

2018 Principle-Based Reserves (PBR) Review Report

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Prepared by the Valuation Analysis (E) Working Group

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Section I. Executive Summary

This report provides a summary of the major findings from the Valuation Analysis (E) Working Group’s review of the 2018 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 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. As of 12/31/18, a total of 37 companies spread across 17 states of domicile have implemented PBR for some or all of their life insurance business issued on or after January 1, 2017. A variety of products have been implemented, including Level Term, Annual Renewable Term, Universal Life with Secondary Guarantees (ULSG, including Variable Universal Life and Indexed Universal Life), and Participating and Non-Participating Whole Life. Table 1 below shows some statistics on these policies from the Supplement.

Table 1: 2018 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 (in millions)	Average Policy Size (\$)	Average Reserve per Policy (\$)	Average Reserve per \$1,000 (\$)
Term	33	2,022,892	466,692	165	230,709	82	0.35
ULSG	8	28,513	21,428	692	751,522	24,283	32.31
Other	11	1,258,883	17,317	47	13,756	37	2.72
Total	37*	3,310,288	505,437	904	152,687	273	1.79

*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 has 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 2018 PBR filings to fulfill this charge and provide information to regulators to support their review of PBR.

Overall, the VM-20 Reserves Supplements and PBR Actuarial Reports were substantially improved compared to the 2017 filings. Issues described in last year's VAWG report continued to occur in 2018, but to a lesser extent. They are not repeated here, except to emphasize certain requirements and to highlight key related amendments that will become effective in the 2020 *Valuation Manual*. Since findings from the 2017 review remain relevant, companies planning to implement PBR are encouraged to review [last year's VAWG report](#).

Findings from review of the 2018 PBR Actuarial Reports include concerns regarding mortality assumptions, nonguaranteed YRT reinsurance, simplifications, assumption changes, materiality, exclusion tests, dates used for deterministic/stochastic reserve calculations, assets, organization and readability of reports, and governance and controls. The VAWG does not plan to recommend and refer potential *Valuation Manual* amendments to LATF based on this year's review, since updates intended to clarify assumption, methodology, and reporting requirements have already been adopted and will go into effect in the 2020 *Valuation Manual*.

This report concludes with a summary of notable emerging best practices, including reserve analysis and effective use of graphs, tables, and spreadsheets.

Section II. PBR Review Approach for 2018 Filings

Part 1 of the 2018 Supplement was reviewed by NAIC Resources. The intent was to identify any reporting issues and review reserve relationships.

Detailed reviews of the 2018 PBR Actuarial Reports were performed by NAIC Resources, the California Department of Insurance, and the Texas Department of Insurance (VAWG members). 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. 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 questions and requests for information, ranging from general topics such as governance to detailed requests when points weren't clear. Fewer questions were sent to second-year filers. The responses were very helpful in understanding each company's assumptions, methodology, and governance process.

Observations and findings from the detailed reviews of the 2018 Supplements and PBR Actuarial Reports were summarized in a confidential PBR review paper prepared by NAIC Resources with input from the OPBR and the Texas Department of Insurance. The VAWG met with the regulators that had domestic PBR submissions to discuss the findings. VAWG meetings are held in regulator-only session conducted pursuant to paragraph 3 of the *NAIC Policy Statement on Open Meetings*; i.e., the discussion includes information with respect to specific companies, entities or individuals, including, but not limited to, collaborative financial analysis. These meetings are also confidential under Section II.B "Confidentiality" of the *VAWG Process & Procedures Manual*.

Section III. Limitations

The analysis relies on the information submitted by companies in their Supplement and PBR Actuarial Reports. Due to reporting issues, data submitted in the Supplement was adjusted for some companies to help ensure that statistics 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. Many reports had at least one section that was not completely clear to reviewers, and in some cases, relevant information could not be easily found.

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

The findings from the review of the 2018 Supplement were similar to those found last year, in terms of the types of issues identified. However, filings were substantially improved this year, and there were fewer reporting issues overall. Companies have been asked to resubmit their Supplement if it was found to be incomplete or inaccurate.

NAIC Resources have been analyzing 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 Findings from Review of the PBR Actuarial Reports

Major findings for the PBR Actuarial Reports included concerns regarding mortality assumptions, nonguaranteed YRT reinsurance, simplifications, assumption changes, materiality, exclusion tests, dates used for deterministic/stochastic reserve calculations, assets, organization and readability of reports, and governance and controls. Unless noted otherwise, any citations from the *Valuation Manual* are from the Jan. 1, 2020 Edition. It is recognized that companies were not subject to new requirements adopted for the 2020 *Valuation Manual*; the citations are provided as a reference for future use.

A. Mortality Assumptions

The following issues were found:

- Unclear mortality segments, or incorrectly determined mortality segments

VM-01 defines "mortality segment" as a subset of policies for which a separate mortality table representing the prudent estimate assumption will be determined. VM-20 Section 9.C.1.a states, "The company shall determine mortality segments for the purpose of determining separate prudent estimate mortality assumptions for groups of policies that the company expects will have different mortality experience than other groups of policies (such as male vs. female, smoker vs. non-smoker, preferred vs. super-preferred vs. residual, etc.)." This guidance indicates that mortality segments represent the level at which mortality tables are set. This may be different from the level at which mortality experience is aggregated for purposes of calculating credibility.

VM-31 Section 3.D.3.a requires a description of each mortality segment and the rationale for selecting the policies to include in each mortality segment. This guidance indicates that the number of mortality segments should be easily identified and that there should be a description of each individual mortality segment.

Example of appropriate mortality segments:

A company expects different mortality experience by gender (male vs. female) and risk class (non-smoker vs. smoker and super-preferred, for non-smokers only, vs. preferred vs. residual), so separate mortality tables of prudent estimate assumptions have been developed for each permutation. There are 10 mortality segments, identified as:

- Male super-preferred non-smoker
- Male preferred non-smoker
- Male residual non-smoker
- Male preferred smoker
- Male residual smoker
- Female super-preferred non-smoker
- Female preferred non-smoker
- Female residual non-smoker
- Female preferred smoker
- Female residual smoker

Examples of incorrectly determined mortality segments:

Statements such as “level term products are a distinct mortality segment” or “all level term products use the same mortality table assumption” are too broad because they do not describe the breakdown of groups of policies that the company expects will have different mortality experience with different prudent estimate assumptions. Similarly, indicating that a mortality segment is “issue age 0 to 90 and duration through attained age 120” is not appropriate because it’s too granular. It does not describe the mortality segment; it only describes the issue age and duration range that will be used in the mortality table for a mortality segment.

- Use of the VM-20 Bühlmann credibility formula for simplified issue business

Some companies incorrectly used the VM-20 Section 9.C.5.a Bühlmann credibility formula for their simplified issue business. The Bühlmann methodology is technically allowed for Simplified Issue business within the *Valuation Manual*; however, at present, it is not practically possible since there are no industry factors available for Simplified Issue. Therefore, only the Limited Fluctuation method can currently be used for determining credibility for Simplified Issue business. The factors in VM-20 for the Bühlmann were developed to only be used in conjunction with the 2015 VBT.

- Aggregating experience for policies having dissimilar underwriting

Some companies aggregated experience for policies having dissimilar underwriting for purposes of determining credibility, the sufficient data period, and mortality margins (e.g., aggregating fully underwritten and simplified issue business). VM-20 Section 9.C.2.d will not allow this.

- Unclear disclosure of mortality aggregation approach

For some companies, it was not clear whether the aggregate experience informed the experience used for each segment, pursuant to VM-20 Section 9.C.2.d. Disclosure is required in VM-31 Section 3.D.3.d. For more information about this topic, see a [presentation](#) with [examples](#) relating to mortality aggregation, provided on the NAIC website.

- Unclear description of company experience

Some companies did not clearly describe their company-specific tables (i.e., company tables that are not expressed as a percent of an industry table) or how the tables were developed. A description and summary of company experience is required in VM-31 Section 3.D.3.b. This information is also important for VM-31 Section 3.D.3.d.

- Misinterpretation of grading rules

Some companies misinterpreted the table in VM-20 Section 9.C.6 of the 2018 *Valuation Manual*, and graded to 100% of the applicable industry tables either faster or slower than required. Note that an amendment to clarify the grading procedure can be found in VM-20 Section 9.C.7 in the 2020 *Valuation Manual*.

- Unclear analysis of actual to expected (A/E) mortality ratios for each mortality segment

For many companies, it was not clear what was used for E in their A/E calculation of each individual mortality segment. As required by VM-31 Section 3.D.3.m, the expected mortality shall be that last determined under VM-20 Section 9.C.2.e.

- Inappropriate or unclear mortality improvement factors

For the industry tables, some companies used SOA mortality improvement factors that were out of date. As explained in VM-20 Section 9.C.3.g, the improvement factors used for the applicable industry basic table should be those for Year-End YYYY, published on the SOA website. YYYY is the calendar year of valuation.

For the company experience tables, some companies used the SOA mortality improvement factors without support showing that this was a reasonable assumption, or they used mortality improvement factors that were not described. VM-31 Section 3.D.3.i requires a description and rationale for mortality improvement assumptions.

B. Nonguaranteed YRT Reinsurance

The following issues were found:

- There was a wide range of practice among companies in terms of modeling for YRT reinsurance. This appears to have stemmed from different interpretations of VM-20 guidance regarding appropriate methods for projecting future YRT premium rates as well as different interpretations of applicable sections of the *Accounting Practices & Procedures Manual*. A field study is in progress to study the impacts of several *Valuation Manual* amendment proposals.
- Some companies appeared to have an inappropriate interpretation of “non-guaranteed YRT reinsurance.” If a reinsurer has the option to adjust a component of YRT reinsurance, then it is non-guaranteed. For example, if the reinsurer guarantees YRT reinsurance rates for X years, then the YRT reinsurance rates are non-guaranteed for all years beyond X and this represents a variant of non-guaranteed YRT. Similarly, if a YRT contract is such that there are some limitations on the circumstances under which the reinsurer may change YRT reinsurance rates, but there are also some circumstances under which the reinsurer is permitted to change YRT reinsurance rates under the contract, this also represents a variant of non-guaranteed YRT.

C. Simplifications

The following issues were found:

- Some companies provided comments on model simplifications in various sections of their reports, but in the section dedicated to the topic, they indicated that no simplifications were made. All approximations, simplifications, and modeling efficiency techniques should be disclosed in one section of the report for VM-31 Section 3.D.11.j.
- Some practices that would be considered simplifications were not identified as such. An example would be a simplified investment strategy.
- Most reports did not mention whether a VM-20 Section 2.G demonstration had been done. VM-20 Section 2.G states that “A company may use simplifications, approximations, and modeling efficiency techniques to calculate the NPR, the deterministic reserve and/or the stochastic reserve required by this section 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”.

VM-31 Section 3.D.11.j will require a statement that this demonstration is available upon request.

D. Assumption Changes

In some cases, second-year filers made changes to anticipated experience assumptions and/or margins, which is allowed. However, as required by VM-31 Section 3.C.3, the reasonableness of these changes should be explained, particularly when they materially reduce the modeled reserve. An attribution analysis showing the impact of each change is also desirable.

E. Materiality

A number of companies did not set a materiality standard, or set a materiality standard based on a percentage of total company reserves or surplus. Note that VM-20 Section 2.H will require companies to set their materiality standard at a level appropriate for the PBR reserve.

F. Exclusion Tests

If the Stochastic Exclusion Ratio Test is used, it must be performed annually and within 12 months before the valuation date, pursuant to VM-20 Section 6.A.1.ii. For some companies, this requirement was not met.

G. Dates used for Deterministic/Stochastic Reserve Calculations

Some companies did not disclose calculation dates and related information in a manner sufficient to evaluate the appropriateness of a reserve adjustment, or to determine how differences were handled when dates for the liabilities, assets, yield curve, spreads, and default costs were not in sync. VM-31 Sections 3.D.11.h and 3.D.11.i will require information relating to calculations as of the valuation date and calculations as of a date preceding the valuation date.

H. Assets

The following issues were found:

- Some companies misinterpreted the guidance in VM-20 Section 7.E.1.g for the use of an alternative investment strategy. The companies tested the modeled reserve by substituting a 50/50 blend of PBR credit rating 6/3 public non-callable corporate bonds for all modeled assets rather than making the substitution for the portion of the modeled assets that were fixed income reinvestment assets.
- Some companies did not demonstrate compliance with VM-20 Section 7.E.1.g by showing that the modeled reserve is the higher of that produced using the modeled company investment strategy and the alternative investment strategy. This will be required for VM-31 Section 3.D.6.s.
- When describing the modeled company investment strategy and reinvestment assumptions, some companies did not include disinvestment assumptions, which is a required disclosure for VM-31 Section 3.D.6.r.

I. Organization and Readability

Companies should ensure that the PBR Actuarial Report is a readable, cohesive document. As noted in VM-31 Section 3.A, the report must retain and follow the order of the requirements listed in VM-31. While companies are encouraged to leverage existing documents and provide them as appendices where appropriate (e.g. the Actuarial Opinion Memorandum, company experience studies, etc.), each appendix should be referenced and put in context within the higher-level discussion provided in the

body of the report in the applicable section of the PBR Actuarial Report. It should be clear how the information in the appendix meets the specific disclosure requirements in VM-31. Also, to facilitate review of the PBR Actuarial Report, the use of multiple layers of files embedded within documents is discouraged.

J. Governance and Controls

NPR was not classified as a model by some companies. This seems to have contributed to NPR errors due to a lack of sufficient controls. It is important to note that Section II of the *Valuation Manual* was amended to clarify that NPR calculations are considered part of a principle-based valuation. This means that VM-G corporate governance guidance applies to the NPR. Controls and standards used for the DR and SR should also be used for the NPR. Companies should also consider alignment of these controls and standards with the company's enterprise control framework.

VM-G Section 1.A requires sufficient measures for oversight of the function related to principle-based reserves. VM-G Section 3 states that senior management is responsible for directing the implementation and ongoing operation of the principle-based valuation function. This includes making reports to the board no less frequently than annually to facilitate their oversight role. Since PBR reserves are expected to grow quickly, early efforts are essential to educate the board about PBR and communicate items such as those listed in VM-G Sections 3.A.6 and 4.A.3.

Section VI. Emerging Best Practices

- There was greater use of graphs and tables in the 2018 reports, which were generally effective in conveying information succinctly and clearly. Examples include:
 - Graphs to scale showing the complete path of net asset earned rates.
 - Tables showing a complete list of riders and the products to which they apply.
 - Tables showing the distribution of assets by type, quality, and maturity.
- Many companies provided assumptions and other information in spreadsheets, where appropriate. Note that VM-31 Section 3.D.1.a will require that assumptions be provided in Excel format. An [example of one possible format](#) is provided on the NAIC website.
- Some companies provided a detailed attribution analysis showing how the DR changed from one period to the next. This was very helpful for reviewers. Best practice would be to show this for the reported reserve and all components (e.g. separate columns for NPR, DR, SR, and dominant reserve, as applicable).
- Some companies provided a chart that reconciled the reported reserves in the VM-20 Reserves Supplement with the amounts reported in Exhibit 5 for the same business.