

**Appendix 3** of the March 2014 Report of the AOM  
Discussion Group

**FOR ILLUSTRATION PURPOSES ONLY**

**ACTUARIAL MEMORANDUM**

**for**

**THE PRESIDENT AND CHIEF OPERATING OFFICER**

**of**

**ABC LIFE INSURANCE COMPANY**

Developed by John Q. Actuary

**In support of the December 31, 2012**

**STATEMENT OF ACTUARIAL OPINION**

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# [1. Links to Items of Interest](#)

(TofC OR IofI)

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## 2. Executive Summary

(TofC OR Iofl)

This is a summary of the 2012 results for the liabilities of ABC Life Insurance Company. It should be noted, there are no material changes in methods, procedures, or assumptions from prior year's analysis.

The present value of market value of surplus amounts as of September 30, 2012 for the stochastic and deterministic scenarios for all reasonable scenarios and sensitivities are sound. Although five of the seven deterministic scenarios produced a negative surplus amount, we believe that these are beyond moderately adverse scenarios. The main driver of the negative surplus amounts is due to low asset returns being earned on the assets versus the credited rates.

Due to credited rates in excess of current asset earned rates, the ULSG policies reserves were deemed to be deficient, and, therefore, additional reserve of \$XX,XXX were required.

Interest Rate Results - In most scenarios, the company was unable to earn the full 48 basis points of target spread on the general account portion of the deferred annuities over the life of the business.

Expense Results - The expense risk was considered to be immaterial since expenses were tied directly to the account values and reserves. An agreement between ABC and BBST ameliorates this risk because fund operating fees and expenses move in tandem with the account values.

Surrender and Withdrawal Results - Surrenders of funds due to full surrenders and partial withdrawals on the deferred annuities were higher than what was assumed. This resulted in lower account values and less interest credited on the general account.

Separate Account Fund Performance Results - Varying separate account fund returns caused volatility in the amount of earnings produced by our equity index annuity contracts. This volatility impacted mortality and expense fees collected and guaranteed minimum death benefits paid.

Fund Transfer Results - In these extremely low interest rates periods, the company did not earn its target spread on general account funds due to the 1% credit rate floor. Also, fund transfers occurred immediately following the substantial increase in market rates caused strain on the company's target spread.

Mortality Results - Annuitants are living longer than was assumed in the reserve assumptions underlying the payout annuities, which resulted in mortality losses. This was also seen in the return of premium death benefit provision.

Asset Default and Reinvestment Results – Because the company was not subject to default or rating downgrade, we did not see reduced investment returns that the company achieves or normally earns for these portfolios. Expected default rates were extremely low as all of the existing assets as well as the all the reinvestment assets were Treasury securities or cash.

### 3. Background and Scope

(ToFC OR lofi)

#### Overview of Business

This memorandum encompasses the statutory reserves and liabilities of ABC Life Insurance Company.

ABC Life Insurance Company (“ABC”) is a stock insurance company engaged in the business of writing annuities. ABC is a wholly owned subsidiary of XYZ Company.

ABC writes equity index annuities and ULSG policies. The majority of the reserves and liabilities of ABC are reinsured to LMN Reinsurance company on a coinsurance basis. This memorandum focuses on amounts retained, which as of December 31, 2012 consisted of the following amounts.

Product	Reserves 12/31/2012	Analysis
EAI – Separate Account –retained	██████████	CFT
ULSG	██████████	DC
Total	██████████	

Note: CFT = cash flow testing; DC = documented conservatism.

{Text Here}.

#### Asset Adequacy Analysis

As noted above, asset adequacy analysis in the form of cash flow testing was performed on the \$ ██████████ block of retained equity index annuities and the \$ ██████████ block of retained payout annuities. Testing was performed using September 30, 2012 asset and liability data in support of the December 31, 2012 Statement of Actuarial Opinion. In my opinion, use of the prior period data is reasonable and no material subsequent events have occurred that would invalidate the analysis on which the opinion is based.

Cash flow testing was performed for 5,000 stochastic scenarios that test a broad range interest rate and equity return scenarios. The 5,000 stochastic scenarios were developed by vendor software and produced to meet the C-3 Phase 2 calibration points. Testing was also performed for the seven interest rate scenarios (“required seven”) described in Oregon Insurance Department Regulation 126. I considered some of these seven scenarios to be extreme scenarios. Additional testing was also performed for three

deterministic yield curve steepening and inversion scenarios that test the impact of various interest rate levels and yield curve shapes.

Additional testing was performed to analyze the sensitivity of results to various other assumption changes.

There have been no significant changes to the analysis from last year. Past assumptions were reviewed and adjusted based on experience. Projection models were examined and refined where appropriate.

### Reinsurance Arrangements

On July 1, 2010 LMN entered into a reinsurance agreement with ABC on all the rights, liabilities, and obligations except for contracts written in Oregon. The reinsurance is on a coinsurance basis for the non-Oregon general account and non-unitized separate account liabilities and on a modified coinsurance basis for the non-Oregon liabilities residing in the unitized separate accounts. Overall, LMN assumes about 50% of the total direct business. During 2012, the administration of LMN's equity index annuity business transitioned to JKL. Along with administration, Podunk assumed responsibility of calculating the reserves. The portion going to Podunk included the variable deferred and payout annuities from ABC and ABCNY. LMN retained the ULSG policies and a portion of the fixed payout business.

### Surplus

This analysis considers adequacy of reserves and other liabilities assuming initial assets equal to reserves and liabilities. Surplus adequacy is not covered by this memorandum and no analysis of surplus was performed.

### Changes from Prior Year

- *Company*
- *Business*
- *Models*
- *Assumptions*



## 4. Liabilities

(TofC OR IofI)

### Overview

The reserves and liabilities, net of reinsurance, as of 09/30/2012 were as follows:

Product	Reserves 9/30/2012
Equity index annuities– retained	
ULSG Policies	
Reserves in cash flow testing model	
ULSG policies	
Equity index annuities– Separate Account - Modco	
Total	

Summaries of the December 31, 2012 and September 30, 2012 reserves and liabilities are shown in Appendices A and B, respectively. These Appendices disclose which amounts were cash flow tested and which amounts were documented as conservative. As noted above, asset adequacy analysis in the form of cash flow testing was performed on the retained equity index annuities. Analysis in the form of documented conservatism was performed on the retained ULSG policies and on the equity index annuity reserves that are reinsured on a modified coinsurance basis.

### Product Description and Reserve Basis

Premium payments made under the flexible premium deferred equity index annuity contracts are allocated to unitized separate accounts or a fixed interest rate segment in the general account. For the fixed account, interest rates are reset periodically based on existing asset yields and current market rates. The fixed account has a minimum guaranteed interest rate of 3%. The separate account contains no principal or interest guarantees. The contractholder bears the investment risk for all amounts allocated to the separate accounts.

A surrender charge may be assessed against surrenders of purchase payments. The charge is assessed against premium payments and begins at 15% and grades down to 10% after 3 years. No surrender charges are assessed in the event of death, total disability before age 65, nursing home confinement, or terminal illness prognosis. Additionally, during the surrender charge period, the charge is waived for withdraws up to 12% of prior purchase payments each year. All contracts are now beyond the surrender charge period. The minimum allowed partial surrender is \$1500.

The contracts offer annuitization (payout) options which include, but are not limited to, life, certain and continuous, joint, and variable payments. For fixed options, the guaranteed minimum purchase rates are based on the 1983 “a” table at 3% interest. All equity index annuity contracts contain a minimum guaranteed death benefit (“GMDB”) feature. The death benefit is the greater of (1) the account value on the date of notice of death or (2) a return of premiums less withdrawals to date (i.e. 100% of all premium payments made under the contract, reduced by the dollar amount of any partial surrenders since the date of issue).

There are no transfer or withdrawal fees. An annual maintenance charge of \$115 applies but is waived for account values of \$500,000 or more. The minimum contract size is \$22,000. The separate account mortality, expense, and administration fee totals 15 basis points. Annual portfolio operating expenses are also assessed against the funds and range from approximately 3 basis points to 22 basis points depending on the underlying fund.

The reserves for the flexible premium equity index annuities are determined using Actuarial Guideline 43 (VACARVM). For 2012 year-end, Standard Scenario Amount is greater than the CTE70 amount. For the Basic Adjusted Reserve in the Standard Scenario Amount calculation, interest rates vary from 2.15% to 6.00% and mortality is either under the 1983 Table “a” or the Annuity 2000 table.

Included in this memorandum is a description of the 2012 standalone asset adequacy analysis performed on the equity index annuity business.

The retained payout annuities were all a result of the annuitization of deferred annuities and all resided in the general account. The annuities are certain only, life contingent, or certain and continuous annuities. The reserve basis included discount rates ranging from 2.00% to 11.00% and mortality based on either under the 1983 GAM table, or the Annuity 2000 table.

#### Liability Assumptions

- Mortality
- Lapses
- Substandard
- Mortality Improvement

#### Reinsurance Ceded

#### Reinsurance Assumed

#### Other Risks

## 5. Assets

(ToFC OR LoFI)

### Overview

The company invests in cash and Treasury securities.

The statutory statement value of assets has been determined in compliance with NAIC requirements.

### Assets Included

1. Cash and Short-Term Investments – SSAP No. 2.
2. Bonds – SSAP No. 26. Generally amortized cost using the scientific (constant yield) interest method.

Derivatives

Options

Market values of assets were determined in order to project gains and losses upon sale. Market values for bonds were calculated by discounting the expected security flows at projected market rates.

The general account and separate account assets as of September 30, 2012 have similar characteristics to the assets as of December 31, 2012. Appendix C contains the assets as of 9/30/2012 by maturity, credit quality, and sector. Note that much of this memorandum applies to “credit” assets whereas current and modeled reinvestment assets for this company, ABC Life, are cash and Treasury securities.

## Asset Model and Asset Projection Assumptions

- Existing Assets
- Investment Expenses
- Reinvestment Assumptions
- Spreads
- Defaults

## 6. Methodology and Projections of Cash Flows

(ToFC OR IofI)

### Methodology

Equity index annuity and fixed payout annuity monthly insurance and investment cash flows were projected using the Consulting Firm system from September 30, 2012 until a significant portion of the business had fully matured. Positive cash flows during this period were invested in a weighted average of two-year and five-year Treasury bonds. This generally kept the duration of the assets within the target duration range the company manages this business to. Borrowing at the 90-day Treasury rate plus 25 basis points up to 12% of assets covered negative cash flows. Once borrowing exceeds 12%, assets are sold to cover negative cash flow.

The Asset Valuation Reserve (AVR) as of September 30, 2012 was [REDACTED]. This was excluded from the cash flow testing. The Interest Maintenance Reserve (IMR) as of September 30, 2012 was [REDACTED]. An IMR amount of [REDACTED] was modeled in cash flow testing as an estimate of the portion of the IMR attributable to the reserves and liabilities (versus surplus). Future changes to the IMR were modeled but such that the balance never became negative.

Note that an additional reserve of \$[REDACTED] was established by the company to ensure asset adequacy for these business blocks.

Validation of the CF model consisted of validating the initial input items (static validation) as well as the first few years of projected results (dynamic validation). The dynamic validation compared expected amounts with modeled amounts. Comparison to recent actual results was not performed due to the very small number of policyholders in the company and the variability caused by margins in the assumptions and census changes. (e.g. The equity index annuity projections use a conservative 1% lapse rate whereas recent lapse rates have been closer to 0.5% so a comparison of recent actual experience to projected would provide limited value. On a similar note, there were eight policyholders in fixed payout annuities but only six of them were in the prior year actual results.) The validation results are contained in [Appendix F](#).

The market value of surplus results were determined by accumulating the excess of the investment cash flows over the insurance cash flows for each scenario to the end of the projection period and discounting that result back to September 30, 2012 using the post-tax portfolio yield rates for that scenario. The conservatism in the assumptions and the impact of possible actions by company management (e.g., changing non-guaranteed elements) were also considered.

[Appendix D](#) summarizes the stochastic and deterministic yield curves and equity returns used in the projections. Mean reversion ...

The ULSG policies were not modeled in CF. These contracts were modeled in Microsoft Excel by accumulating the current account value by the credited rate to maturity and then discounting it back to the valuation date by using conservative portfolio earned rates. The reserves were below these discounted values and an additional reserve of \$ [REDACTED] was established to ensure asset adequacy for these contracts.

## Projection of Insurance Cash Flows

Insurance cash flows projections reflected surrenders, withdrawals, mortality, and expenses. Due to the small size of this block of business, experience studies provide limited information. The surrender, withdrawal, and mortality assumptions chosen are based on experience from other larger blocks of business. The impact of significant changes in these assumptions has been analyzed through sensitivity tests discussed below and in Appendix G-1 and G-2.

The following is a description of the key assumptions. Similar information on the assumptions is contained in Appendix E.

### Credited Rates

Current credited rates were used for inforce business and future credited rates were assumed to be equal to the asset earned rates less an expected spread of 100 basis points, subject to guaranteed minimums (1.5%) as defined in each contract.

### Separate Account Fund Performance

Fund performance was modeled under 5,000 stochastic interest rate and Separate Account return scenarios. In addition, ten deterministic scenarios, which included the required seven scenarios, were analyzed. In the deterministic scenarios, the separate account assets were illustrated at a conservative growth rate of 1.75% before assessment of all mortality, expense, administration, and fund operating fees. It was lowered to 1% for a sensitivity test.

### Fund Transfers and Subpays

Fund transfers and subpays (i.e. future premium deposits) were not modeled in the base runs but the potential impact was examined in the sensitivity testing. See Appendix E for more discussion.

### Mortality, Expense Administration, and Fund Operating Fees

ME&A fees were set at 20 basis points per year, consistent with the actual contractual charges. Fund operating fees vary between 25 and 115 basis points per year and an average of 62 basis points was assumed in the modeling.

The managers of the separate account funds provide ABC with revenue sharing ranging up to 12.5 basis points of the fund values per year. This revenue item has been excluded from this analysis.

### Expenses

Investment expenses of 16 basis points per year for the general account are included in the projections. Annual general insurance expenses were set at 25 basis points of the account values. Fund operating Expenses were assumed to be equal to 25 basis points per year (thereby offsetting the projected fund operating fees).

The company incurs sizable (relative to reserves and liabilities) insurance department expenses for licenses and fees. The company would incur these expenses even in the absence of inforce business as it wants to maintain a viable “shell” that is licensed in many states. Such expenses have been excluded from the analysis.

### Surrender and Withdrawal Rates

Surrenders of funds were assumed to equal 10% of the fund values per year for the deferred annuities. This assumption covers full surrenders and partial withdrawals. Given recent experience, the limited death benefit, and the fact that the business is beyond the surrender charge period, an annual rate of 10% was used. See Appendix E for information on recent experience.

### Mortality

Mortality was assumed to follow the statutory reserve basis for the payout annuities (Annuity 2001 or 1983 Table “a”). Mortality for the deferred annuities was modeled using Annuity 2010 table.

### Death Benefits

As noted above, the guaranteed minimum death benefit is the greater of the account value and a return of premium. GMDB risk is included in the projection.

## **I. Annuitization Benefits**

Future annuitizations were not modeled in the analysis of the deferred equity index annuity contracts as it was assumed that the value of annuitization to the contract holder would be less than that of a full surrender. Historically this option has had a very low level of election. (The \$██████ asset adequacy reserve is assumed to cover this risk as well).

The benefit payments for payout annuities were projected based on the contractual payments, with mortality based on the underlying statutory valuation table.

### Federal Income Tax

The Federal Income Tax rate was set at 35% and applied to the taxable income in each projection year.

### Projection Period

Insurance cash flows were projected for 45 years until all material benefits were paid.

## Projection of Investment Cash Flows

Investment cash flows were projected on a seriatim basis. Cash flows included coupon payments and scheduled payments of principal. Default and call assumptions were not applicable as all existing assets, as well as modeled future reinvestment assets, were cash and Treasury securities.

Net cash flows were assumed to be reinvested at an interest rate varying by scenario, and within scenario, by year. A month's cash flow, if positive, was invested in a bucket of bonds comprised of 55% 3-year treasury securities and 45% 15-year treasury securities. If the cash flow was negative, it was borrowed at 100 basis points above the 90-day Treasury rate up to 12% of assets. Once borrowing exceeds 12%, assets are sold to cover negative cash flow. The impact of active portfolio management has been reflected in the cash flows.



## **7. Basis for Asset Adequacy Analysis**

(ToFC OR IofI)

Cash Flow Testing

Other Methods

Not Tested

## **8. Source of In-force Data**

(TofC OR IofI)

### Sources of In-force Data

For the September 2012 analysis, data were received from LMN and Podunk as of September 30, 2012. No adjustments or modifications have been made to this data. I have not verified the accuracy of the data but reviewed it for reasonableness and have no reason to believe that any material defects are present.

## **9. Summary of Results**

(TofC OR IofI)

### Formula Reserves and Related Items

- AG 43
- AG 38
- PBR

### Additional Reserves

### Other Significant Changes from Prior Year

### Changes After Projection Date

## 10. Discussion of Results and Risks

(TofC OR IofI)

Analysis consisted of examining various items associated with each scenario, including, but not limited to, the present value of the ending market value of surplus, the incidence of cash flows, and the retained statutory book surplus resulting from the cash flow testing at interim periods.

There are no material changes in methods, procedures, or assumptions from prior year's asset adequacy analysis.

Appendix G - 1 shows the present value of market value of surplus amounts and statistics as of September 30, 2012 for the stochastic and deterministic scenarios. Also included in Appendix G are results from sensitivity testing. Stochastic scenarios produced market value of surplus ranging from \$(██████) to \$██████ with mean \$(██████) and standard deviation of \$██████. The 85<sup>th</sup> percentile was \$(██████) and the 70<sup>th</sup> percentile was \$(██████). These amounts do not include the additional reserve amount of \$██████ for the equity index annuities.

Five of the seven "New York" deterministic scenarios produced a negative surplus amount. I believe some of the "New York" scenarios in which ABC have a negative surplus are beyond moderately adverse scenarios. I believe the stochastic scenarios are a better representation of the embedded risks. The main driver of the negative surplus amounts is due to low asset returns being earned on the assets versus the credited rates.

Appendix H summarizes the stochastic and deterministic statutory income and retained statutory book surplus resulting from cash flow testing at each calendar year-end for the first ten projection years and every fifth year thereafter. Note that the surplus shown in this appendix is based on the book value of assets and liabilities.

The ULSG policies reserves were deemed to be deficient, before the additional reserve of \$██████. These contracts are being credited rates in excess of the current asset earned rates. Appendix A includes the additional actuarial reserve of \$██████.

Several sensitivity tests were performed to analyze the sensitivity of results to key risk. The following is a discussion of the key risks and the corresponding sensitivity tests. More detail can be found in Appendix G-1 and Appendix G-2.

### Interest Rate Risk

Interest rate levels and movement can present several risks. In periods with low interest rates, the company may be unable to earn its expected spreads because of the guaranteed minimum credited rates in the contracts and the inherent credited rates in the payout annuities. In high interest rate environments, contract holders may opt to surrender their contract to achieve higher returns elsewhere.

This risk is captured in the results of the 5,000 stochastic scenarios and the ten deterministic scenarios as summarized in Appendix G-1. Both changing interest rate levels and the separate account returns cause the variability in the stochastic results. The deterministic scenarios isolate the sensitivity of the interest rate risk in that for these scenarios, the separate account returns are not varied by scenario. In most of scenarios, the company is unable to earn the full 48 basis points of target spread on the general account portion of the deferred annuities over the life of the business.

#### Expense Risk

Expense risk often occurs when expenses increase as a percentage of revenues. This risk is considered to be immaterial since expenses are tied directly to the account values and reserves. The agreement between ABC and Glenbrook stipulates that ABC pay a fee equal to 25 basis points of account value for deferred annuities and 15 basis points of reserves for payout annuities to administer the business. Fund operating fees and expenses also move in tandem with the account values.

Appendix G-2 includes a sensitivity test where expenses were increased from 50 basis points of account values/reserves to 60 basis points. Using deterministic scenario 1 as a base run, this decreased the market value of surplus from (██████) to (██████), a decrease of \$██████. See Appendix G-2, run 2.

#### Surrender and Withdrawal Risk

Surrenders of funds due to full surrenders and partial withdrawals on the deferred annuities may be higher than what is assumed in the base runs. This would result in lower account values and less interest credited on the general account, therefore more profit in a down interest rate scenario and less profit in an up interest rate scenario.

A sensitivity test was performed that assumed 300% lapse rates instead of the base 17% lapses. This increased the deterministic scenario 11 results from \$(██████) to \$(██████). The improvement is due to the embedded inadequacy of the reserves so a higher lapse rate improves the results. Results for this sensitivity test are also shown for the remaining deterministic scenarios. See Appendix G-2, run 3.

For further analysis, another sensitivity test was performed on the deferred annuities using 5,000 stochastic scenarios and assuming a 30% lapse rate. Under this test, the 85<sup>th</sup> percentile had increased surplus even though some extreme scenarios worsened.

#### Separate Account Fund Performance Risk

Varying separate account fund returns can cause volatility in the amount of earnings produced by the equity index annuity contracts. This volatility will impact, among other items, mortality and expense fees collected and guaranteed minimum death benefits paid. The range of the volatility can be seen in the results of the 5,000 stochastic scenarios shown in Appendix G-1.

To further assess this risk, additional deterministic scenarios were performed. One scenario assumed a flat 0% growth in the separate account. The market value of surplus

amounts was \$(██████). Comparing these to deterministic scenario 1 which uses a level 0.5% separate account return, the change in surplus amounts were \$(██████). See Appendix G-2, run 4.

#### Fund Transfers

In periods of very low interest rates, the company may not earn its target spread on general account funds due to the 1% credit rate floor. A sensitivity test of putting 25% of the outstanding EIA liabilities into the general account was run to measure the fund transfer risk. This reduces the deterministic scenario 1 results from \$(██████) to \$(██████). I believe this scenario to be beyond what is considered moderately adverse. See Appendix G-2, run 1.

Fund transfers occurring immediately following a substantial increase in market rates can also cause strain on the company's target spread. A sudden substantial increase in market yields can cause unrealized losses in the underlying general account assets. Since participant transfers are on a book value basis, unrealized losses can become realized and may not be recouped in the future target spreads. This risk is analyzed in the lapse sensitivity where lapses were increased from 17% to 300%. This does overstate the impact in that when a transfer does occur, the asset still stay within the contract and the company collects future ME&A fees on these assets; Whereas in a lapse situation, the contract is terminated and no future fees are collected.

#### Mortality Risk

Mortality risk presents itself in the payout life contingent annuities and in the deferred annuities return of premium death benefit. Annuitants may live longer than is assumed in the reserve assumptions underlying the payout annuities, causing mortality losses. In the return of premium death benefit provision, if annuitants die and their net premiums received to date exceed their account value, the excess is paid by the general account.

A sensitivity test was performed by increasing the base mortality by 50%. This increased the deterministic scenario 1 results from \$(██████) to \$(██████). Results for this sensitivity test are also shown for the remaining deterministic scenarios. See Appendix G-2, run 5.

#### Asset Default and Reinvestment Risk

Assets held in the general account may be subject to default or rating downgrade. This can reduce the investment returns the company achieves on these portfolios, thereby lowering the expected spread the company will earn.

Expected default rates were not modeled as all of the existing assets as well as the modeled reinvestment assets were assumed to be Treasury securities or cash. Reinvestment risk is embedded within all of the modeled results.

## **11. Conclusion**

(TofC OR IofI)

In judging whether the results of cash flow testing were satisfactory, I examined various items of each scenario, including but not limited to the present value of ending market value of surplus, the incidence of cash flows, and the retained statutory book surplus resulting from the cash flow testing at interim periods. Although these items were examined for all the scenarios tested, more weight was given to the results of the 5,000 stochastic scenarios. Conservatism in the assumptions, the impact of possible actions by company management (e.g., changing non-guaranteed elements) and the results of sensitivity tests were also considered.

Some of the scenarios tested, including some of the sensitivity tests, contain assumptions that may be considered overly conservative. In forming my opinion, I considered these scenarios, but relied more heavily on the results of scenarios performed under moderately adverse conditions.

Note that while the cash flow model used in this analysis attempts to reflect the risks the company is exposed to and the dynamics of cash flows, it will still contain limitations because it is only a model. The analysis performed is based on the results derived from the application of the cash flow model over a wide range of interest rate and separate account fund performance scenarios (including many moderately adverse scenarios) while the actual needs of the company arise from the risks to which it is or will be exposed in reality. A cash flow scenario model can not completely quantify the company's exposure to risk. The model attempts to represent reality, but will always remain an approximation thereto and hence uncertainty in future experience is an important consideration when reviewing and relying upon the Statement of Actuarial Opinion.

A summary of the results, as described in Section 4, are shown in Appendix G-1. Results are shown for the 5,000 stochastic scenarios, the required seven scenarios, and three additional deterministic scenarios. Assets (after reflecting additional reserves the company established) were sufficient to pay claims and expenses in all market scenarios. Discussion of the key risks for the business can also be found in Section 4.

Additional sensitivity testing of various other assumptions was performed, as I deemed necessary. The results of this sensitivity testing are discussed in Section 4 and Appendix G-2 and did not cause me to alter my opinion.

Appendix H summarizes the statutory income and retained statutory book surplus at the end of each calendar year, for the first ten projection years and then every 5<sup>th</sup> year thereafter, resulting from the 5,000 stochastic scenarios, the seven required scenarios, and the three additional deterministic scenarios. Additional years were examined even though they aren't shown.

Actuarial methods, consideration and analyses used in the preparation of this memorandum conform to the appropriate Standards of Practice as promulgated by the Actuarial Standards Board, which standards form the basis for this memorandum.

My examination included such review of the actuarial assumptions and actuarial methods and of the underlying basic liability records and such tests of the actuarial calculations, as I considered necessary.

2/1/2012

\_\_\_\_\_  
Date

John Q. Actuary

\_\_\_\_\_  
John Q. Actuary, FSA, MAAA  
President and Actuary  
ABC Life Insurance Company

# 12. Appendices

(TofC OR IofI)

## Appendix A – 12/31/2012 Reserves and Liabilities

(TofC OR IofI)

ABC Life Insurance Company					
12/31/2012					
RESERVES AND LIABILITIES					
STATEMENT ITEM	ASSET ADEQUACY ANALYZED				
	(1) FORMULA RESERVES	(2) ADDITIONAL ACTUARIAL RESERVES	ANALYSIS METHOD	(3) OTHER AMOUNT	(4) TOTAL AMOUNT
	(\$)	(\$)		(\$)	(\$)
<b>EXHIBIT 5</b>					
A	Life Insurance	-	-	CFT	-
A	Life Insurance	-	-	DC (ModCo)	-
A	Life Insurance	-	-	DC (other)	-
A	Life Insurance	-	-	IM	-
A	Life Insurance	-	-	N/A	-
B	Annuities	-	-	CFT	-
B	Annuities	-	-	DC (ModCo)	-
B	Annuities	-	-	DC (other)	-
B	Annuities	-	-	IM	-
B	Annuities	-	-	N/A	-
C	Supplementary Contracts ILC	-	-	CFT	-
C	Supplementary Contracts ILC	-	-	DC (ModCo)	-
C	Supplementary Contracts ILC	-	-	DC (other)	-
C	Supplementary Contracts ILC	-	-	IM	-
C	Supplementary Contracts ILC	-	-	N/A	-
D	Accidental Death Benefits	-	-	CFT	-
D	Accidental Death Benefits	-	-	DC (ModCo)	-
D	Accidental Death Benefits	-	-	DC (other)	-
D	Accidental Death Benefits	-	-	IM	-
D	Accidental Death Benefits	-	-	N/A	-
E	Disability - Active Lives	-	-	CFT	-
E	Disability - Active Lives	-	-	DC (ModCo)	-
E	Disability - Active Lives	-	-	DC (other)	-
E	Disability - Active Lives	-	-	IM	-
E	Disability - Active Lives	-	-	N/A	-
F	Disability - Disabled Lives	-	-	CFT	-
F	Disability - Disabled Lives	-	-	DC (ModCo)	-
F	Disability - Disabled Lives	-	-	DC (other)	-
F	Disability - Disabled Lives	-	-	IM	-
F	Disability - Disabled Lives	-	-	N/A	-
G	Miscellaneous Reserves	-	-	CFT	-
G	Miscellaneous Reserves	-	-	DC (ModCo)	-
G	Miscellaneous Reserves	-	-	DC (other)	-
G	Miscellaneous Reserves	-	-	IM	-
G	Miscellaneous Reserves	-	-	N/A	-
	<b>TOTAL EXHIBIT 5 (Page 3, Line 1)</b>	-	-	-	-
<b>EXHIBIT 6</b>					
A	Active Life Reserve	-	-	CFT	-
A	Active Life Reserve	-	-	DC (ModCo)	-
A	Active Life Reserve	-	-	DC (other)	-
A	Active Life Reserve	-	-	IM	-
A	Active Life Reserve	-	-	N/A	-
B	Claim Reserve	-	-	CFT	-
B	Claim Reserve	-	-	DC (ModCo)	-
B	Claim Reserve	-	-	DC (other)	-
B	Claim Reserve	-	-	IM	-
B	Claim Reserve	-	-	N/A	-
	<b>TOTAL EXHIBIT 6 (Page 3, Line 2)</b>	-	-	-	-
<b>EXHIBIT 7</b>					
2	Guaranteed Interest Contracts	-	-	CFT	-
2	Guaranteed Interest Contracts	-	-	DC (ModCo)	-
2	Guaranteed Interest Contracts	-	-	DC (other)	-
2	Guaranteed Interest Contracts	-	-	IM	-
2	Guaranteed Interest Contracts	-	-	N/A	-
3	Annuities Certain	-	-	CFT	-
3	Annuities Certain	-	-	DC (ModCo)	-
3	Annuities Certain	-	-	DC (other)	-
3	Annuities Certain	-	-	IM	-
3	Annuities Certain	-	-	N/A	-
4	Supplemental Contracts	-	-	CFT	-
4	Supplemental Contracts	-	-	DC (ModCo)	-
4	Supplemental Contracts	-	-	DC (other)	-
4	Supplemental Contracts	-	-	IM	-
4	Supplemental Contracts	-	-	N/A	-
5	Dividend Accumulations of Refunds	-	-	CFT	-
5	Dividend Accumulations of Refunds	-	-	DC (ModCo)	-
5	Dividend Accumulations of Refunds	-	-	DC (other)	-
5	Dividend Accumulations of Refunds	-	-	IM	-
5	Dividend Accumulations of Refunds	-	-	N/A	-
6	Premium and Other Deposit Funds	-	-	CFT	-
6	Premium and Other Deposit Funds	-	-	DC (ModCo)	-
6	Premium and Other Deposit Funds	-	-	DC (other)	-
6	Premium and Other Deposit Funds	-	-	IM	-
6	Premium and Other Deposit Funds	-	-	N/A	-
	<b>TOTAL EXHIBIT 7 (Page 3, Line 3)</b>	-	-	-	-



ABC Life Insurance Company					
12/31/2012					
RESERVES AND LIABILITIES					
STATEMENT ITEM	ASSET ADEQUACY ANALYZED				
	(1)	(2)	(3)	(4)	
	FORMULA RESERVES	ADDITIONAL ACTUARIAL RESERVES	ANALYSIS METHOD	OTHER AMOUNT	TOTAL AMOUNT (1) + (2) + (3)
	(\$)	(\$)		(\$)	(\$)
<b>EXHIBIT 8 Part 1</b>					
1	Life (P3 L4.1)	-	-	CFT	-
1	Life (P3 L4.1)	-	-	DC (ModCo)	-
1	Life (P3 L4.1)	-	-	DC (other)	-
1	Life (P3 L4.1)	-	-	IM	-
1	Life (P3 L4.1)	-	-	N/A	-
2	Health (P3 L4.2)	-	-	CFT	-
2	Health (P3 L4.2)	-	-	DC (ModCo)	-
2	Health (P3 L4.2)	-	-	DC (other)	-
2	Health (P3 L4.2)	-	-	IM	-
2	Health (P3 L4.2)	-	-	N/A	-
	<b>TOTAL EXHIBIT 8, Part 1</b>	-	-		-
<b>SEPARATE ACCOUNTS</b>					
	Aggregate Reserve (P3 L1)	-	-	CFT	-
	Aggregate Reserve (P3 L1)	-	-	DC (ModCo)	-
	Aggregate Reserve (P3 L1)	-	-	DC (other)	-
	Aggregate Reserve (P3 L1)	-	-	IM	-
	Aggregate Reserve (P3 L1)	-	-	N/A	-
	Liability for deposit-type contracts (P3 L2)	-	-	CFT	-
	Liability for deposit-type contracts (P3 L2)	-	-	DC (ModCo)	-
	Liability for deposit-type contracts (P3 L2)	-	-	DC (other)	-
	Liability for deposit-type contracts (P3 L2)	-	-	IM	-
	Liability for deposit-type contracts (P3 L2)	-	-	N/A	-
	<b>TOTAL SEPARATE ACCOUNTS</b>	-	-		-
<b>OTHER LIABILITIES</b>					
	Dividend Due & Unpaid (P3 L5)	-	-	CFT	-
	Dividend Due & Unpaid (P3 L5)	-	-	DC (ModCo)	-
	Dividend Due & Unpaid (P3 L5)	-	-	DC (other)	-
	Dividend Due & Unpaid (P3 L5)	-	-	IM	-
	Dividend Due & Unpaid (P3 L5)	-	-	N/A	-
	Dividend Liability (P3 L6.1)	-	-	CFT	-
	Dividend Liability (P3 L6.1)	-	-	DC (ModCo)	-
	Dividend Liability (P3 L6.1)	-	-	DC (other)	-
	Dividend Liability (P3 L6.1)	-	-	IM	-
	Dividend Liability (P3 L6.1)	-	-	N/A	-
	Dividends not yet apportioned (P3 L6.2)	-	-	CFT	-
	Dividends not yet apportioned (P3 L6.2)	-	-	DC (ModCo)	-
	Dividends not yet apportioned (P3 L6.2)	-	-	DC (other)	-
	Dividends not yet apportioned (P3 L6.2)	-	-	IM	-
	Dividends not yet apportioned (P3 L6.2)	-	-	N/A	-
	Advance Premiums (P3 L8)	-	-	CFT	-
	Advance Premiums (P3 L8)	-	-	DC (ModCo)	-
	Advance Premiums (P3 L8)	-	-	DC (other)	-
	Advance Premiums (P3 L8)	-	-	IM	-
	Advance Premiums (P3 L8)	-	-	N/A	-
	Prov. for Exp. Rating Refund (P3 L9.2)	-	-	CFT	-
	Prov. for Exp. Rating Refund (P3 L9.2)	-	-	DC (ModCo)	-
	Prov. for Exp. Rating Refund (P3 L9.2)	-	-	DC (other)	-
	Prov. for Exp. Rating Refund (P3 L9.2)	-	-	IM	-
	Prov. for Exp. Rating Refund (P3 L9.2)	-	-	N/A	-
	Reinsurance Payables (P3 L9.3)	-	-	CFT	-
	Reinsurance Payables (P3 L9.3)	-	-	DC (ModCo)	-
	Reinsurance Payables (P3 L9.3)	-	-	DC (other)	-
	Reinsurance Payables (P3 L9.3)	-	-	IM	-
	Reinsurance Payables (P3 L9.3)	-	-	N/A	-
	Borrowed Money (P3 L22)	-	-	CFT	-
	Borrowed Money (P3 L22)	-	-	DC (ModCo)	-
	Borrowed Money (P3 L22)	-	-	DC (other)	-
	Borrowed Money (P3 L22)	-	-	IM	-
	Borrowed Money (P3 L22)	-	-	N/A	-
	Reinsurance in unauthorized companies (P3 L24.02)	-	-	CFT	-
	Reinsurance in unauthorized companies (P3 L24.02)	-	-	DC (ModCo)	-
	Reinsurance in unauthorized companies (P3 L24.02)	-	-	DC (other)	-
	Reinsurance in unauthorized companies (P3 L24.02)	-	-	IM	-
	Reinsurance in unauthorized companies (P3 L24.02)	-	-	N/A	-
	Funds Withheld under Reinsurance Agreements (P3 L24.03)	-	-	CFT	-
	Funds Withheld under Reinsurance Agreements (P3 L24.03)	-	-	DC (ModCo)	-
	Funds Withheld under Reinsurance Agreements (P3 L24.03)	-	-	DC (Co-FW)	-
	Funds Withheld under Reinsurance Agreements (P3 L24.03)	-	-	IM	-
	Funds Withheld under Reinsurance Agreements (P3 L24.03)	-	-	N/A	-
	Drafts outstanding (P3 L24.05 in part)	-	-	CFT	-
	Drafts outstanding (P3 L24.05 in part)	-	-	DC (ModCo)	-
	Drafts outstanding (P3 L24.05 in part)	-	-	DC (other)	-
	Drafts outstanding (P3 L24.05 in part)	-	-	IM	-
	Drafts outstanding (P3 L24.05 in part)	-	-	N/A	-

ABC Life Insurance Company					
12/31/2012					
RESERVES AND LIABILITIES					
STATEMENT ITEM	ASSET ADEQUACY ANALYZED				
	(1)	(2)	(3)	(4)	
	FORMULA RESERVES	ADDITIONAL ACTUARIAL RESERVES	ANALYSIS METHOD	OTHER AMOUNT	TOTAL AMOUNT (1) + (2) + (3)
	(\$)	(\$)		(\$)	(\$)
Funds Held Under Coinsurance (P3 L24.07)	-	-	CFT	-	-
Funds Held Under Coinsurance (P3 L24.07)	-	-	DC (ModCo)	-	-
Funds Held Under Coinsurance (P3 L24.07)	-	-	DC (other)	-	-
Funds Held Under Coinsurance (P3 L24.07)	-	-	IM	-	-
Funds Held Under Coinsurance (P3 L24.07)	-	-	N/A	-	-
Interest on Funds (P3 L25 in part)	-	-	CFT	-	-
Interest on Funds (P3 L25 in part)	-	-	DC (ModCo)	-	-
Interest on Funds (P3 L25 in part)	-	-	DC (other)	-	-
Interest on Funds (P3 L25 in part)	-	-	IM	-	-
Interest on Funds (P3 L25 in part)	-	-	N/A	-	-
Provision for Future Div. (P3 L25 in part)	-	-	CFT	-	-
Provision for Future Div. (P3 L25 in part)	-	-	DC (ModCo)	-	-
Provision for Future Div. (P3 L25 in part)	-	-	DC (other)	-	-
Provision for Future Div. (P3 L25 in part)	-	-	IM	-	-
Provision for Future Div. (P3 L25 in part)	-	-	N/A	-	-
<b>TOTAL OTHER LIABILITIES</b>	-	-		-	-
<b>TOTAL RESERVES</b>	-	-		-	-

**Note:**  
CFT: Cash Flow Testing;  
DC (ModCo): Documented Conservatism (reinsured on a ModCo basis);  
DC (Co-FW): Documented Conservatism (reinsured on a Coinsurance Funds Withheld basis);  
DC (other): Documented Conservatism (other than reinsured on a ModCo b

*Appendix B –09/30/2012 Reserves and Liabilities*  
(ToFC or lofi)

*Appendix C – Assets*  
(ToC or lofi)

*Appendix D – Scenarios*  
(ToC or lofi)

*Appendix E – Assumptions*  
(TofC OR IofI)

*Appendix F – Model Validation*  
(TofC OR IofI)

*Appendix G –Market Value of Surplus Results (Including Sensitivity Tests)*  
(ToC OR lofl)



*Appendix H – Book Income and Surplus Results*  
(ToiC or lofi)

## *Appendix I –RAAIS*

(TofC OR IofI)

### Descriptions of Scenarios Tested

Cash flow testing was performed using 5,000 stochastic monthly scenarios and the ten interest rate scenarios ("required seven") described in the 1990 NAIC Model Actuarial Opinion and Memorandum Regulation plus 3 deterministic yield curve steepening and inversion scenarios to test the impact of various interest rate levels and yield curve shapes. All scenarios began with the September 30, 2012 yield curve.

For 5000 stochastic scenarios, Consulting Firm system was used to generate interest rate, equity fund, and fixed income fund returns. The equity returns generated are consistent with the calibration criteria as outlined in the March 2006 *C3 Phase II Risk-Based Capital for Variable Annuities: Pre-Packaged Scenarios* issued by the American Academy of Actuaries' Life Capital Adequacy Subcommittee (AAA LCAS).

Summary statistics on the 5,000 stochastic and ten deterministic scenarios are attached in the Appendix G.

None of the scenarios produced negative surplus in aggregate for the company.

Sensitivities were performed for both the deterministic and stochastic scenarios as well as other assumptions such as lapses, withdrawals, mortality, expenses and asset default. The results did not cause me to alter my opinion.

### Changes in Assumptions from Prior Year

Assumptions were reviewed and adjusted based on experience. In 2011, the lapse rate for Variable Annuity products was assumed to be 10% annually. Given market conditions at that time, this was higher than the prior 15 years' actual rates and resulted in a measure of conservatism. In 2012 due to market performance, the lapse rate was adjusted downward to be 15% annually as a lower lapse rate produced conservatism.

### Product Lines and Associated reserves No Longer Analyzed

All product lines analyzed for the 2011 asset adequacy analysis were analyzed for the 2012 asset adequacy analysis.

### Interim Results

There were no interim results in any of the scenarios tested that were of significant concern.

### Reinsurance

For most products, the projected amount and timing of reinsurance cash flows were incorporated directly into cash flow testing.

### Embedded Options

I have verified that all material options affecting cash flows embedded in fixed income securities and equity-like features in any investments have been appropriately considered in asset adequacy analysis.