modeling Efficiency Techniques

Many companies used simplifications, approximations, and modeling efficiency techniques to calculate reserves, without the required VM-20 Section 2.G support. VM-20 Section 2.G states that "A company may use simplifications, approximations, and modeling efficiency techniques if the company can demonstrate that the use of such techniques does not understate the reserve by a material amount, and the expected value of the reserve calculated using simplifications, approximations and modeling efficiency techniques is not less than the expected value of the reserve calculated that does not use them". Examples of simplifications, approximations, and modeling efficiency techniques that were used without the required support include:

- Calculating only the NPR for Term business, and not performing the Stochastic Exclusion test.
- Setting a net asset earned rate assumption, instead of modeling assets and using the prescribed scenario to determine the path of net asset earned rates in the DR calculation.
- Using a very simplified asset modeling approach.
- Calculating the DR as of a date prior to the valuation date, without adjusting the reserves to the valuation date.
- Simplifying prescribed spreads and default costs.
- Not modeling certain contract features, such as living benefits and term conversions.

3. Exclusion Tests

Several companies incorrectly described the numerator in the Stochastic Exclusion Ratio Test (SERT) as the biggest difference from the base scenario. The numerator should be the largest adjusted DR for scenarios other than the base scenario, minus the adjusted DR for the base scenario (scenario 9). Companies should note that using the biggest difference from the base scenario can result in an incorrect SERT ratio. Please see Appendix 1 for an example that illustrates this.

4. Mortality

There were many issues with the development and modeling of mortality for the DR and SR. Many companies reported very high credibility percentages, and seemed to be aggregating dissimilar experience, which may overstate credibility. A proposed amendment developed by the American Academy of Actuaries Life Reserves Working Group (Amendment Proposal Form 2018-17) is under discussion to address this.

For some companies, mortality experience for simplified issue business was higher than the industry limited underwriting table, and they appeared to be grading down to better industry experience. Several companies did not provide the grading period or sufficient data period, or incorrectly referenced an old grading table which applied for valuations on 12/31/16 and prior. Several companies cited use of RR tables that do not exist, or adjusted RR tables down from those indicated by the RR tool without providing supporting information.

Some companies capped exposure and claim amounts (e.g. capping a 5m claim at 1m) when calculating credibility, which is not allowed since it can result in more favorable credibility percentages. A proposed amendment (Amendment Proposal Form 2018-42) has been exposed to address this.

Some companies misinterpreted the table in VM-20 Section 9.C.6, and graded to 100% of the applicable industry tables either faster or slower than required. Please see Appendix 2 for an example illustrating grading approaches that can and cannot be used.

Some companies calculated and reported separate credibility results for each mortality segment. This is required by VM-31 Section 3.D.3.f.i for mortality segments that are not aggregated. However, companies should note that only the aggregated credibility results need to be reported in the PBR Actuarial Report when multiple mortality segments are aggregated together.

5. Lapse Assumptions and Margins

Many companies did not provide lapse assumptions as required by VM-31 section 3.D.1. For some companies, the lapse assumptions did not make intuitive sense.

The lapse margins appeared to be too small for some companies. VM-20 Section 9.B.1 does not allow companies to justify setting no margin on lapse assumptions based on the conservatism in the mortality margin. This section states that, “The company shall determine an explicit set of initial margins for each material assumption independently.” Further clarification is provided in the same section of the 2019 Valuation Manual.

6. Expense Assumptions and Margins

Many companies had no margin or a very small margin on their expense assumptions without providing justification. The vast majority of companies either did not mention any margin on inflation, or stated that there was no margin on this assumption, without discussing why this was appropriate. Several companies set low investment expense assumptions relative to the complexity of their assets. Most companies did not set a margin on investment expenses and did not discuss why this was appropriate.

7. Assets

For a few companies, the starting asset amount was not within the 2% corridor. The correct range is from 98% of the modeled reserve to the greater of NPR or 102% of the modeled reserve. Some companies incorrectly used 102% of NPR or described the corridor incorrectly. The 2019 version of VM-20 clarifies the bounds of the corridor.

The selection of assets for contracts subject to PBR seemed optimistic for some companies. The pattern of net asset earned rates was unusual for some companies, and this was not explained in the PBR Actuarial Report.

Section VII. VM-31 Reporting Considerations for Companies

Providing the information shown in Tables 2 and 3 and satisfying ASOP 41 will add length to the PBR Actuarial Reports. However, companies can minimize this and avoid an excessive amount of documentation by developing more efficient and effective approaches to convey information. The goal would be to provide information succinctly and clearly so that the reader does not have to make assumptions or ask questions. Below are some considerations.

1. Consider using graphs where appropriate. For example, instead of writing a paragraph describing the path of net asset earned rates (NAERs) or showing sample rates for certain durations (both of which will raise questions from the reader) show the entire path of NAERs in a graph, and explain any unusual movements if necessary.
2. Use tables to convey a lot of information in one place. For example, items 2-6 in Table 3 (and many others) would lend themselves well to this approach.
3. Provide spreadsheets where appropriate, such as for item 4 in Table 2.
4. Leverage existing documentation. For example, the same product descriptions provided in the Actuarial Opinion Memorandum could be used in the PBR Actuarial Report.
5. Consider how the use of a few words can avoid confusion and questions from regulators. For example:
    a. Fully underwritten
    If all business is fully underwritten, including these words avoids questions about accelerated underwriting and other approaches.
    b. Pro rata
    If assets were allocated to PBR policies on a pro-rata basis, saying so avoids questions about how the assets were selected.

    c. <0.1% remaining
       Projection periods need to be set long enough to run off liabilities. Stating the rationale for the projection period avoids questions on the appropriateness of the period chosen.
    d. Actuarial judgment
       If an assumption was based on actuarial judgment, say so, and state why this was necessary.

6. Choose an actuary qualified in the same practice area with strong writing skills to peer review the PBR Actuarial Report, assessing it for readability and compliance with each VM-31 reporting requirement. This would test whether the report meets the requirement stated in VM-31 Section 2.A that "the PBR Actuarial Report must include documentation and disclosure sufficient for another actuary qualified in the same practice area to evaluate the work."
7. Review ASOP 41 as you draft the PBR Actuarial Report. Consider the ability of the reader to assess reasonableness. Some questions to ask include:
    - Are the reasons that you can rely on your model clear from the report?
    - Was a sufficient level of detail included for regulators to review the business profile and risks?
    - Can a reader tell what your assumptions, margins, and methods are from the report, and why they were selected?

Appendix 1 – Stochastic Exclusion Ratio Test (SERT) Ratio Examples

Some companies calculated the SERT Ratio correctly but incorrectly described the numerator as the biggest difference or biggest absolute difference from the base scenario (Scenario 9). The numerator of the SERT Ratio should be the largest adjusted DR for scenarios other than the base scenario, minus the adjusted DR for the base scenario. The examples below are provided to illustrate the correct calculation as well as potential incorrect interpretations.

a, b, c represent values as described in VM-20 Section 6.A.2.a

- a = Baseline Adjusted Deterministic Reserve
- b = Largest Adjusted Deterministic Reserve other than from the baseline
- c = Baseline PV of Benefits

The numbers in the chart below are for illustration only and are not intended to be realistic.

	- Column A - Adjusted Deterministic Reserve (in millions)	- Column B - Difference from Baseline	- Column C - Absolute Value of Difference from Baseline
Scenario 1	-7	-8	8
Scenario 2	-5	-6	6
Scenario 3	-3	-4	4
Scenario 4	-1	-2	2
Scenario 5	1	0	0
Scenario 6	3	2	2
Scenario 7	4	3	3
Scenario 8	2	1	1
Scenario 9 - Baseline	1	0	0
Scenario 10	0	-1	1
Scenario 11	-1	-2	2
Scenario 12	-2	-3	3
Scenario 13	-3	-4	4
Scenario 14	-5	-6	6
Scenario 15	-3	-4	4
Scenario 16	-1	-2	2

Let c = 100 million

Example 1: Correctly calculating the SERT Ratio using Column A
a = 1; b = 4; b – a = 3
(b – a)/c = 3%

Example 2: Correctly calculating the SERT Ratio using Column B
Biggest Difference interpreted as the highest positive difference = 3
(Biggest Difference)/c = 3%

Example 3: Incorrectly calculating the SERT Ratio using Column B
Biggest Difference interpreted as the biggest difference from the baseline = -8
(Biggest Difference)/c = -8%

Example 4: Incorrectly calculating the SERT Ratio using Column C
Biggest Difference = 8
(Biggest Difference)/c = 8%

Appendix 2 – Grading Period Examples

Some companies have misinterpreted the table below from VM-20 Section 9.C.6, and graded to 100% of the applicable industry tables either faster or slower than required. The examples below illustrate grading approaches that can and cannot be used. (Note that the reference table below is from the 2018 Valuation Manual. For valuations on and after Jan. 1, 2020, the 2019 Valuation Manual provides a new, more granular table without asterisks.)

Credibility of company data (as defined in Section 9.C.4 above) (1)	Maximum # of years for data to be considered sufficient (2)	Maximum # of years in which to begin grading after sufficient data no longer exists (3)	Maximum # of years in which the assumption must grade to 100% to an applicable industry table (from the duration where sufficient data no longer exists)* (4)
20%–39%	10	2	8*
40%–59%	20	4	12*
60%–79%	35	7	17*
80%–100%	50	10	25*

* The maximum # of years in which the assumption must grade to 100% of an applicable industry table shall be the lesser of (a) the appropriate number of years stated in the chart above or (b) the number of years of sufficient data + 15 times the credibility percentage applicable to column (1) in the chart above. This maximum # of years figure shall be rounded to the nearest whole number.

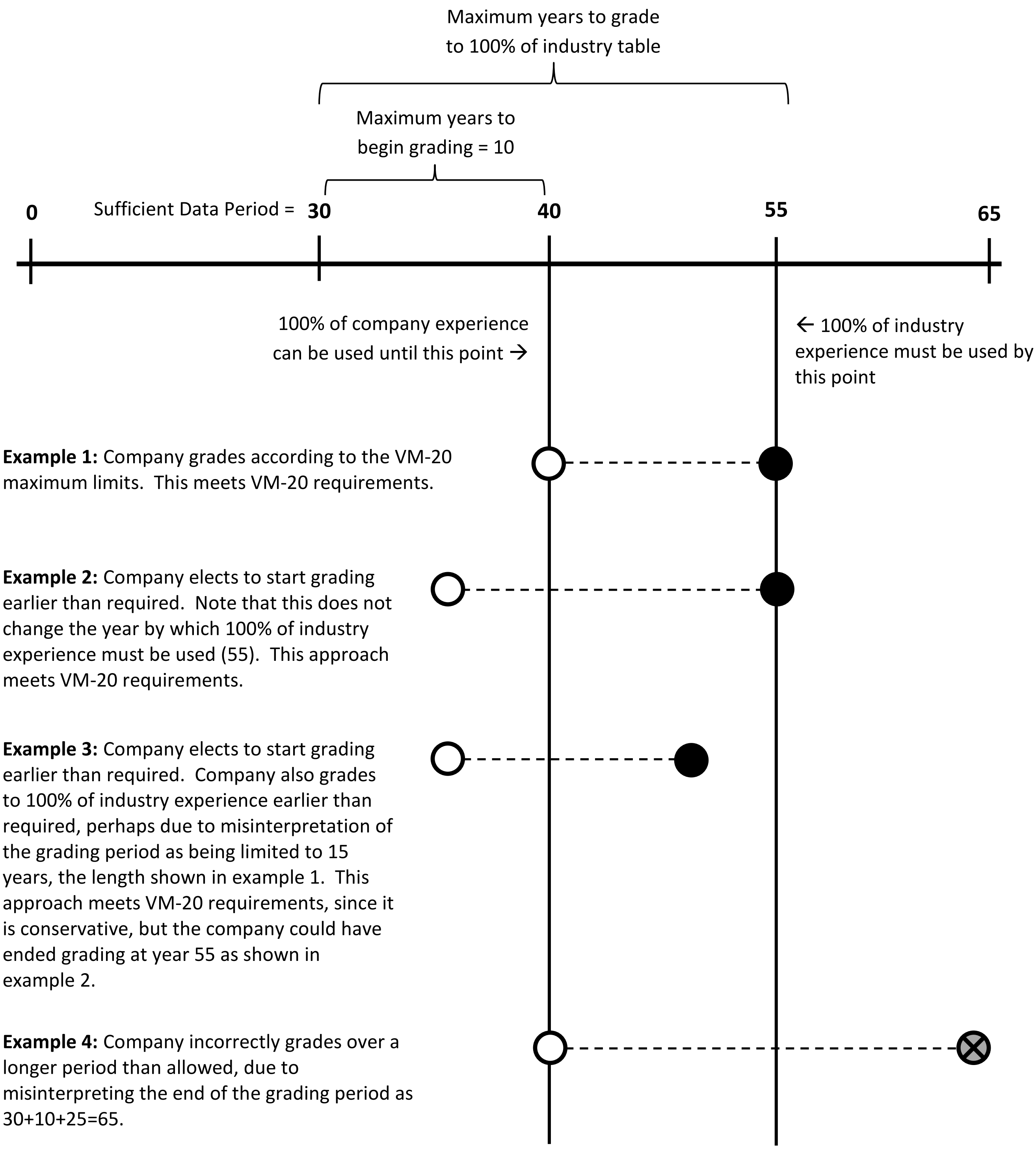
<u>Assumptions and calculations for examples shown on the next page</u>
Assume a credibility score of 100% and a sufficient data period of 30 years.

Using the table above:

- Maximum # of years for data to be considered sufficient = min(30, 50) = 30 years
- Maximum # of years in which to begin grading after sufficient data no longer exists = 10 years. Therefore, grading must begin by year 40 (30+10).
- Maximum # of years in which the assumption must grade to 100% to an applicable industry table (from the duration where sufficient data no longer exists) = min(25, 30+15*100%) = 25 years. Therefore, grading must end by year 55 (30+25),

In the following examples, the company can use 100% company experience for up to 40 years, but must grade to 100% industry experience by year 55.

Examples using the assumptions and calculations from the previous page:



Example 1: Company grades according to the VM-20 maximum limits. This meets VM-20 requirements.

Example 2: Company elects to start grading earlier than required. Note that this does not change the year by which 100% of industry experience must be used (55). This approach meets VM-20 requirements.

Example 3: Company elects to start grading earlier than required. Company also grades to 100% of industry experience earlier than required, perhaps due to misinterpretation of the grading period as being limited to 15 years, the length shown in example 1. This approach meets VM-20 requirements, since it is conservative, but the company could have ended grading at year 55 as shown in example 2.

Example 4: Company incorrectly grades over a longer period than allowed, due to misinterpreting the end of the grading period as 30+10+25=65.