

VARWG June 2005 Analysis Report

List of Attachments

Attachment 1: Alternatives for Standard Scenario Reserve

- **Non-Integrated vs. Integrated Calculation**
- **Level of Aggregation (None, Full, and Limited)**

Note: This was Attachment 2 of the March 2005 Analysis Report

Attachment 2: Plan Detail for Non-Integrated and Integrated

Note: This shows the results by plan type of the non-integrated and integrated calculation on a non-aggregated basis.

Attachment 3: Unit Results for Guaranteed Withdrawal Benefit

Attachment 4: Sensitivity Test with Guaranteed Withdrawal Benefit

Attachment 5: Modeling Specifications

Attachment 1: Alternatives To Standard Scenario Reserve Calculation

Product has Basic Annuity Charge 1.15%; 5% GMDB includes 5% GMIB

Results may differ for other populations, assumptions, or product designs

<u>Shock Used</u>	Up 20%		None		Down 20%	
1 Account Value (AV)	\$898.7	as % AV	\$748.9	as % AV	\$599.1	as % AV
2 Surrender Value	\$875.3	97.40%	\$725.0	96.80%	\$574.7	95.91%
3 AG 33 Reserve	\$876.4	97.52%	\$726.7	97.04%	\$578.2	96.50%
Model Results -- Excess above Surrender Value -- 65 CTE						
4 December Calibration	\$2.4	0.27%	\$8.0	1.06%	\$25.9	4.33%
5 Proposed Calibration	\$3.1	0.34%	\$11.9	1.59%	\$36.2	6.04%
Std Scenario with Alternatives -- Excess above Surrender Value						
<u>Non-Integrated Calculation*</u>						
6 No Aggregation	\$7.9	0.88%	\$20.2	2.70%	\$44.3	7.39%
7 Full Aggregation	\$1.1	0.12%	\$2.9	0.39%	\$32.2	5.38%
8 Limited Aggregation	\$4.1	0.45%	\$10.7	1.43%	\$32.2	5.38%
<u>Integrated Calculation</u>						
9 No Aggregation	\$7.5	0.84%	\$20.9	2.79%	\$46.8	7.81%
10 Full Aggregation	\$0.0	0.00%	\$5.7	0.76%	\$36.1	6.03%
11 Limited Aggregation	\$3.6	0.40%	\$11.3	1.51%	\$36.1	6.03%

Description of Methods

6 This is the amount specified in Aug Specs. It is a contract-by-contract calculation where the result for each contract is the AG33 Reserve plus the PV of the largest accumulated loss.

7 This is the Fully aggregated amount using the Aug Specs. The PV of Accumulated Loss for each projection year-end is obtained by summing the result at that projection year-end over all cells; the largest loss is then calculated using those summed results for each projection year-end. The sum of the AG33 results is added to this PV of largest accumulated loss

8 This is the limited aggregation approach. It is similar to Full aggregation EXCEPT that any accumulated gains are zeroed out at the cell level for end of the first 5 projection years (but these gains are reflected in the results for subsequent projection years).

9 This calculation has Start Reserve = Surrender Value and working reserve = Surrender Value. Assumptions are same as Std Scenario EXCEPT that allowed revenue is product charges less 0.25% during the Surrender Charge period and 0.50% after Surrender Charge period.

10 This is the Fully aggregated amount; same approach as with SS Full Aggregation (line 7).

11 This is the limited aggregation approach; same approach as line 8

* Non-Integrated Calculations use the AG33 Reserve rather than the Surrender Value. AG33 ignores partial withdrawal paths and always uses A2000 with Type A Val Interest Rate for the calendar year of issue. Results may differ from earlier work due to the use of an annual time step in model created to model and investigate alternatives to Standard Scenario.

Attachment 2 -- Results By Plan Type for Non-Integrated and Integrated Approaches

Plan Types	Account Value	Surrender Value	Basic Adj. Reserve
Return of Premium	260.800	254.692	255.325
Annual Ratchet (MAV)	289.590	279.086	279.772
Combo / High	138.150	132.019	132.369
5% Package	60.390	59.197	59.281
TOTAL	748.930	724.993	726.747

Basic Adjusted Reserve	726.747
Surrender Value	724.993
\$ in Excess of Surrender Value	1.754
as % Acct. Value	0.23%

Plan Types	Non-Integrated Approach			Integrated Approach			(7) = (4) - (1) Differ in Std. Scen.
	(1) Std. Scenario Reserve	(2) \$ above SV	(3) As % of AV	(4) Std. Scenario Reserve	(5) \$ above SV	(6) As % of AV	
Return of Premium	256.670	1.979	0.76%	257.047	2.355	0.90%	0.377
Annual Ratchet (MAV)	282.896	3.811	1.32%	283.225	4.139	1.43%	0.329
Combo / High	137.281	5.262	3.81%	137.179	5.160	3.74%	-0.102
5% Package	68.336	9.140	15.13%	68.435	9.239	15.30%	0.099
TOTAL	745.184	20.191	2.70%	745.887	20.893	2.79%	0.703

Notes:

Amounts are in millions

Values shown in March Report

Values shown assume no shock to initial account value.

Combo / High is the greater of an Annual Ratchet and a 5% Roll-up (GMDB only)

5% Package is a combination of a 5% Roll-up GMDB and a 5% Roll-up GMIB

Attachment 3 -- Unit Results: ROP GMDB with ROP GMWB

Duration\ITM	Additional Reserve (above CSV, as % of AV)						Additional Asset Require. (above CSV, as % of AV)					
	-20%	-10%	0%	10%	20%	40%	-20%	-10%	0%	10%	20%	40%
Income Buyers take the max allowed withdrawal from issue												
Modeled Results												
0			2.79%						7.68%			
3.5	0.66%	1.22%	2.87%	5.93%	11.35%	25.00%	2.14%	3.64%	7.58%	12.08%	17.06%	26.98%
6.5	0.25%	0.80%	2.32%	5.72%	11.73%	27.14%	0.70%	2.26%	5.86%	10.81%	16.37%	27.35%
9.5	0.33%	1.24%	4.04%	9.77%	17.54%	33.75%	0.88%	3.34%	8.18%	13.49%	19.01%	30.13%
Standard Scenario Results												
0			0.00%						2.77%			
3.5	0.14%	0.27%	0.40%	0.73%	7.48%	21.00%	0.14%	0.27%	4.87%	9.64%	14.51%	24.48%
6.5	0.00%	0.06%	0.16%	3.78%	11.54%	26.90%	0.00%	0.86%	6.28%	11.61%	16.97%	27.84%
9.5	0.00%	0.00%	0.47%	8.63%	17.16%	34.05%	0.00%	2.57%	8.23%	13.91%	19.76%	31.10%
Investment Guarantee Buyers start taking the maximum once ITM reaches 15% (assumed to be 1.5 years before val date)												
Modeled Results												
3.5	0.64%	1.11%	2.26%	4.67%	8.80%	21.11%	2.16%	3.50%	6.46%	10.65%	15.37%	24.86%
6.5	0.53%	0.72%	1.21%	2.69%	5.60%	16.65%	1.80%	2.37%	3.83%	7.26%	11.87%	21.81%
9.5	0.61%	0.80%	1.30%	2.75%	5.51%	15.87%	2.13%	2.71%	4.26%	7.75%	12.09%	21.19%
Standard Scenario Results												
3.5	0.12%	0.24%	0.37%	0.50%	4.77%	17.50%	0.12%	0.24%	3.66%	8.24%	12.88%	22.43%
6.5	0.00%	0.04%	0.14%	0.24%	3.60%	16.69%	0.00%	0.04%	2.89%	7.64%	12.40%	22.21%
9.5	0.00%	0.00%	0.00%	0.00%	3.04%	15.98%	0.00%	0.00%	2.58%	7.23%	11.97%	21.62%

Note: Male Attained Age 65 Std Scenario based on August specs; includes effect of using Basic Adjusted Reserve
 Modeled results (but not Standard Scenario) would differ if modeled different withdrawal behavior

Attachment 4 -- Sensitivity Tests on Unit Results: ROP GMDB with ROP GMWB

Same starting point but different future withdrawal activity

Duration\ITM	Additional Reserve (above CSV, as % of AV)						Additional Asset Require. (above CSV, as % of AV)					
	-20%	-10%	0%	10%	20%	40%	-20%	-10%	0%	10%	20%	40%
Income Buyers take <u>future withdrawals equal to 50%</u> of the max allowed withdrawal												
Modeled Results												
0			0.88%						2.83%			
3.5	0.14%	0.33%	0.83%	1.82%	3.63%	10.41%	0.49%	1.13%	2.74%	5.66%	9.58%	17.93%
6.5	0.12%	0.32%	0.82%	1.98%	4.21%	13.20%	0.40%	1.03%	2.67%	6.04%	10.36%	19.83%
9.5	0.27%	0.80%	2.13%	4.93%	9.82%	23.36%	0.81%	2.37%	6.00%	10.61%	15.51%	25.53%
Standard Scenario Results												
0			0.00%						2.77%			
3.5	0.14%	0.27%	0.40%	0.73%	7.48%	21.00%	0.14%	0.27%	4.87%	9.64%	14.51%	24.48%
6.5	0.00%	0.06%	0.16%	3.78%	11.54%	26.90%	0.00%	0.86%	6.28%	11.61%	16.97%	27.84%
9.5	0.00%	0.00%	0.47%	8.63%	17.16%	34.05%	0.00%	2.57%	8.23%	13.91%	19.76%	31.10%
Investment Guarantee Buyers take <u>future withdrawals equal to 50%</u> of the max allowed withdrawal												
Modeled Results												
3.5	0.12%	0.25%	0.59%	1.29%	2.61%	7.83%	0.44%	0.92%	2.01%	4.21%	7.51%	15.17%
6.5	0.08%	0.14%	0.27%	0.64%	1.37%	4.71%	0.33%	0.53%	1.05%	2.34%	4.81%	12.16%
9.5	0.08%	0.14%	0.27%	0.61%	1.27%	4.17%	0.36%	0.58%	1.11%	2.38%	4.68%	11.63%
Standard Scenario Results												
3.5	0.12%	0.24%	0.37%	0.50%	4.77%	17.50%	0.12%	0.24%	3.66%	8.24%	12.88%	22.43%
6.5	0.00%	0.04%	0.14%	0.24%	3.60%	16.69%	0.00%	0.04%	2.89%	7.64%	12.40%	22.21%
9.5	0.00%	0.00%	0.00%	0.00%	3.04%	15.98%	0.00%	0.00%	2.58%	7.23%	11.97%	21.62%

Note: Male Attained Age 65 Std Scenario based on August specs; includes effect of using Basic Adjusted Reserve
Past Withdrawal Activity is the same as Attachment 3 (full amount taken for period indicated)

Attachment 5: Modeling Specifications

Standard Product:

Basic Annuity Charge (M&E): 1.15% (unless indicated otherwise)

Annual Fee: None

Surrender Charge is 7% of premium in first contribution year, down by 1% per year, with a Free Withdrawal Amount equal to 10% of Account Value (non-cumulative).

Basic Death Benefit: waiver of surrender charges

Max. Annuitization Age: All policies terminate at age 95

Optional Guaranteed Minimum Death Benefits:

Return of Premium: charge is 0.05% of account value

5% Roll-up: Premium accumulated continuously at 5% interest; roll-up frozen at age 80 or 250% of premium, if earlier; charge is 0.20% of account value

Max Annual Value (Annual Ratchet): frozen at age 80; charge is 0.15% of account value

High or Combo: greater of 5% Roll-up or Max Anniv. Value; charge is 0.25% of account value

Optional Guaranteed Minimum Income Benefit (GMIB):

Waiting Period: later of attained age 60 or 7 years after issue

Restrictions: can be elected only on contract anniversary; cannot be elected after age 85

Guaranteed Annuity Option: 15 year annuity certain with interest at 3%

Cost of Annuitization: is the excess of the current cost of guaranteed income (using 7 Year Treasury for scenario plus 0.35%) over the Account Value; never negative.

5% Roll-up GMIB: Premium accumulated continuously at 5% interest; roll-up frozen at age 80 or 250% of premium, if earlier;

Charge is 0.35% of benefit base

Optional Guaranteed Minimum Withdrawal Benefit (GMWB):

7% per year of Premium received in first contract year (unless benefit is reset) is allowed to be withdrawn each year until all eligible premium has been withdrawn.

Available for issues ages through 80

Charge is 0.50% of account value

Definitions used:

- Guaranteed Withdrawal Base (GWB): used to determine Maximum Withdrawal. Initially, this is the premium received in the first year.
- Maximum Withdrawal Amount (MWA): maximum withdrawal allowed in a contract year without a pro-rata adjustment. This equals 7% of the Guaranteed Withdrawal Base.
- Withdrawal Account (WDA): used to track the aggregate amount left to be distributed under the GMWB. When this account becomes 0, the benefit ceases.

Impact of Withdrawals:

- If amount withdrawn in a year is no more than MWA, the Withdrawal Account (WDA) is reduced by the amount of the withdrawal.
- If amount withdrawn in a year exceeds the MWA, the Withdrawal Account (WDA) and the Guaranteed Withdrawal Base (GWB) are adjusted on a pro-rata basis for the excess withdrawal. The adjustment to the GWB changes the amount of future Maximum Withdrawal Amount (MWA).

Reset:

- Allowed on / after 5 years from last reset provided that the Account Value > Maximum Withdrawal Amount (MWA)
- GWB and WDA are reset to the Account Value and MWA is re-determined.
- Note: Modeling assumes that a reset is elected whenever it results in a larger MWA.

Impact on Other Features:

- Death Benefit equals the greater of the GMDB Amount and the Account Value. However, if the Account Value is zero, the death benefit is the present value of future guaranteed withdrawal amounts.
- Withdrawals not in excess of the MWA reduce the GMDB on a \$ for \$ basis while excess withdrawals reduce the GMDB on a pro-rata basis.
- On the last possible Annuity Date, the customer is paid the present value of remaining guaranteed withdrawals.
- No Surrender Charges are levied on withdrawals up to the MWA. Withdrawals up to the MWA reduce the premium amount on which the surrender charges are based.

Experience Assumptions:

Mortality: 65% of 1994 MGDB Table (ALB)

Base Lapse Rates:

Policy Yr.	1	2	3	4	5	6	7	8	9	10+
Lapses	1.5%	4%	4%	4%	6%	8%	10%	30%	20%	10%

Measure of ITM: uses the ratio of Guar. Value / Market Value (Comment: Ratio = 1+ ITM%)

- For GMDB, Guar. Value is the GMDB Amount; Market Value is AV

- For GMIB, Guar. Value is the amount of income determined by the Benefit Base and the use of associated guaranteed purchase rates. Market Value is the amount of income using the AV and the better of guaranteed or current purchase rates.
- For GMWB, Guar. Value is Withdrawal Account (WDA); Market Value is AV

Dynamic Lapse Multiplier (used with GMDB and any GMIB):

The actual lapse rate is the product of the base lapse rate and the dynamic lapse multiplier. The dynamic lapse adjustment depends on the ratio of Guaranteed Value to Market Value (GV / MV) and is calculated separately for the GMDB and any GMIB. If both benefits are on the contract, then the large ratio is used. The dynamic adjustment has a value of 1 when the ratio is 1.1 or less and grades linearly to a value of 50% when the ratio of GV / MV is 1.5.

Lapse Rate for contracts with GMWB:

If the GMWB ratio (GV / MV) is less than or equal to 1.1, then the lapse rates are the same as if the contract did not have a GMWB. If the GMWB ratio is greater than 1.1, the lapse rate is determined through the following process:

1. Calculate lapse rates as the product of the base lapse rate and the dynamic lapse multiplier. This represents the lapse rates associated with a GMWB ratio of 1.1.
2. A lapse rate of 3.00% represents the lapse rates associated with a GMWB ratio of 1.5 or higher.
3. If the GMWB ratio is between 1.1 and 1.5, obtain lapse rates by linear interpolation using the results of steps 1 and 2.
4. The actual lapse rates are the lower of those from step 1 or step 3 (step 2 if the ratio is over 1.5).
5. When the AV = 0 and the WDA > 0, there are no lapses.

Partial Withdrawals: Ignored except when GMWB rider exists

GMIB Utilization: This depends on attained age and the ratio GV / MV, with a special adjustments on the first and last anniversaries on which the customer is eligible to elect the benefit. The maximum utilization rate is 10% at age 60 through 65, grading linearly to 20% at age 70 and remaining at 20% through age 79. Thereafter, it grades linearly down to 10% at age 84 and remaining level thereafter. On the first eligibility date the cap is never less than 15% and equals 20% on the last eligibility date.

The utilization rate is assumed to be 0% when the ratio of GV / MV is less than 1 and equal to the base annuitization rate of 5% when the ratio is between 1 and 1.1. For higher values of the ratio, the utilization rate is 5% plus a dynamic factor. The dynamic factor adds 2% to the utilization rate for each 10% that the benefit goes deeper "in the money". For example, when the GV/ MV ratio is 1.8, the utilization rate is (before applying any cap) is 19%, consisting of a 5% base level plus 14% from the dynamic factor.

GMWB Utilization:

Some GMWB purchasers are motivated by a steady source of income while others are using the GMWB as an investment guarantee. This latter group will have various ITM trigger points at which they will commence withdrawals. The following table shows the percent in each group along with the corresponding trigger points:

Type of GMWB Buyer	ITM Trigger Point	Percent of Buyers
Income	0%	20%
Investment Guarantee	15%	20%
	25%	25%
	35%	35%

The withdrawals are assumed to occur pro-rata during the year, occurring at the end of each time step interval. In each category, the annual withdrawal is equal to Maximum Withdrawal Amount and, once the trigger has been reached, the customer is assumed to continue the withdrawals regardless of subsequent ITM ratios. (Also, see note on sensitivity tests for unit results.)

Packages Modeled:

1. The 5% Package consists of the 5% Rollup GMDB coupled with the 5% Rollup GMIB.
2. The ROP Package consists of the Return of Premium GMDB with the GMWB. For withdrawals up to the amount of the MWA, the GMDB is assumed to be reduced on a dollar-for-dollar basis.

Investment Allocation:

100% US Diversified Equity with a mutual fund expense ratio of 1.00%. Revenue sharing is 0.25%.

Expenses: \$85 per policy with inflation of 3% beginning in the second projection year plus 0.05% of account value.

Other Financial Assumptions:

Statutory reserve is assumed to be Cash Surrender Value.

Discount Rate for PV of Worst Surplus: 5.77% before-tax or 3.75% after-tax.

Federal Income Tax: 35%

Cell Characteristics: All male; attained age and duration depends on cell. Average size (depends on cell) is approximately \$50,000. Contracts assume a single premium payment. (See note below on comparison of unit factors between modeling and Standard Scenario.)

Scenarios: 1,000 scenarios were selected using the picking tool developed by the C3P2 Working Group.

The corresponding 7 Year US Treasury Rate to each scenario / duration was used in calculating the Cost of Annuitization.

The present value of any remaining guaranteed withdrawals is charged as a benefit expense at the last duration and also is the GMDB after the AV reaches 0. In the modeling, the present value uses the corresponding 7 Year US Treasury Rate to each scenario / duration.

Notes on Unit Factor Comparison

- The comparison of Modeled vs. Standard Scenario uses an attained age of 65 and assumes a single premium of \$100,000.
- For this comparison, the Standard Scenario amount equals the Basic Adjusted Reserve and the GPV component. The GPV component uses the August 2004 specs. The commuted value of remaining withdrawal payments uses the DR.
- Customers with the Investment Guarantee profile are assumed to have reached the trigger point 1.5 years before the valuation date.
- As a sensitivity test, the results for both the Income Buyers and Investment Guarantee Buyers are also shown with the same starting point (that is, the same past withdrawal activity) but assuming that in the future only 50% of the maximum withdrawal amount is taken.