



AMERICAN ACADEMY *of* ACTUARIES

Report of the American Academy of Actuaries' Annuity Reserve Work Group

Presented to the National Association of Insurance Commissioners' Life and Health Actuarial Task Force

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Annuity Reserve Work Group

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On April 13, 2009, the Life and Health Actuarial Task Force of the NAIC (“LHATF”) requested that the American Academy of Actuaries examine the questions posed by Mr. Matthew Coleman in a letter to Mr. Larry J. Bruning dated March 11, 2009 and contained within Exhibit A to this report relating to the proper selection of valuation interest rate(s) applicable to Guaranteed Lifetime Income Benefits currently offered by several insurers on fixed deferred annuities. That request was referred to the Annuity Reserves Work Group (“ARWG”). It should be obvious to all that the fact that this question arose at all is evidence of the need for a principle-based approach to the valuation of fixed annuities since the treatment that may be afforded to the subject benefit would be the same as that for all other benefits. That is, under a principle-based approach, the qualified actuary would simply apply the principles and guidelines to be found in a chapter tentatively identified as “VM-22” of the Valuation Manual that will contain the requirements for applying the new draft Standard Valuation Law to fixed annuities and no special attention would need to be paid by LHATF to the question which is the subject of this report. Nonetheless, since VM-22 and the new draft Standard Valuation Law are not yet effective, this report of the ARWG documents the viable interpretations of the Standard Valuation Law and the various applicable Actuarial Guidelines to this product which were developed during the meetings described above along with the ARWG’s perceived advantages and disadvantages of each.

I. Description of a Guaranteed Lifetime Income Benefit (“GLIB”)

A GLIB is a guarantee to the contract owner of a fixed deferred annuity, whether traditional or indexed, that he or she can have a defined income for life in an amount defined by formula while retaining traditional rights to the underlying deferred annuity. The intent is to provide income benefits while overcoming the most familiar reason not to annuitize – the loss of control over the principal amount.

There may or may not be an explicit charge to the Accumulation Value for the benefit. The benefit may be added by optional rider (probably the more common method) or may be built-in to the base annuity contract.

Requirements for accessing the income benefit may include a minimum period for the annuity/rider to have been in force before election (e.g., one year), minimum and maximum ages for the annuitant (e.g., 60 to 90), and premium restrictions prior to election for flexible-premium annuities (e.g., no premiums other than the initial premium or premiums paid via salary reduction having been paid in the five years prior to election).

The amount of the income benefit is typically defined to be a percentage times the greater of the contract’s Accumulation Value or a shadow fund.

- The shadow fund, which is not used for any purpose other than definition of the income benefit, typically is guaranteed to accumulate at a rate higher than the rate currently credited to the Accumulation Value (e.g., 7% or 8%, either compound or simple) for a defined period (e.g., 20 years). A bonus feature may apply to the shadow fund.
- The percentage may be a scalar (e.g., 5%) or may vary by attained age (e.g., 5% at age 60, increasing by 0.1% per year of attained age). A separate scale may be available for joint income but is similarly defined (e.g., a scalar or a linear vector but not rates derived directly from life annuities).

Income benefits are deducted from the annuity’s Accumulation Value. Once elected, the contract owner may have rights to stop and restart the income benefit and may also request full or partial surrender of the annuity, though doing so will negatively impact or eliminate subsequent guaranteed income benefits. For instance, it is common for such an “excess withdrawal” to decrease future guaranteed income benefits in the same proportion as it decreases the existing Accumulation Value.

The annuity's death benefit (typically the Accumulation Value) remains in force and does not reach zero until the Accumulation Value has been exhausted. Keeping the death benefit in force simplifies nonforfeiture compliance and reduces the opportunity for mortality antiselection. Indeed, the GLIB can be seen not to provide any additional benefit until exhaustion of the annuity's Accumulation Value. If the Accumulation Value becomes zero, the guaranteed income benefit in force at that time will continue to be paid during the life (lives) of the annuitant(s).

II. Products with Somewhat Similar Features

In our discussions we have noted that there are some products for which the valuation interest rates for payments are well established and these products have some features which are similar to those of the GLIB:

- An n-year Certain and Life annuity provides payments for life and if death occurs during the guaranteed period, the commuted value of the remaining guaranteed payments may be available on a lump sum basis to the beneficiary. The payment stream is identical to that of a GLIB for the same periodic payment, but the traditional n-year Certain and Life does not provide any withdrawal features. This product design is typically afforded a Plan Type A valuation rate.

In recent years, there have been payout annuities similar to an n-year Certain and Life annuity sold by some insurers that do provide for withdrawals after payments begin of a portion of the “value” with a reduction in the remaining payment amounts. They sometimes provide for a market value adjustment. We are not aware that the proper valuation interest rate is universally established, however.

- Two-tiered annuities, which have two accumulation values (an upper tier and a lower tier), have some features that are similar to a GLIB especially if the GLIB incorporates a shadow fund used to determine the amount of the periodic withdrawals. In other words, the shadow fund is somewhat similar to the upper tier of a two-tiered annuity which provides for conversion to a payout annuity and the regular Accumulation Value of the GLIB contract provides for the other benefits such as partial withdrawals, death benefits and cash surrenders just like the lower tier. However, the GLIB provides for withdrawal at all times when the Accumulation Value is greater than zero and we do not know of any two-tiered annuities that provide for withdrawals from the upper tier.

Valuation of two-tiered annuities was one of the principal reasons for the creation of Actuarial Guideline 33 (“AG 33”). It clarified that the annuitization benefits should be valued using a Plan Type A valuation interest rate. However while the lack of complete similarity between a two-tiered annuity and a deferred annuity with a GLIB benefit does not automatically mean that a Plan Type A rate should be applied to valuation of the payout annuity resulting from election of the GLIB option, there is a feature of the two-tiered annuity that is worth noting. That is, AG 33 clearly established that one determines the correct valuation interest rate from the benefits included in the Integrated Benefit Streams on a “stream specific” basis. In other words, one simply examines the benefits contained within an Integrated Benefit Stream and determines the valuation rate for each one without regard to whatever other options the contract owner may have or to the other benefits making up the stream.

III. Analysis of Applicable Law and Guidelines.

The ARWG recognizes that valuation of fixed deferred annuities containing a GLIB falls under the Standard Valuation Law. Hence, it looked to the Actuarial Guidelines for guidance regarding the proper selection of valuation interest rate and found that AG 33 would likely provide the proper guidance for this investigation.

Rationale Within the 1980 Amendments to the Standard Valuation Law

During our discussions we attempted to use the apparent rationale in the 1980 Amendments to the Standard Valuation Law to analyze the connection between various benefit types (used herein with the same meaning as in section 4 of the text portion of AG 33¹) covered by AG 33 and the valuation interest rates prescribed by it and the SVL.

Historically, it seems clear that that the 1980 Amendments to the SVL were shaped by concerns about investment and reinvestment risk, and that the intent of the law was to allow use of higher valuation rates for contracts with less risk of this type by associating different dynamic valuation interest rates with the different plan types.

This understanding is derived from the following quotes from the indicated pages of a report on the 1980 Amendments² which is attached to this report as Exhibit C. This report, which was extracted from the Proceedings of the National Association of Insurance Commissioners, contains substantially similar wording to what was actually adopted as the 1980 Amendments and though not identical, we believe it nonetheless indicates the thinking that went into the development of the 1980 Amendments.

- “The dynamic interest rate proposal involves statutory interest rates determined as weighted averages of a basic rate of 3% and a reference interest rate representative of current new money interest rates.” (Exhibit C, page 1, first paragraph of the proposal)
- “The proposed weighting factors were determined after extensive analyses of cash flow patterns for the different product groups. Consideration was given to the need to invest and reinvest funds, and a variety of future investment scenarios were assumed.” (Exhibit C, page2, “Weighting Factors,” paragraph 1)

¹ AG 33 Text Item 4: “Guarantee duration and Plan Type are based upon the specific characteristics of each individual benefit type that comprise the integrated benefit stream....”

² NAIC Proceedings, 1980, Vol. 1, pages 633 to 666

- “The weighting factor recommended for each product group or subdivision thereof is based on the lower of the factors which would result from either the decreasing or increasing assumption as to future interest rates.” (Exhibit C, page 2, “Weighting Factors,” paragraph 2)
- “Relative to a given set of investment assumptions, a valuation interest rate can be judged adequate if (A) exceeds (B)” where:

“A = projected interest rate on reserve assets (according to specified investment assumptions applied to projected cash flows generated under specified product assumptions)”

“B = projected interest required on reserve liabilities (at the valuation interest rate, or rates, being tested).”

(Exhibit C, Appendix 2, Page 17, order adjusted for clarity)

Plan Types Under AG 33

Similarly, AG 33 can be understood as building on CARVM as defined in the SVL by clarifying the concept that one single contract could be associated with multiple Plan Types (and hence valuation rates). This was accomplished by noting that a contract can give rise to multiple integrated benefit streams and then assigning a Plan Type to each benefit type within each integrated benefit stream. Different valuation rates could then apply to different benefit types within a given stream, based on the Plan Type for each benefit type.

Section 7 of the text portion of AG 33 states that “This Actuarial Guideline requires that the actuary consider, not necessarily test, all potential integrated benefit streams to determine to what extent each contract owner option has a material impact on the reserve.” Many of those streams will involve this benefit if it is attached to a contract. Valuation under AG 33 calls for a potentially separate valuation interest rate for each benefit type of an Integrated Benefit Stream. During our discussions, we went a bit further than separating an Integrated Benefit Stream into categories of benefit payments and considered that it really calls for each cash flow (i.e., benefit payment) from the insurer to have a valuation interest rate associated with it. This is just a natural extension of the way that some actuaries have considered AG 33 to apply anyway inasmuch as once we have determined the valuation rate applicable to a benefit type, one only needs to “assign it” to the cash flows coming from that benefit.

According to this analysis, AG 33 “assigns” valuation rates according to the five parameters recited therein – three that apply at the contract level and two that apply at the benefit level – Guarantee Duration and Plan Type. The question then at hand is what Plan Type(s) apply to the various benefits available under a deferred fixed annuity with a GLIB feature, and that is the subject of our deliberations and this report.

Section 4 of the text portion of AG 33 delineates the determination of Plan Type and Guarantee Duration for certain classes of benefit types which we summarize below (these classes are enumerated “A,” “B,” and “C” in AG 33, but we present the descriptions with numbers to prevent confusion with Plan Type).

1. Elective benefits (the text does not use this term although it is clearly appropriate) involving cash surrender benefits and partial withdrawals are specified to be assigned to any of Plan Types A, B, or C, with a Guarantee Duration equal to the number of years interest crediting is guaranteed in excess of the so-called long life rate. The selection of Plan Type “should be based upon the withdrawal characteristics of the benefit as stated in the contract.”
2. Considering the second class of elective benefits (again, the text does not use this term), AG 33 specifies that “for portions of the integrated benefit stream attributable to full and partial annuitization benefits ... if the underlying assumption is that the contract owner may withdraw funds only as an immediate life annuity or as installments over 5 years or more, this will generally result in a Plan Type A....”

3. For non-elective benefits within an Integrated Benefit Stream, “Plan Type A should generally be used.”

As a result of this analysis and the analysis described earlier in this section, we believe that:

- In selecting the Plan Type to apply to each benefit type of a particular Integrated Benefit Stream, the ARWG believes that one should look to the characteristics of the benefit type and not to any options available to the contract owner *outside the terms of that benefit type*. Thus, while a contract may provide for a partial withdrawal capability, unless an annuitization option that has been assumed to have been selected by the contract owner within an Integrated Benefit Stream that also contains its own withdrawal capability, then one should not consider the presence of a withdrawal capability that is outside the annuitization option in determining the Plan Type for the annuitization option. In other words, one should “put blinders on” and not allow the other contract provisions to obscure the choice of Plan Type for each benefit type within a particular Integrated Benefit Stream.

For example, consider a deferred annuity (without the GLIB benefit) that has cash values and an annuitization option that also offers its own separate cash surrender option. For valuation of a contract having these benefits, the ARWG believes that one would likely consider an Integrated Benefit Stream that assumes no cash surrender during the first “n” years following the valuation date with the election at the end of the nth year of the annuitization option having its own cash surrender value and that this (second) cash surrender option is elected at year n+7. There are two cash surrender options to consider. The first is the unelected cash surrender option during the first n years following valuation and the second is the option to cash surrender the annuitization and that is assumed to have been elected 7 years after the annuitization occurred. The key point to consider is that the option to cash surrender during the first n years after valuation should not be considered in determining the Plan Type (or Guarantee Duration) of the benefit type consisting of the annuitization and subsequent surrender of it. Rather, the “withdrawal characteristics” of the annuitization are unaffected by the withdrawal characteristics of another benefit type (cash surrender during the n year deferral period).

Another example is an Integrated Benefit Stream containing a stream of five or more partial withdrawals of equal amount (whether “free” or not) from a deferred annuity. Following the reasoning in the previous paragraph, some actuaries would conclude that the stream of partial withdrawals within this Integrated Benefit Stream would qualify for a Plan Type C valuation interest rate (likely Plan Type B if a market value adjustment applies) because the partial withdrawal election option essentially includes an option to make additional withdrawals or a complete surrender at any time. In other words, looking solely at the partial withdrawal option, one must conclude that it contains additional withdrawal features. As such, these actuaries would conclude that even though it has repetitive equal amounts within the Integrated Benefit Stream, it still does not qualify for consideration of a Plan Type A valuation rate as an annuitization since the contract owner is eligible to make additional withdrawals or a cash surrender during this stream of partial withdrawals.

- It is clear that the crux of the issues surrounding the central question to which this report is dedicated is whether the payment stream(s) resulting from a GLIB constitute an annuitization and whether the presence of the GLIB affects the Plan Type and Guarantee Duration of other benefit types. In addition, do the terms of that annuitization provide withdrawal benefits? An interpretation of Section 4 of AG 33 might be that the process of deciding Plan Type (and Guarantee Duration) for a benefit type within an Integrated Benefit Stream consists of the following:
 - i. Decide if the benefit type is non-elective or elective. If non-elective, use the requirements of 4(C) of AG 33.
 - ii. If the benefit type is elective, then under 4(A) decide if it is “attributable to full surrender and partial withdrawal benefits”. If so, one uses the “withdrawal characteristics of the benefit, as stated in the contract” to select Plan Type A, B or C.

- iii. If the benefit type consists of full or partial annuitization benefits, then the guidance provided under 4(B) states that “if the underlying assumption is that the contract owner may withdraw funds only as an immediate life annuity or as installments over 5 years or more, this will generally result in a Plan Type A.” One must question the use of the word “assumption” here. Does it refer to the act of assuming, when constructing an Integrated Benefit Stream, that is, that the contract owner is going to “withdraw” funds from the contract in the form of a series of annuity payments? Or does it refer to assuming that, once annuitization has been elected, that the payments are made as a life annuity or in installments of 5 years or more? If the latter, this would lend credence to the assertion that a stream of level payments from a GLIB lasting 5 years or more could qualify for Plan Type A. However, it seems more likely that the wording of 4(B) cited above refers to assuming that funds are withdrawn from the contract by annuitizing the Accumulation Value (upper tier in the case of a two-tiered annuity) by way of contractual provisions resulting in payments lasting at least 5 years or extending to all of life.
- In addition, in analyzing the characteristics of a benefit type within an Integrated Benefit Stream for purpose of selecting the proper Plan Type, one should assume that the insurer will make investments consistent with the investment and reinvestment risk for each benefit type of that Integrated Benefit Stream – again ignoring other options available to the contract owner or other Integrated Benefit Streams.

IV. Potential Interpretations Considered by the ARWG and Preliminary Analysis

During our deliberations, we identified the seven potential interpretations of AG 33 that are described in this section. After this, we decided to eliminate the interpretations we felt could not be supported under AG 33. Sections 3 and 4 of AG 33, and section 4B in particular, lend support to considering a different valuation rate based on the characteristic of each benefit payment. This seemed to eliminate Interpretation 5. Furthermore, we could not find any specific support within AG 33 for the valuation rate arrangement in Interpretation 6 or the graduated rates in Interpretation 7. Thus, we eliminated Interpretations 5, 6, and 7 from further consideration.

In the following descriptions, all references to “Plan Type C” should be understood to mean “... or Plan Type B if an MVA formula is applicable”.

Interpretation 1. Plan Type A would apply to all payments for the GLIB Integrated Benefit Stream that runs past the point where the Accumulation Value goes to zero and is thus a lifetime annuity. All payments in all other Integrated Benefit Streams involving the GLIB are valued using a Plan Type C rate. For example, if the contract owner is assumed to elect the GLIB option at the end of the n th contract year and 3 years later cash surrenders the contract, then all cash flows involving the GLIB (i.e., three years of GLIB withdrawals) have a Plan Type C rate as does the cash surrender value paid at the end of year $n+3$. We believe this is the approach suggested by Matthew Coleman.

Interpretation 2. Plan Type C would apply to all GLIB benefit payments and to all discounting of them when there are values remaining in the annuity during the valuation projection, and Plan Type A would apply for discounting of all GLIB benefit payments during the period when there are no values remaining in the annuity. In other words, in an Integrated Benefit Stream involving the GLIB, the GLIB withdrawals made prior to the Accumulation Value becoming zero are discounted back to the valuation date at a Plan Type C rate. GLIB withdrawals thereafter would be discounted back to the time when the Accumulation Value becomes zero at the Plan Type A rate and then discounted back to the valuation date at the Plan Type C rate. (Note that this arrangement does not really “fit” with the characterization made earlier where each cash flow in an Integrated Benefit Stream has its own valuation rate, since the payments made after the Accumulation Value goes to zero would have two valuation rates.)

Interpretation 3. Plan Type A would apply to all GLIB benefit payments, even if the Integrated Benefit Stream terminates with a full (or partial) cash withdrawal, with Plan Type C applying to the cash withdrawal portion only. At first blush, this seems to not recognize the withdrawal characteristics of the GLIB. However, when one takes into account that the total number of Integrated Benefit Streams considered under AG 33 would also include an Integrated Benefit Stream that assumes a full

surrender one year after the GLIB election, and another that assumes a full surrender two years after election, and so forth, one can see that the GLIB withdrawal capability is indeed being reflected. The amount of the GLIB withdrawal benefits for the majority of attained ages at benefit election and current designs do not provide for exhaustion of the Accumulation Value in fewer than 5 years, which would lead to an assignment of Plan Type A for the restricted withdrawals that qualify as GLIB payments.

Interpretation 4. Under this approach, one considers that the GLIB benefit can really be bifurcated into two benefit types. One is a temporary life annuity for “n” years, where n is the number of years before the AV goes to zero, which also has a cash surrender value equal to the Accumulation Value less any remaining surrender charge (which is very likely to be zero by this time). The other is a true n-year deferred life annuity. The payments of the first benefit type would be valued at a Plan Type C rate because it has withdrawal benefits. Payments of the second benefit type are valued at a Plan Type A rate from the valuation date onward (not just the years after the nth year as in Interpretation 2). This is consistent with an investment philosophy that calls for the insurer to buy two types of assets backing up a total reserve made up of the two benefit types – one that recognizes the withdrawal characteristics for the temporary life annuity with cash values and the second that has (perhaps) laddered maturities that anticipates the life-contingent payment stream that starts n years hence.

Interpretation 5. This would apply a Plan Type C rate to all GLIB benefit payments regardless of whether they are made before or after the time when the Accumulation Value goes to zero.

Interpretation 6. This interpretation would apply Plan Type C rates for the benefit payments made during a defined period that is less than the time required to exhaust the Accumulation Value and Plan Type A rates for benefit payments afterwards. For example, Plan Type C rates would apply to GLIB payments made during the first half, say, of the period from benefit inception to Accumulation Value depletion and Plan Type A for payments made thereafter.

Interpretation 7. Finally, Interpretation 7 would apply a Plan Type C rate to the first GLIB benefit paid, a Plan Type A rate to benefit payments after Accumulation Value depletion, and graduated rates between Plan Types C and A would apply to durations between benefit inception and depletion of the AV.

The reader may want to refer to the charts in Exhibit B to ensure an understanding of Interpretations 1-4.

V. Advantages and Disadvantages of Interpretations 1-4

Interpretation 1.

- Advantages – Interpretation 1 does not imply a change in valuation practices for ordinary SPDA's with no GLIB attached because the Plan Type A rate is applied only to benefit streams (i.e., those involving lifetime GLIB withdrawals) that could not have occurred in an ordinary SPDA. It is consistent with established industry actuarial practice.
- Disadvantages – This interpretation draws a distinction between GLIB Integrated Benefit Streams that run for all of life and all other GLIB Integrated Benefit Streams inasmuch as the former would qualify for a Plan Type A rate while the latter qualifies for Plan Type C (or Plan Type B if there is a market value adjustment). However, that distinction doesn't seem to be present in section 4 of AG 33 inasmuch as it applies a Plan Type A rate to annuitization streams that run for five years or more.

This interpretation relies heavily on the meaning of the word “assumption” in the quote from section 4 of AG 33 that reads “if the underlying assumption is that the contract owner may withdraw funds only as an immediate life annuity or as installments over 5 years or more, this will generally result in a Plan Type A.” In other words, it relies on “assumption” taking on the meaning that it refers to:

- an assumption that a series of payments, lasting at least five years, will occur within the Integrated Benefit Stream

rather than to:

- an assumption that the sole option that the contract owner has for withdrawing funds from the Accumulation Value is the payment stream itself.

As noted earlier, the former meaning seems somewhat less likely than the latter.

Interpretation 2.

- Advantages – Any payments made prior to exhaustion of the Accumulation Value are valued consistently with a similar annuity with no GLIB attached, and Plan Type A rates apply only to payments made when there is no Accumulation Value remaining. This is consistent with the intuitive sense that the GLIB is an "add-on" to the typical SPDA and that the benefit that it provides does not generate any cashflows before the exhaustion of the Accumulation Value.
- Disadvantages – While this interpretation is somewhat similar to Interpretation 4, we could find no support within AG 33 for the provision in Interpretation 2 that suggests discounting payments made after exhaustion of the Accumulation Value at a Plan Type A rate to the exhaustion date and Plan Type C rates used to discount that value back to the valuation date. Indeed, the "Plan Types Under AG 33" discussion above seems to contradict this approach.

Interpretation 3.

- Advantages – This interpretation does not depend on whether the Accumulation Value is zero when determining the valuation rate for GLIB benefit type, and is thus less sensitive to details of product design.
- Disadvantages - This interpretation could be taken to imply that for an ordinary SPDA with an integrated benefit stream with five substantially equal partial withdrawals followed by a full surrender, the withdrawals should be valued using a Plan Type A rate and the surrender lump sum using a Plan Type C rate. In contrast, some actuaries believe that for an ordinary SPDA with an integrated benefit stream with four substantially equal partial withdrawals followed by a full surrender, the withdrawals and the surrender lump sum would both be valued using a Plan Type C rate, which would be the same as this Interpretation 3 would apply to an SPDA having a GLIB benefit.

However, the first outcome would represent a change from what some actuaries believe is the typical valuation practice, and therefore if Interpretation 3 were to be adopted, some guidance might be required to ensure that it was applied as intended, to the case in which the withdrawals, once started, could reasonably be assumed to continue.

Interpretation 3 also seems to suffer from the same reliance on the meaning of the word "assumption" in section 4 as does Interpretation 1 (see the Disadvantages for Interpretation 1).

Interpretation 4.

- Advantages – This interpretation is consistent with the valuation of an Integrated Benefit Stream under AG 33 involving a series of partial withdrawals of equal amounts followed by a full annuitization of the contract (assuming the generally accepted interpretation of AG 33 that applies Plan Type A interest rates for the annuitization portion of the Integrated Benefit Stream to discount from the valuation date throughout the annuitization period).

In addition, any payments made when the annuity has positive Accumulation Value are valued consistently with withdrawals from a similar annuity with no GLIB attached, and Plan Type A rates apply only to payments made when there is no Accumulation Value remaining. This is consistent with the intuitive sense that the GLIB is an "add-on" to the typical SPDA and that the benefit that it provides does not generate any cashflows before the exhaustion of the Accumulation Value.

- Disadvantages - No obvious problems with the interpretation.

VI. Concluding Comments

In analyzing the question to which this report is dedicated, the limitations of CARVM as a rule-based valuation method become painfully obvious within the backdrop of the NAIC's efforts to develop a principle-based approach to reserving. Under CARVM, the apparent assumption in each Integrated Benefit Stream is that the company invests for that specific benefit stream. However, under a Principle Based Valuation, the projections to be performed by the actuary will reflect the reality of the situation inasmuch as the company can only invest in a single strategy at any given time. The restrictions surrounding the approach of a rules-based methodology present conceptual problems in determining a reasonable answer to the question posed.

The ARWG stands ready to assist LHATF further in developing an answer to this question. In addition, the ARWG has developed an Excel workbook that allows for testing of certain reserve candidates (i.e., present value of an Integrated Benefit Streams) for a sample contract with a GLIB provision that result from application of some of the interpretations described in this report. Should LHATF desire receiving this type of numerical analysis, or the Excel workbook itself, the ARWG is prepared to provide it.

In the analysis that has been performed thus far, no clear "best choice" has yet emerged, although some interpretations seem more consistent with the "Plan Types Under AG 33" analysis described in Section III than do others. We await feedback and direction from LHATF and believe that a "best choice" to recommend to LHATF, along with a rationale supporting its derivation under AG 33, may be developed.

Exhibit A – Letter from Matthew Coleman to Mr. Larry J. Bruning Dated March 11, 2009

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AnnuityWorks, LLC
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March 11, 2009

Larry J. Bruning Chief Actuary Kansas Insurance Department 420 SW Ninth Street Topeka,
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Larry,

I know you are in the process of forming an opinion concerning the application of AG33 and the SVL to certain Guaranteed Lifetime Income Benefits attached to Fixed Deferred Annuities. I have attached below my position on this issue for your consideration. In light of the growing popularity of these benefits, some carriers are looking to their state regulators for guidance. As a consultant for some of these companies, I am very interested in your view.

Our understanding of AG33 is that every single possible benefit stream available under a policy must be evaluated. This can result in thousands of possible scenarios. The benefit stream(s) generating the highest present value then define the reserve required by the SVL under AG33.

Our desire is to evaluate only those integrated benefit streams (or scenarios) which are, in fact, life annuities using Type A rates. All other scenarios where, for example, GLIB withdrawals begin but are terminated by full surrender would be characterized as Type C.

Further, where there are portions of the integrated benefit stream that are elected partial withdrawals – those portions would be characterized and valued as Type C. Likewise, where other remaining portions emerge as life annuities – these streams would be valued using Type A.

We have come to this conclusion by considering the current methods of evaluating deferred annuities with annuitization options. Consider a benefit stream where a 1% partial withdrawal is elected in the 5th policy year, then the remainder of the policy is subsequently annuitized for life. Is the entire benefit stream to be valued at Type C because of the partial withdrawal?

Most GLIB's contractual provisions allow for excess withdrawals up to full surrender. These benefits must be considered as part of the entirety of the possible benefit streams used to develop reserves generated for the base policy plus GLIB.

We divide this system of benefits between those streams deriving from the base policy and those *uniquely* provided by the GLIB. The base policy provides all kinds of withdrawals, both partial and total, including systematic withdrawals that identically mimic GLIB systematics but end in full surrender. All of these base policy configurations of partial withdrawal and surrender must

be valued under Type C. In fact, were the GLIB not offered, this calculation would essentially provide the base policy's entire reserve.

However, there are some benefits that cannot be accessed except as life-contingent installments. These benefits are unique to the GLIB and, we believe, are entitled to Type A calculations under the SVL and AG33.

AG33 Section 4 contains the following language upon which we heavily rely:

4. Determination of Guarantee Duration and Plan Type

Guarantee duration and Plan Type are based upon the specific characteristics of each individual benefit type that comprise the integrated benefit stream, as follows:

- A. For portions of the integrated benefit stream attributable to full surrender and partial withdrawal benefits, ... (We use Type C here)*
- B. For portions of the integrated benefit stream attributable to full and partial annuitization benefits, ... If the underlying assumption is that the contract owner may withdraw funds only as an immediate life annuity or as installments over 5 years or more, this will generally result in a Plan Type A...*
- C. For portions of the integrated benefit stream attributable to non-elective benefits, since the underlying assumption is that no withdrawal is permitted, Plan Type A should generally be used...*

Key to our understanding of this section is the notion of “*portions*” of the integrated benefit stream. Instead of characterizing the entire benefit stream as Type A or C based on one portion of it, we believe the guidance is to treat each portion separately based on each portion’s relevant characteristics. Any on-demand partial withdrawal would be valued proportionately under Type C while the remaining life contingent portion would be valued under Type A.

We understand 4C to apply, for example, to full Accumulation Value death benefits. While it says, "the underlying assumption is that no withdrawal is permitted", this language is not understood to mean that no withdrawal is permitted within the entire benefit stream, but that no withdrawal is permitted within that portion of the integrated benefit stream uniquely attributable to death benefits.

In the same way, we read in 4B that, "the underlying assumption is that the contract owner may withdraw funds as an immediate life annuity or as installments over 5 years or more." We do not see this language as meaning that the contract must preclude the owner from taking any elective partial withdrawals in order for any benefit stream to merit Type A. If that was so, one small partial withdrawal would prevent Type A valuation of any later annuitization. Instead we see the meaning of "funds" in this context to mean those funds uniquely attributable to that portion of the integrated benefit stream that cannot be accessed except as a life annuity or installments over 5 years.

Those who have argued against this approach have suggested that because of the policyholder’s option to fully surrender and their ability to take withdrawals in excess of the prescribed GLIB benefits, all possible streams generated under the GLIB are characterized as Type C. Under that approach, the much higher benefits that can only be accessed as life annuities are forced to be valued as if they were available on demand. However, by contract, these higher benefits are strictly **unavailable** as lump sum or even via partial withdrawal under the GLIB.

The framework of interest rates described within the SVL clearly advantages those benefits that are only available as life annuities or installments exceeding 5 years. It is the clear intent of the framers of the SVL to provide, for the same present value, lower partial withdrawal benefits and higher life-contingent installments. The one-excess-withdrawal disqualification method takes away that advantage when the remainder of a particular elected benefit stream contains only life-contingent installments.

It is our desire to apply Type A rates to only those portions of the integrated benefit stream which are in fact life annuities. All other elective benefit streams will be classified as Type C.

Thanks again for your help with this important matter.

Cordially,

Matthew Coleman, FSA, MAAA

EXHIBIT B - UNDERSTANDING THE INTERPRETATIONS

Interpretation 1

Plan Type A would apply to all payments for the GLIB Integrated Benefit Stream that runs past the point where the Accumulation Value goes to zero and is thus a lifetime annuity. All payments in all other Integrated Benefit Streams involving the GLIB are valued using a Plan Type C rate. For example, if the contract owner is assumed to elect the GLIB option at the end of the nth contract year and 3 years later cash surrenders the contract, then all cash flows involving the GLIB (i.e. three years of GLIB withdrawals) have a Plan Type C rate as does the cash surrender value paid at the end of year n+3. We believe this is the approach suggested by Matthew Coleman. Type C rate. For example, if the owner is assumed to elect the GLIB option at the end of the nth policy year and 3 years later cash surrenders the contract, then all cash flows involving the GLIB (i.e. three years of GLIB withdrawals) have a Plan Type C rate as does the cash surrender value paid at the end of year n+3. We believe this is the approach suggested by Matthew Coleman.

IBS Scenario I: Level GLIB payments for life	
A) Payments prior to time s where s = policy year in the valuation projection when the AV expires	Plan Type A
B) Payments after time s	Plan Type A

IBS Scenario II: Level GLIB payments to a time < s (at least 5 years), then full cash surrender, ending the contract	
A) Level Payments	Plan Type C
B) Cash Surrender in Excess of GLIB Payment in year of surrender	Plan Type C

IBS Scenario III: Level GLIB payments to a time < s (at least 5 years), then partial cash surrender which reduces subsequent GLIB payments; reduced payments continue for life	Note: Requires Interpretation
A) Initial Level Payments	Plan Type A for Lower Level Amount; Plan Type C for Pmt in Excess
B) Partial Cash Surrender	Plan Type C
C) Subsequent Lower Level Payments prior to time s	Plan Type A
D) Subsequent Lower Level Payments after time s	Plan Type A

All references to "Plan Type C" should be understood to mean "... or Plan Type B if an MVA formula is applicable."

EXHIBIT B - UNDERSTANDING THE INTERPRETATIONS

Interpretation 2
<p>Plan Type C would apply to all GLIB benefit payments and to all discounting of them when there are values remaining in the annuity during the valuation projection, and Plan Type A would apply for discounting of all GLIB benefit payments during the period when there are no values remaining in the annuity. In other words, in an Integrated Benefit Stream involving the GLIB, the GLIB withdrawals made prior to the Accumulation Value becoming zero are discounted back to the valuation date at a Plan Type C rate. GLIB withdrawals thereafter would be discounted back to the time when the Accumulation Value becomes zero at the Plan Type A rate and then discounted back to the valuation date at the Plan Type C rate. Plan Type A would apply for discounting of payments thereafter during the period when there are no values remaining in the annuity. In other words, in an IBS Integrated Benefit Stream involving the GLIB, the GLIB withdrawals made prior to the Accumulation Value becoming zero are discounted back to the valuation date at a Plan Type C rate. GLIB withdrawals thereafter would be discounted back to the time when the Accumulation Value becomes zero at the Plan Type A rate and then discounted back to the valuation date at the Plan Type C rate.</p>

IBS Scenario I: Level GLIB payments for life	
A) Payments prior to time s where s = policy year in the valuation projection when the AV expires	Plan Type C
B) Payments after time s	Plan Type A back to $t=s$, Plan Type C from $t=s$ to time of valuation

IBS Scenario II: Level GLIB payments to a time $< s$ (at least 5 years), then full cash surrender, ending the contract	
A) Level Payments	Plan Type C
B) Cash Surrender in Excess of GLIB Payment in year of surrender	Plan Type C

IBS Scenario III: Level GLIB payments to a time $< s$ (at least 5 years), then partial cash surrender which reduces subsequent GLIB payments; reduced payments continue for life	
A) Initial Level Payments	Plan Type C
B) Partial Cash Surrender	Plan Type C
C) Subsequent Lower Level Payments prior to time s	Plan Type C
D) Subsequent Lower Level Payments after time s	Plan Type A back to $t=s$, Plan Type C from $t=s$ to time of valuation

All references to "Plan Type C" should be understood to mean "... or Plan Type B if an MVA formula is applicable."

EXHIBIT B - UNDERSTANDING THE INTERPRETATIONS

Interpretation 3

Plan Type C would apply to all GLIB benefit payments and to all discounting of them when there are values remaining in the annuity during the valuation projection, and Plan Type A would apply for discounting of all GLIB benefit payments during the period when there are no values remaining in the annuity. In other words, in an Integrated Benefit Stream involving the GLIB, the GLIB withdrawals made prior to the Accumulation Value becoming zero are discounted back to the valuation date at a Plan Type C rate. GLIB withdrawals thereafter would be discounted back to the time when the Accumulation Value becomes zero at the Plan Type A rate and then discounted back to the valuation date at the Plan Type C rate. Plan Type A would apply for discounting of payments thereafter during the period when there are no values remaining in the annuity. In other words, in an IBS Integrated Benefit Stream involving the GLIB, the GLIB withdrawals made prior to the Accumulation Value becoming zero are discounted back to the valuation date at a Plan Type C rate. GLIB withdrawals thereafter would be discounted back to the time when the Accumulation Value becomes zero at the Plan Type A rate and then discounted back to the valuation date at the Plan Type C rate.

IBS Scenario I: Level GLIB payments for life	
A) Payments prior to time s where s = policy year in the valuation projection when the AV expires	Plan Type A
B) Payments after time s	Plan Type A

IBS Scenario II: Level GLIB payments to a time $< s$ (at least 5 years), then full cash surrender, ending the contract	
A) Level Payments	Plan Type A
B) Cash Surrender in Excess of GLIB Payment in year of surrender	Plan Type C

IBS Scenario III: Level GLIB payments to a time $< s$ (at least 5 years), then partial cash surrender which reduces subsequent GLIB payments; reduced payments continue for life	
A) Initial Level Payments	Plan Type A
B) Partial Cash Surrender	Plan Type C
C) Subsequent Lower Level Payments prior to time s	Plan Type A
D) Subsequent Lower Level Payments after time s	Plan Type A

All references to "Plan Type C" should be understood to mean "... or Plan Type B if an MVA formula is applicable."

EXHIBIT B - UNDERSTANDING THE INTERPRETATIONS

Interpretation 4

Under this approach, one considers that the GLIB benefit can really be bifurcated into two benefit types. One is a temporary life annuity for "n" years, where n is the number of years before the AV goes to zero, which also has a cash surrender value equal to the Accumulation Value less any remaining surrender charge (which is very likely to be zero by this time). The other is a true n-year deferred life annuity. The payments of the first benefit type would be valued at a Plan Type C rate because it has withdrawal benefits. Payments of the second benefit type are valued at a Plan Type A rate from the valuation date onward (not just the years after the nth year as in Interpretation 2). This is consistent with an investment philosophy that calls for the insurer to buy two types of assets backing up a total reserve made up of the two benefit types – one that recognizes the withdrawal characteristics for the temporary life annuity with cash values and the second that has (perhaps) laddered maturities that anticipates the life-contingent payment stream that starts n years hence. n is the number of years before the AV goes to zero, having a cash surrender value equal to the AV less any remaining surrender charge (which is very likely to be zero by this time). The other is an n-year deferred true life annuity. The first category of payments would be valued at a Plan Type C rate because it has (presumably) book value withdrawal benefits. The second category of payments is valued at a Plan Type A rate from the valuation date onward (not just the years after the nth year as in interpretation 2). This is consistent with an investment philosophy that calls for the insurer to buy two Plan Types of assets backing up a total reserve made up of two components – one that recognizes the withdrawal characteristics for the temporary life annuity with cash values and the second that has (perhaps) laddered maturities that anticipates the life-contingent payment stream that starts n years hence.

<p>IBS Scenario I: Level GLIB payments for life</p> <p>A) Payments prior to time s where s = policy year in the valuation projection when the AV expires</p> <p>B) Payments after time s</p>	<p>Plan Type C</p> <p>Plan Type A</p>
<p>IBS Scenario II: Level GLIB payments to a time < s (at least 5 years), then full cash surrender, ending the contract</p> <p>A) Level Payments</p> <p>B) Cash Surrender in Excess of GLIB Payment in year of surrender</p>	<p>Plan Type C</p> <p>Plan Type C</p>
<p>IBS Scenario III: Level GLIB payments to a time < s (at least 5 years), then partial cash surrender which reduces subsequent GLIB payments; reduced payments continue for life</p> <p>A) Initial Level Payments</p> <p>B) Partial Cash Surrender</p> <p>C) Subsequent Lower Level Payments prior to time s</p> <p>D) Subsequent Lower Level Payments after time s</p>	<p>Plan Type C</p> <p>Plan Type C</p> <p>Plan Type C</p> <p>Plan Type A</p>

All references to "Plan Type C" should be understood to mean "... or Plan Type B if an MVA formula is applicable."

(ATTACHMENT G-7)

To: (C) Committee Technical Task Force on Valuation and Nonforfeiture Value Regulation

From: Daniel F. Case, Associate Actuary
American Council of Life Insurance
Washington, D.C. 20006

Date: November 21, 1979

Re: Proposed Amendments to Standard Valuation and Nonforfeiture Laws

Your chairman, Ted Becker, has given us permission to send the enclosed memorandum directly to you, in order that you may receive it a few days in advance of your December 1 meeting.

The memorandum sets forth proposals which the Council's Actuarial Committee has asked us to present to you as an exposure draft. We hope that you will be able to discuss these proposals at your upcoming meeting and thus begin a process by which the NAIC may adopt some much-needed changes to the Standard Laws.

As the memorandum indicates, the proposed amendments would: (1) establish a system for automatically updating the statutory valuation and nonforfeiture interest rates; (2) adopt a new mortality table for Ordinary life insurance; (3) change the excess initial expense allowance in the Standard Nonforfeiture Law for Life Insurance; and (4) make other changes in the Standard Nonforfeiture Law for Life Insurance.

DESCRIPTION OF DYNAMIC INTEREST RATE BASIS
CONTAINED IN PROPOSED AMENDMENTS TO
THE STANDARD VALUATION LAW AND
THE STANDARD NONFORFEITURE LAW FOR LIFE INSURANCE

The dynamic interest rate proposal involves statutory interest rates determined as weighted averages of a basic rate of 3% and a reference interest rate representative of current new money interest rates. The valuation interest rates may be expressed as:

$$I = .03 + W(R - .03), \text{ and}$$

the nonforfeiture interest rate for life insurance may be expressed as:

$$I = .04 + W(R - .03)$$

where I represents the statutory interest rate, W represents the weighting factor and R represents the reference interest rate. The additional 1% in the expression for the life insurance nonforfeiture rate reflects the differential between valuation and nonforfeiture interest rates present in the current model laws.

Except as noted below, the rate I applies at all durations of a policy or contract issued in a given year.

Reference Interest Rate

The reference interest rate is based on the Average of Yields on Seasoned Aa Public Utility Bonds, as published by Moody's Investors Service, Inc.

For life insurance and for deferred annuities issued at ages less than 55, the reference interest rate is equal to the lesser of the 12-month average and the 36-month average, ending on June 30, of Moody's Average of Yields on Seasoned Aa Public Utility Bonds. For other products - deferred annuities issued at ages 55 and over, immediate annuities, and guaranteed interest contracts - where financial results are more directly related to yields on current investments, the reference rate that is proposed is simply the 12-month average of the same Moody's index. (For details concerning the effective date of changes in the valuation and nonforfeiture interest rates see the section of this memorandum headed Timing of Interest Rate Changes.)

Moody's Average of Yields on Seasoned Aa Public Utility Bonds was chosen as the basis for determination of the reference interest rate because of the high correlation and the level of margins between those yields and gross yields on new investments of life insurance companies. A study of the historical gross yields on new investments of 55 life insurance companies supports this conclusion. Appendix I contains a discussion of (i) the choice of the reference rate periods, (ii) the correlation studies, and (iii) the margins in the reference rate indexes.

Weighting Factors

The proposed weighting factors were determined after extensive analyses of cash flow patterns for the different product groups. Consideration was given to the need to invest and reinvest funds, and a variety of future investment scenarios were assumed. The research also took account of expenses and Federal income tax characteristics of each of the product groups. Appendix II describes the methodology and assumptions that were used and the results of the analyses. Following is a summary description.

The analyses of cash flow patterns took into account both increasing and decreasing assumptions as to future interest rates. In a decreasing-interest-rate environment future premiums and considerations, interest on invested assets and roll-over of those assets are assumed to be invested at rates lower than the initial investments. This is partially offset by capital gains which emerge when the net cash flow becomes negative. In an increasing-interest-rate environment subsequent investments after the first are made at higher rates, but eventual negative cash flows lead to capital losses. The weighting factor recommended for each product group or subdivision thereof is based on the lower of the factors which would result from either the increasing or decreasing assumption as to future interest rates. This introduces an additional measure of conservatism in an aggregate portfolio composed of various types of products, since some products will benefit from a scenario that hurts others.

Weighting Factors for Life Insurance

The weighting factors for life insurance contained in the proposed amendments are .35 for valuation and .40 for nonforfeiture purposes. A .40 figure would be supportable for both valuation and nonforfeiture purposes, but the .35 figure is recommended to provide an added measure of conservatism. As noted above, these weighting factors are applied to the lower of the 12-month and 36-month averages of the Moody's index. This too provides a measure of conservatism. In periods of increasing interest rates the resulting statutory rates are based on the lower 36-month figure. In periods of declining interest rates, however, the lower and more current 12-month figure is used.

Weighting Factors for Deferred Annuities

The products which fall into this group vary widely in their cash flow characteristics. Contracts issued at younger ages exhibit characteristics similar to life insurance, while those issued at higher ages have more in common with immediate annuities and guaranteed interest contracts. The proposed weighting factors vary by issue age in recognition of this. They are .40 for issue ages under 45, .60 for issue ages 45 through 54, and .80 for issue ages 55 or over. Consideration was given to a subdivision based on the length of the deferral period or the number of years to maturity. While this approach was felt to have some merit, it would involve difficulties in defining the maturity date and could leave room for possible abuse.

Weighting Factor for Single Premium Immediate Annuities

A weighting factor of .85 is proposed for single premium immediate annuities.

Weighting Factors for Guaranteed Interest Contracts

The weighting factors for guaranteed interest contracts apply to all active life funds held under group annuity or individual annuity contracts, or similar funding agreements, with interest rate guarantees but without permanent annuity purchase rate guarantees. For such funds with permanent annuity purchase rate guarantees, the deferred annuity weights apply. The weighting factors proposed are as follows:

For contracts with guarantee periods of 10 years or less, 90% for contracts which provide for payment of full book value in a single sum or in periodic payments over a period of less than 5 years and 100% for other contracts;

For contracts with guarantee periods of more than 10 but less than or equal to 20 years, 95%; and

For contracts with guarantee periods of more than 20 years, 90%.

For the purposes of determining the appropriate weighting factor, the duration of the guarantee period, referred to above, is the length of time for which interest guarantees of any kind apply, except that for contracts which provide for payment of full book value in a single sum or in periodic payments over a period of less than five years, the duration of the guarantee period is the number of years until the earliest date at which full return of book value is available.

It is proposed that the weighting factors and the resulting valuation interest rates be applied to guaranteed interest contracts on a year-of-receipt basis. That is, the net increase over the prior year in the fund associated with these contracts, whether such increase is caused by new deposits or by interest credited, should be valued as a separate liability at the valuation interest rate determined for the year of the increase. At renewal of an interest guarantee, the weighting factor is determined as if the principal is paid out and returned as a consideration under new guarantees.

The stipulation that valuation is to be on a year-of-receipt basis and the absence of permanent annuity purchase rates account for the fact that the weighting factors proposed for guaranteed interest contracts exceed those for immediate annuities and deferred annuities. In a declining-interest-rate scenario, for example, the valuation interest rates for years after the first year of a guaranteed interest contract will decline.

Timing of Interest Rate Changes

For products other than life insurance the statutory valuation interest rates resulting from the reference interest rate determined as of June 30 of a particular calendar year would apply to new business of that calendar year. Specifically, the interest rates in the minimum standard for the valuation of individual annuities issued in a particular calendar year, annuities purchased under group annuity contracts in that calendar year and the net increase during that calendar year in funds held under guaranteed interest contracts would be based on the reference interest rate determined as of June 30 of that year.

For life insurance additional time is needed for administrative reasons between the date on which a required change in the interest rates becomes known and the date on which the change must be implemented. The proposed amendments provide that the statutory valuation and nonforfeiture interest rates for life insurance policies issued in a particular calendar year be determined on the basis of the reference interest rate determined as of June 30 of the immediately preceding calendar year, but in the case of the nonforfeiture interest rates companies are given additional time - up to one year - to implement a change. This proposal is consistent with the long-standing practice of permitting companies a discretionary period of time in which to comply with changes in the nonforfeiture law.

Additional Recommendations

- (1) To recognize the possible need for future changes in the mortality table or the reference interest rate index, it is recommended that the state insurance commissioners be authorized to adopt an alternative table or index if approved by the NAIC for this purpose.
- (2) To facilitate the administration of the dynamic interest concept, it is recommended that any refiling of nonforfeiture values or their methods of computation for any previously approved policy form which involves only a change in the interest rate used to compute nonforfeiture values shall not require refiling of any provision of that policy form.

Summary

A summary in tabular form of the proposed basis for determination and application of the dynamic valuation and nonforfeiture interest rates is presented below. The table shows the interest rates that would result from the proposed formula based on an assumed reference interest rate of 9%. The illustration is based on a 9% reference interest rate because it reflects the approximate level of the reference rate that the proposal would produce for life insurance for 1979. (For other products, except for deferred annuities issued at ages under 55, the reference rate for 1979 would be 9.60%.)

The interest rates have been rounded to the nearer $\frac{1}{4}\%$, and it is proposed that the interest rates contained in the minimum valuation and nonforfeiture standards be rounded in this fashion in order to avoid insignificant changes in the standards from one year to the next. In addition, it is recommended that for life insurance there be no change in the interest rates contained in the minimum valuation and nonforfeiture standards unless the change from the previous year is $\frac{1}{4}\%$ or more.

Tables A, B and C illustrate the valuation rates and the nonforfeiture interest rate for life insurance which would have applied if the proposed amendments had been in effect for the years 1960-1979. Table D shows the interest rates that result from the proposed formula for various weighting factors and for a range of reference interest rates from 3.00% to 12.00%.

SUMMARY OF RECOMMENDATION ON DYNAMIC INTEREST RATES

<u>Product Group</u>	<u>Subdivision</u>	<u>Basis of Ref. Rate as of 6/30/t</u>	<u>How Rate is Applied</u>	<u>Weighting Factor</u>		<u>Rounding Rule</u>	<u>Valuation Rate (Assuming 9% Ref. Rate)</u>	
Life Ins.	Valuation	Lower of 36-mos. & 12-mos. averages	Issues of Year t + 1	.35		Nearer 1/4% (but change only if 1/2% or more)	5.00%	
	Nonforfeiture	"	Company Option*	.40 + 1%		"	6.50	
Deferred Annuities	Issue Age:		Issues of:					
	Under 45	"	Year t	.40		Nearer 1/4%	5.50	
	45-54	"	"	.60		"	6.50	
	Over 54	12-mos. avg. only	"	.80		"	7.75	
Immediate Annuities		"	"	.85		"	8.00	
Guaranteed Interest Contracts	Guarantee Period:		Receipts of:	Market Book Payout Payout			Market Book Payout Payout	
	10 years or less	"	Year t	1.00	.90	"	9.00	8.30
	10+ to 20	"	"	.95	.95	"	8.75	8.75
	Over 20	"	"	.90	.90	"	8.50	8.50

* Applies to issues beginning on a date between 1/1/t + 1 and 1/1/t + 2, as elected by the company.

TABLE A
ILLUSTRATION OF
VALUATION AND NONFORFEITURE INTEREST RATES
FOR LIFE INSURANCE
CORRESPONDING TO ACTUAL HISTORIC REFERENCE RATES
IN EACH OF THE YEARS 1960-1979

Year	Reference Interest Rate	Valuation Interest Rate	Nonforfeiture Interest Rate
1960	4.30%	3.50%	4.50%
1961	4.41	3.50	4.50
1962	4.50	3.50	4.50
1963	4.32	3.50	4.50
1964	4.39	3.50	4.50
1965	4.39	3.50	4.50
1966	4.55	3.50	4.50
1967	4.88	3.75*	4.75*
1968	5.46	3.75*	5.00
1969	6.09	4.00	5.25*
1970	6.97	4.50	5.50
1971	7.68	4.75*	5.75*
1972	7.85	4.75*	6.00
1973	7.49	4.50	5.75*
1974	7.85	4.75*	6.00
1975	8.39	5.00	6.25*
1976	9.00	5.00	6.50
1977	8.58	5.00	6.25*
1978	8.66	5.00	6.25*
1979	8.94	5.00	6.50

The reference interest rate shown above is the lesser of the 12-month and 36-month averages of the Moody's index ending on June 30 of the year indicated. See the section of this memorandum headed Timing of Interest Rate Changes. The interest rates marked with an asterisk () would not be effective because of the proposed rule that requires a change of at least 1/2% for a change to be effective.

TABLE B
ILLUSTRATION OF
VALUATION INTEREST RATES FOR ANNUITIES
CORRESPONDING TO ACTUAL HISTORIC REFERENCE RATES
IN EACH OF THE YEARS 1960-1979

Year	Reference Rate		Deferred Annuities			Single Premium Immediate Annuities
	12-MO.	36-MO.	ISSUE AGES			
	AVG.	AVG.	0-44	45-54	55+Up	
1960	4.65%	4.30%	3.50%	3.75%	4.25%	4.50%
1961	4.41	4.45	3.50	3.75	4.25	4.25
1962	4.50	4.52	3.50	4.00	4.25	4.25
1963	4.32	4.41	3.50	3.75	4.00	4.00
1964	4.39	4.40	3.50	3.75	4.00	4.25
1965	4.45	4.39	3.50	3.75	4.25	4.25
1966	4.81	4.55	3.50	4.00	4.50	4.50
1967	5.39	4.88	3.75	4.25	5.00	5.00
1968	6.19	5.46	4.00	4.50	5.50	5.75
1969	6.69	6.09	4.25	4.75	6.00	6.25
1970	8.03	6.97	4.50	5.50	7.00	7.25
1971	8.33	7.68	4.75	5.75	7.25	7.50
1972	7.85	8.07	5.00	6.00	7.00	7.00
1973	7.49	7.89	4.75	5.75	6.50	6.75
1974	8.21	7.85	5.00	6.00	7.25	7.50
1975	9.48	8.39	5.25	6.25	8.25	8.50
1976	9.32	9.00	5.50	6.50	8.00	8.25
1977	8.58	9.13	5.25	6.25	7.50	7.75
1978	8.66	8.85	5.25	6.50	7.50	7.75
1979	9.60	8.94	5.50	6.50	8.25	8.50

The reference interest rate applicable to deferred annuities issued below age 55 is the lower of the two averages shown. The 12-month average applies to immediate annuities and deferred annuities issued at age 55 and over.

TABLE C
ILLUSTRATION OF
VALUATION INTEREST RATES
FOR GUARANTEED INTEREST CONTRACTS

Year	Reference Interest Rate	Duration of Guarantee Period (In Years)			
		0 - 10		10+ - 20	Over 20
		Book	Market		
1960	4.65%	4.50%	4.75%	4.50%	4.50%
1961	4.41	4.25	4.50	4.25	4.25
1962	4.50	4.25	4.50	4.50	4.25
1963	4.32	4.25	4.25	4.25	4.25
1964	4.39	4.25	4.50	4.25	4.25
1965	4.45	4.25	4.50	4.50	4.25
1966	4.81	4.75	4.75	4.75	4.75
1967	5.39	5.25	5.50	5.25	5.25
1968	6.19	5.75	6.25	6.00	5.75
1969	6.69	6.25	6.75	6.50	6.25
1970	8.03	7.50	8.00	7.75	7.50
1971	8.33	7.75	8.25	8.00	7.75
1972	7.85	7.25	7.75	7.50	7.25
1973	7.49	7.00	7.50	7.25	7.00
1974	8.21	7.75	8.25	8.00	7.75
1975	9.48	8.75	9.50	9.25	8.75
1976	9.32	8.75	9.25	9.00	8.75
1977	8.58	8.00	8.50	8.25	8.00
1978	8.66	8.00	8.75	8.50	8.00
1979	9.60	9.00	9.50	9.25	9.00

The reference interest rate shown is the 12-month average of the Moody's index ending June 30 of the year indicated.

TABLE D
 ILLUSTRATION OF
 VALUATION INTEREST RATES
 CORRESPONDING TO REFERENCE RATES
 OVER THE INTERVAL 3% to 12%

Reference Rate	Valuation Interest Rates for Weighting Factors							1.00
	.35	.40	.60	.80	.85	.90	.95	
3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
3.50	3.25	3.25	3.25	3.50	3.50	3.50	3.50	3.50
4.00	3.25	3.50	3.50	3.75	3.75	4.00	4.00	4.00
4.50	3.50	3.50	4.00	4.25	4.25	4.25	4.50	4.50
5.00	3.75	3.75	4.25	4.50	4.75	4.75	5.00	5.00
5.50	4.00	4.00	4.50	5.00	5.25	5.25	5.50	5.50
6.00	4.00	4.25	4.75	5.50	5.50	5.75	5.75	6.00
6.50	4.25	4.50	5.00	5.75	6.00	6.25	6.25	6.50
7.00	4.50	4.50	5.50	6.25	6.50	6.50	6.75	7.00
7.50	4.50	4.75	5.75	6.50	6.75	7.00	7.25	7.50
8.00	4.75	5.00	6.00	7.00	7.25	7.50	7.75	8.00
8.50	5.00	5.25	6.25	7.50	7.75	8.00	8.25	8.50
9.00	5.00	5.50	6.50	7.75	8.00	8.50	8.75	9.00
9.50	5.25	5.50	7.00	8.25	8.50	8.75	9.25	9.50
10.00	5.50	5.75	7.25	8.50	9.00	9.25	9.75	10.00
10.50	5.75	6.00	7.50	9.00	9.50	9.75	10.25	10.50
11.00	5.75	6.25	7.75	9.50	9.75	10.25	10.50	11.00
11.50	6.00	6.50	8.00	9.75	10.25	10.75	11.00	11.50
12.00	6.25	6.50	8.50	10.25	10.75	11.00	11.50	12.00

FOOTNOTES TO TABLE D

- Column 1 Shows illustrated reference rates.
- Column 2 Applies to valuation of life insurance.
- Column 3 Applies to valuation of deferred annuities issued below age 45. The interest rate in column three plus 1% is the recommended nonforfeiture interest rate for life insurance.
- Column 4 Applies to valuation of deferred annuities issued at ages 45 to 54.
- Column 5 Applies to valuation of deferred annuities issued at ages 55 and over.
- Column 6 Applies to single premium deferred annuities.
- Column 7 Applies to guaranteed interest contracts with guarantee periods over 20 years and to book-value-guaranteed interest contracts with guaranteed periods of 10 years or less.
- Column 8 Applies to guaranteed interest contracts with guarantee periods of more than 10 but less than or equal to 20 years.
- Column 9 Applies to guaranteed interest contracts (other than book-value contracts) with guarantee periods of 10 years or less.

**PROPOSED AMENDMENTS TO NAIC
STANDARD VALUATION AND NONFORFEITURE LAWS**

Attached to this memorandum are proposed amendments to the NAIC Standard Valuation and Nonforfeiture Laws.

The Amendments would (1) introduce for the first time a dynamic system for automatic updating of the statutory interest rates used in determining minimum reserves and minimum nonforfeiture values; (2) replace the 1958 CSO Table with a modern life insurance mortality table with sex-distinct mortality rates rather than an age setback for females; (3) change the excess initial expense allowances in the Standard Nonforfeiture Law for Life Insurance; and (4) revise the Standard Nonforfeiture Law for Life Insurance to incorporate most of the recommendations resulting from a study of this law by special committee of the Society of Actuaries.

These proposals are briefly described below. We believe their adoption would significantly improve the regulatory framework for the conduct of business of life insurance in the United States. We urge that the NAIC give the proposals thorough and immediate attention.

1. Dynamic System for Automatic Updating of the Statutory Valuation and Nonforfeiture Interest Rates

Because of rising investment yields, it was found necessary in 1972 and, again, in 1976 to amend the Standard Valuation and Nonforfeiture Laws to increase the statutory interest rates used in determining minimum reserve and nonforfeiture value standards. Each such change takes a great deal of time and effort to obtain enactment in all states of the NAIC-endorsed amendments.

In order to reduce the expense, the delay, and the risk of nonuniformity involved in frequently updating the laws, we believe that a mechanism for automatic adjustment of the statutory interest rates is needed. The attached proposal would create such a mechanism with respect to the Standard Valuation Law and the Standard Nonforfeiture Law for Life Insurance.

Under the attached proposal all types of life insurance, annuities, and deposit fund contracts, both individual and group, would be included within a single framework of dynamic minimum valuation standards that would be incorporated in the model law. Similar automatic adjustments of statutory interest rates would also be built into the minimum nonforfeiture standards for life insurance. The statutory interest rates used in these standards would be tied by formula to the average of yields on seasoned Aa Public Utility Bonds as published by Moody's Investors Service, Inc. A reference interest rate determined from specified averages of those yields ending on June 30 of each year would be used to determine statutory interest rates which would apply at all policy durations to policies and contracts issued in a specified calendar year (or to the net increase in funds in a specified calendar year in the case of certain contracts). Some examples of the statutory interest rates that would be applicable for various products assuming certain reference interest rates are as follows:

STATUTORY INTEREST RATES FOR:

<u>Reference Interest Rate</u>	<u>Life Insurance (Valuation)</u>	<u>Life Insurance (Nonforfeiture)</u>	<u>Deferred Annuities (1) (Valuation)</u>	<u>Immediate Annuities (Valuation)</u>	<u>Guaranteed Interest Contracts (2) (Valuation)</u>
6%	4.00%	5.25%	4.25 to 5.50%	5.50%	5.75 to 6.00%
9%	5.00	6.50	5.50 to 7.75	8.00	8.50 to 9.00
12%	6.25	7.50	6.50 to 10.25	10.75	11.00 to 12.00

(1) The rates for deferred annuities vary by issue age.

(2) The rates for guaranteed interest contracts vary depending upon the nature and duration of the guarantee under the contract.

Under the proposed amendments state insurance commissioners would be authorized to adopt changes in the method of determining the reference interest rate if the NAIC determined that it was no longer feasible or appropriate to use the Moody's index and recommended an alternative method for determining the reference interest rate. A complete description of the proposed dynamic interest rate basis and a draft of changes in the Standard Valuation Law required to implement the proposal are attached to this memorandum.

2. New Ordinary Mortality Tables

Since the Commissioners 1958 Standard Ordinary Mortality Table (1958 CSO) was adopted, there has been a dramatic reduction in mortality rates among standard Ordinary insured lives. As a result, changes in the theoretically appropriate amounts of minimum reserve and nonforfeiture value are indicated. The Society of Actuaries' Special Committee to Recommend New Mortality Tables has concluded that it is time to replace the 1958 CSO Table in the laws, and it has prepared a new table (Table K) for the purpose. The Society Committee's "Report on New Mortality Tables for Valuation of Individual Ordinary Insurance," which had been sent to the Society's Board of Governors, was included as an exposure draft attached to the June 1979 report of the NAIC Technical Task Force to Review Valuation and Nonforfeiture Value Regulation. The new table was discussed at the annual meeting of the Society of Actuaries in October 1979. We recommend that a new table similar or identical to Table K be adopted by the NAIC and that state insurance commissioners be authorized to permit the use of further updates in mortality tables in the future if they are recommended by the NAIC.

3. Change in Excess Initial Expense Allowance in Standard Nonforfeiture Law for Life Insurance

The proposed amendments would change the excess initial expense allowance in the formula in the Standard Nonforfeiture Law for Life Insurance to reduce the minimum nonforfeiture values for most permanent policies. For level-premium whole life insurance the formula for computing the excess initial expense allowance would be changed from 65% of premium plus \$20 per \$1000 of insurance to 125% of premium plus \$10 per \$1000 of insurance.

For non-level-premium policies, an additional change contained in the proposal would make the initial expense allowance much less dependent on the size of the first-year premium than it otherwise would be, thereby increasing the minimum nonforfeiture values for high first-year-premium policies. More details and the rationale for the new formula may be found in the paper, "Expense Formulas for Minimum Nonforfeiture Values," by C.F.B. Richardson, in the Transactions of the Society of Actuaries, Vol. XXIX, 1977, p. 209.

4. Other Changes in Standard Nonforfeiture Law for Life Insurance

The proposal would also make a number of detail changes in the Standard Nonforfeiture Law for Life Insurance designed to simplify compliance with the law in various circumstances. A previous draft of these proposed changes dated October 6, 1977 has been exposed to the NAIC Technical Task Force to Review Valuation and Nonforfeiture Value Regulation. Differences between the current proposal and the draft are noted in a footnote in the Summary of Recommended Changes in the Standard Nonforfeiture Law for Life Insurance in the attached memorandum. Additional background on the proposal may be found in the "Report on Actuarial Principles and Practical Problems with Regard to Nonforfeiture Requirements" in the Transactions of the Society of Actuaries, Vol. XXVII, 1975, p. 549.

SUMMARY OF RECOMMENDED CHANGES IN STANDARD NONFORFEITURE LAW FOR LIFE INSURANCE

<u>Recommendation*</u>	<u>Reason</u>	<u>Section of Law Which Must Be Changed To Effect Recommendation*</u>
1. Retain adjusted premium method.	It has worked reasonably well.	No change needed.
2. Base adjusted premium on expense allowances related to <u>nonforfeiture</u> net premium.	To remove circularity and complexity from formula, especially in the case of non-level premium policies.	Section 5-5

<u>Recommendation</u>	<u>Reason</u>	<u>Section of Law Which Must Be Changed To Effect Recommendation</u>
3. Decrease the per \$1000 component and increase the percent of premium component of the excess initial expense allowance.	To reflect changes in relative expense levels.	Section 5-c
4. Effect of inflation on excess initial expense allowance does not appear substantial.	Average size policy is increasing.	No change needed (other than as in Recommendation 3).
5. Base equivalent level amounts on the first 10 years under the policy.	Initial per \$1000 underwriting expenses are most logically related to amounts of insurance in the early years. This formula is less susceptible to manipulation.	Section 5-c
6. Base excess initial expense allowances on levelized net premiums rather than first year adjusted premium.	To produce identical excess initial expense allowances for policies with identical benefits and identical premium paying periods.	Section 5-c
7. Remove per policy costs from gross premiums in determining nonforfeiture value net premiums.	To avoid requiring slightly different nonforfeiture values for each size policy where premiums are not level by duration.	Section 5-c
8. Base excess initial expense allowance on the automatic track for multi-track policies. Allow for additional initial expense allowance on increase in premium at point of increase.	It would be unfair to force all companies into lowest possible expense posture to control a limited number of abuses. At time of premium increase there are additional sales and underwriting expenses.	Section 5-c
9. Base excess initial expense allowance for life-cycle and open policies on similar approach to that used for multi-track policies with additional allowances on increases.	See 8 above.	Section 5-c
Do not use retrospective accumulation of gross premiums. Give broad regulatory freedom to approve completely "open" and undefined policies.	Avoids rate regulation and inconsistencies with adjusted premium approach. There is need to allow freedom for experimentation with new products.	Section 6
10. Establish a procedure to facilitate approval of and to promote flexibility of product designs which are not contemplated by the current Standard Nonforfeiture Law.	To permit the development of new product designs which might be beneficial to the public and would otherwise be inhibited by a nonforfeiture law which is designed to fit more traditional products.	Section 6

<u>Recommendation</u>	<u>Reason</u>	<u>Section of Law Which Must Be Changed To Effect Recommendation</u>
11. Provide for automatic adjustment of statutory nonforfeiture interest rates on a basis similar to that proposed for statutory valuation interest rates.	To avoid having to seek legislation in all jurisdictions each time a change in the interest rate is needed.	Section 5-c
12. New mortality table is recommended.	Life insurance mortality has improved significantly from the experience underlying the 1958 CSO Mortality Table.	Section 5-c
13. Mortality table should include margins.	Tendency toward lower premium forms may produce higher mortality in the future; individual company business varies from the average of the study; margins are needed to provide expenses on paid-up insurance benefits.	No change needed.
14. A six-year age setback would reasonably approximate separate tables for males and females for determining whole life cash values, but separate male and female mortality rates should be developed as part of the new statutory mortality basis.	To more accurately reflect the difference between male and female mortality in nonforfeiture calculations.	Section 5-c
15. Permit other alternatives in determining nonforfeiture values on substandard policies.	There is need to permit other innovative treatment of substandard risks (e.g., graded death benefits).	Section 5-c
16. Policies that never give rise to nonforfeiture values in excess of 2½% of the death benefit at any duration should be exempted.	It is unwieldy and uneconomical to provide trivial nonforfeiture values.	Section 8
17. Extend term insurance exemption from nonforfeiture values to term of 20 years or less expiring before age 71.	Reduces nonforfeiture value inconsistencies between exempt term plans and longer duration term plans.	Section 8
18. Term riders should be treated as separate policies under a severability principle.	The present law impedes utilization of supplemental term riders because it unnecessarily complicates nonforfeiture value calculation.	Section 3
19. Treat renewable and convertible term policies as a series of short-term policies for nonforfeiture purposes. Decide this on nature of the coverage.	Not to take this view is contrary to nature of the coverage and requires cash values on term insurance.	No change needed.

<u>Recommendation</u>	<u>Reason</u>	<u>Section of Law Which Must Be Changed To Effect Recommendation</u>
20. Treat deposit of deposit term and deposit whole life as an integral part of the plan and not as a pure term insurance plan.	To ensure that nonforfeiture values equitably reflect the value of the deposit.	Sections 5-c and Section 8
21. Use a single interest rate for statutory minimum cash values.	To eliminate linkage with the valuation and policy cash value interest rates.	Section 5-c and Section 6 of the Standard Valuation Law.
22. Guaranteed paid-up options should be those purchased by cash value on any interest rate at least as high as that specified in the contract for cash values.	To maintain parity between paid-up options before and after lapse but permit companies to offer more liberal paid-up options.	Section 5-c
23. The cash value mortality table should be used for determining guaranteed paid-up values, except that extended term should employ higher mortality.	Extended term mortality is poorer than paid-up mortality.	Section 5-c
24. Specific expense loadings in paid-up option guarantees are not recommended.	Since expense allowances for options which may come into effect many years in the future are imprecise, it is more practical to allow for paid-expenses through mortality and interest margins.	No change needed.
25. Substitute purchase bases granting larger than guaranteed amounts should be permitted for nonforfeiture insurance options and paid-up dividend additions.	To allow companies to offer more liberal nonparticipating nonforfeiture insurance options and paid-up dividend additions than those guaranteed in the policy.	Section 2(a) and Section 5-c
26. Complete exposition of nonforfeiture values in a policy table should not be required for multi-track or "open" plans.	To avoid showing tables of values which will quickly become obsolete and meaningless to the policyholder.	Section 2(e)
27. Single premium life minimum cash values should be based on the same interest rate as is used for annual premium policies.	Over the long term, there is little justification for establishing a different statutory nonforfeiture interest rate for single premium life insurance. Using the same rate as for annual premium life would still enable companies to offer a viable product.	Section 5-c
28. Deferred annuities should be subject to minimum cash value requirements based on an accumulation of premiums after exclusion.	Nonforfeiture values are appropriate during deferred period and the accumulation method is better understood by the public.	No change needed, since the Standard Nonforfeiture Law for Individual Deferred Annuities adopted by the NAIC in 1976 implements this recommendation.

<u>Recommendation</u>	<u>Reason</u>	<u>Section of Law Which Must Be Changed To Effect Recommendation</u>
29. Nonforfeiture values should not be required in accident and health insurance with the possible exception of return of premium contracts.	Except for return of premium policies, health insurance is like term life insurance in that it generally would produce only trivial nonforfeiture values.	No change needed.
30. Technical matters needing further consideration are refund of unearned premiums at death, fractional modes, age nearest and last birthday bases, family policies, uniform seniority rule and removal of requirement for complex or confusing policy provisions relating to cash values.	To clarify and simplify calculation of minimum nonforfeiture values.	Section 3, Section 5-c and Section 7
31. Permit the Commissioner to adopt new mortality tables, under certain conditions.	To avoid the need for periodic legislation to keep the mortality tables up to date.	Section 5-c
32. Permit the Commissioner to change, under certain conditions, the method of determining the "reference interest rate" which triggers automatic changes in the nonforfeiture interest rate standard.	To enable a prompt substitution for the method contained in the law if that method becomes inappropriate.	Section 5-c
33. Permit insurers to change nonforfeiture values without resubmitting the entire policy form for approval.	To avoid unnecessary administrative expense and delay which might arise due to frequent changes in the nonforfeiture interest rate standard.	Section 5-c

APPENDIX I

REFERENCE INTEREST RATE INDEX

The reference interest rate index that is proposed for a calendar year y is: for products where financial results are more directly related to yields on current investments, the 12-month average, ending on June 30 of that year, of Moody's Average of Yields on Seasoned Aa Public Utility Bonds; for other products, the lesser of the above-described 12-month average and a similar 36-month average ending on the same date.

Reference Rate Period. For products where financial results are more directly related to yields on current investments the recent period is the more appropriate, but for annual premium business a longer and more stable platform is desirable for basing a projection of future interest rates. By using the lower of a 36-month and a 12-month running average, a two-way conservatism is introduced. If the 12-month average is higher, use of the 36-month average avoids the prospect of a short-term "spike" in interest rates that fall soon afterwards; if the 12-month average is lower, using it protects against the possibility that the latest development portends a continuing lower level.

June was chosen as the end point of the moving averages in order to provide the best overall fit between 12-month moving averages of Moody's Aa yields and calendar-year gross yields on new investments for large life insurance companies. Such a lag would be expected because of the forward commitment of funds for direct placements and commercial mortgages.

Correlation Studies. Two studies were made of the correlation between the gross yields on new investments of life insurance companies and the Moody's Average of Yields on Seasoned Aa Public Utility Bonds.

The first involved nine large companies, and the results are summarized in Table I-A. As indicated, the period covered by the study ranged from 10 to 27 years, varying by company. The average gross yield Y on new investments for these companies was $0.895X + 1.307\%$, where X is the average for the calendar year of the Moody's Average (see columns (2) and (3) of Table I-A), and the average correlation (R^2) between X and Y was 95 percent (see column (4)).

The second study covered an expanded list of 55 companies - 14 companies with new investments in 1977 of \$500 million or more (large companies, 23 companies with new investments of \$100 to \$500 million (intermediate companies), and 18 companies with new investments of less than \$100 million (small companies). The results of this study are summarized in Table I-B. In this study, the gross yields on new investments were correlated with the 12-month average, ending in June of the Moody's Average. For the 55 companies, the average correlation weighted by amount invested was 97 percent, and the average unweighted correlation was 85 percent (see column (3)). For the large and intermediate companies, the correlations were over 90 percent. The coefficients of the least-squares regression lines relating the new investment yields and the Moody's Average are shown in columns (1) and (2) of Table I-B.

Margins in Reference Interest Rate Index. An analysis also was made of the margins for the years 1974-77 of (i) the gross yields on new investments of the 55 companies included in the correlation study over (ii) the reference interest rates. The results are shown in Tables I-C and I-D.

For the reference interest rate determined as the lower of the 12-month and 36-month averages of Moody's Average (Table I-C), the average margins for the 55 companies ranged from 0.45 percent (1977, unweighted basis) to 1.50 percent (1975, weighted basis). The number of companies earning less than the reference rate was 0 in 1974, one in 1975, 10 in 1976, and four in 1977.

For the reference interest rate determined as simply the 12-month average of Moody's Average (Table I-D), the average margins for the 55 companies ranged from 0.21 percent (1976, unweighted basis) to 0.89 percent (1974, unweighted basis). The number of companies earning less than the reference rate was 0 in 1974, 10 in 1975, 21 in 1976, and 4 in 1977.

APPENDIX II
DEVELOPMENT AND TESTING OF
WEIGHTING FACTORS

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E. SENSITIVITY TESTS

A. METHODOLOGY

1. Introduction

The valuation interest rates produced according to a proposed set of weighting factors can be tested for adequacy and for consistency. Due to the subjective nature of future interest rate assumptions, relative consistency among a set of valuation interest rates for various products is perhaps easier to demonstrate than the absolute adequacy of the rates.

The basic method used to test the valuation interest rates produced according to a proposed set of weighting factors is not a test of reserve adequacy as such, since that would depend on many factors other than interest rates. Rather, our tests focus on the interest assumption alone by making a comparison of (A) with (B), as follows:

- (A) Projected interest available on reserve assets (according to specified investment assumptions applied to projected cash flows generated under specified product assumptions).
- (B) Projected interest required on reserve liabilities (at the valuation interest rate, or rates, being tested).

Relative to a given set of investment assumptions and product assumptions, a valuation interest rate can be judged "adequate" if (A) exceeds (B). A set of valuation interest rates for different product types can be judged "consistent" if the relationship of (A) to (B) is similar for the different product types.

The comparison of (A) with (B) can be made over various projection periods.

2. Determination of Interest Available and Interest Required

The detailed methodology underlying the test consists of a year-by-year projection of interest available on reserve assets and interest required on reserve liabilities. These projections are based on product assumptions (which vary from product type to product type) and investment assumptions (common to all product types).

Product assumptions, in general, specify (at annual intervals, for simplicity):

- (1) projected benefit payments,
- (2) projected net valuation premium receipts,
- (3) projected administrative expenses and FIT expenses (but only to the extent that gross investment income, rather than gross premium, is assumed to be the source of cash to pay these expenses on a current basis),
- (4) assumed valuation interest rates, and
- (5) projected valuation reserve liabilities.

Investment assumptions specify (at annual intervals):

- (1) projected reference rates,
- (2) adjustments to convert the reference rates to annual effective rates earned,
- (3) projected credit risk losses (actually, the assumed level cost thereof), and
- (4) projected investment expenses.

In addition, the investment assumptions specify a basic investment survival schedule which projects, at annual intervals measured from the time an investment is made, the proportion of the original principal still outstanding on an investment (and still earning the original yield rate secured at the time the investment was made). They also specify an unscheduled prepayment (or refunding) survival table which projects, depending on how far yield rates have declined since the time an investment was made, what proportion of the principal surviving according to the basic schedule will have also survived the risk of unscheduled prepayment. A prepayment penalty is assumed to be paid by the borrower at the time he makes an unscheduled prepayment.

A year-by-year projection of interest available on reserve assets and interest required on reserve liabilities is developed on the basis of these assumptions. For each point in time in the projection period, investable funds (i.e., net cash available in the reserve asset account to make new investments) are developed, equal to:

net valuation premiums received,
 plus rollover of reserve assets,
 plus interest available on reserve assets,
 minus benefit payments made,
 minus profits (i.e., the surplus account is assumed to absorb profits and subsidize losses on a cash basis).

Net valuation premiums received come from the product assumptions.

Rollover of reserve assets is developed by comparing the distribution of reserve assets by time of investment for successive points in time.

For a given point in time, the distribution of reserve assets by time of investment is developed by applying the basic investment survival schedule and the unscheduled prepayment survival table (both from the investment assumptions) to the investable funds developed at all previous points in time and by assuming current investment of current investable funds.

Interest available on reserve assets at each point in time is developed by applying the net yield rates secured at the time investments were made to the distribution of reserve assets by time of investment, and then deducting administrative expenses and FIT expenses (to the extent that gross investment income, rather than gross premiums, is assumed to be the source of cash to pay these expenses on a current basis).

The net yield rate secured at the time an investment was made is equal to:

The reference rate at the time the investment was made,
plus the adjustment to convert to annual effective rate earned,
minus the credit risk cost,
minus the investment expense

(All from the investment assumptions).

Administrative expenses and FIT expenses come from the product assumptions.

Benefit payments come from the product assumptions.

Profits are the balancing item to bring reserve assets equal to reserve liabilities at each point in time.

The investable funds developed through the calculation just described are assumed to purchase new investments in the reserve asset account and the process can continue. It is possible for the investable funds to be negative at some points in time. The implicit assumption is a diversion of cash flow attributable to other policies. The resulting "negative interest" terms in subsequent interest available calculations are logically consistent with this interpretation, since the "other policies" involved must be assumed to require the yield rates available at the time the cash flow was diverted (because, among other reasons, they are being valued by dynamic standards!)

Interest required on reserve liabilities at each point in time is developed by applying the assumed valuation interest rate to the reserve liabilities (both of which come from the product assumptions).

3. Interpretive Statistics

Based on a set of assumptions, the foregoing calculation establishes:

- (A) projected interest available on reserve assets on a year-by-year basis, and
- (B) projected interest required on reserve liabilities on a year-by-year basis.

The very concept of a level valuation rate higher than the ultimate rate to which interest rates may fall involves a recognition that, on a year-by-year basis, reserve interest requirements may sometimes have to be funded from sources other than just current investment income on reserve assets. Granted this point, which seems unavoidable if level valuation rates dynamic by year-of-issue are to be maintained, the crucial question is how to assure that any insufficiency in current interest available on reserve assets will not become unreasonable in relation to the "other sources" to fund reserve interest requirements.

In practice, there could be many "other sources" to fund any current interest deficiencies. From a theoretical point of view, however, it seems logical to require at a minimum that funding for current interest deficiencies be conceived of as coming strictly from excess interest earned in prior years and withheld in surplus. Then, at a minimum, we can argue that the total contribution made over time by interest on reserve assets is commensurate with the total demand made over time by the reserve interest requirements.

For this reason, we decided to summarize the results of our tests by computing and comparing:

- (A) interest available on reserve assets on average over time, and
- (B) interest required on reserve liabilities on average over time.

Thus, we did not test the overall adequacy of reserves, as such, but only the adequacy of the reserve interest rate assumption considered alone. Our test results (unlike the results of an asset share test) were completely insulated from any source of gain and loss other than discrepancies between interest available and interest required on the reserves and our test results (unlike the results of an asset share test) did not include any interest earnings on emerging surplus assets.

Technically, we summarized our test results by comparing (A) and (B) in terms of four statistics:

- (1) average annual excess interest rate over the projection period,
- (2) worst average annual excess interest rate over the projection period,
- (3) average annual interest deficiency over the projection period, and
- (4) worst average annual interest deficiency over the projection period.

Definitions

Let R_t = dollar amount of projected reserve at time t .

A_t = dollar amount of projected interest available at time t .

B_t = dollar amount of projected interest required at time t .

$a_t = \frac{A_t}{R_{t-1}}$ = rate of projected interest available at time t , $R_{t-1} \neq 0$.

$b_t = \frac{B_t}{R_{t-1}}$ = rate of projected interest required at time t , $R_{t-1} \neq 0$.

p = length of projection period.

Then

$$AAEIR_n = \frac{\sum_{t=1}^n (A_t - B_t)}{\sum_{T=1}^n R_{t-1}} = \text{average annual excess interest rate for each } n.$$

If $R_{t-1} \neq 0$ for $t=1, \dots, n$

then

$$AAEIR_n = \frac{\sum_{t=1}^n (A_t - B_t) R_{t-1}}{\sum_{t=1}^n R_{t-1}}$$

so $AAEIR_n$ is a weighted average of annual excess interest rates.

If $R_{t-1} = 0$ for some t 's in the range $1, \dots, n$, then $AAEIR_n$ is the proper generalization of the weighted average concept.

Statistic (1), the average annual excess interest rate over the projection period, is defined to be $AAEIR_p$. The weighting factors that we recommend are based on requiring this statistic to be zero in a highly pessimistic interest rate scenario.

Statistic (2), the worst average annual excess interest rate over the projection period, is defined to be the smallest of $AAEIR_1, AAEIR_2, \dots, AAEIR_p$.

These two statistics alone give no information about the further question of whether the current interest deficiencies that develop in the later years of our projections are reasonable in relation to the presumed source to fund them, the prior years excess interest withheld in surplus. Certainly, the surplus associated in practice with a given block of business does not represent in any simple way an accumulation of all profits (from interest or any other source) generated by that block of business. More likely, the surplus associated with a given block of business is managed in practice so as to bear something like a constant ratio to the reserves on that block of business, independently of its profit experience. Early on this is accomplished by relying on retained profits from other blocks of business; later on by disbursing excess profits as dividends to policyholders and/or shareholders and by devoting part of any retained profits to support surplus requirements on new or unprofitable blocks of business.

In short, it is far from clear what a reasonable assumption might be about the fate of the excess interest earned in the early years of our projections, whether it would in fact be withheld in surplus (perhaps accumulated at interest) or whether it would be "spent" to other purposes before the current interest insufficiencies develop later on in the projections. Therefore, we made no assumption in this regard.

The purpose of the two additional statistics, the "average annual interest deficiency" statistics, is to at least measure the extent to which interest available may be insufficient to cover interest required over some part of the projection period, independently of whether it's sufficient over the project period taken as a whole. They do this essentially by excluding accumulated positive results from the calculation of the averages. Their definitions are as follows:

Let AD_t = accumulated difference at time t

$$= \sum_{R=1}^t (A_R - B_R), (AD_0 = 0)$$

For a given n, let m be such that AD_m is the largest of AD_0, AD_1, \dots, AD_n .

Let $N_t = 0$ for $t = 1, 2, \dots, m$.

Let $N_t = (A_t - B_t)$ for $t = m+1, m+2, \dots, n$.

Then

$$AAID_n = \frac{\sum_{t=1}^n N_t}{\sum_{t=1}^n R_{t-1}} = \text{the average annual interest deficiency for each n.}$$

If $R_{t-1} \neq 0$ for $t=1, \dots, n$,

then

$$AAID_n = \frac{\sum_{t=m+1}^n (a_t - b_t) R_{t-1}}{\sum_{t=1}^n R_{t-1}}$$

so $AAID_n$ is a weighted average comparable to $AAEIR_n$, with zeroes placed in the average for $t=1, 2, \dots, m$.

Statistic (3), the average annual interest deficiency over projection period, is defined to be $AAID_p$.

Statistic (4), the worst average annual interest deficiency over the projection period, is defined to be the smallest of $AAID_1, AAID_2, \dots, AAID_p$.

The point of these rather elaborate definitions is that statistics designed to measure the extent to which the current interest available may be insufficient to cover current interest required ought to have three characteristics:

- (1) They ought to reflect the extent as well as the depth of any insufficiencies. A long period of successive bad years should weigh more heavily than a single bad year. Thus, AAID (as just defined) sums the insufficiencies over any string of bad years.
- (2) They ought to reflect the relative importance of the insufficiency within the whole pattern of reserve development. An x% insufficiency at a time when reserves have shrunk to immaterial levels should not weigh as heavily as an x% insufficiency at a time when reserves are at a maximum. Thus, AAID relates the insufficiencies to an average reserve exposure rather than to the reserves exposed in the years of insufficiency alone.
- (3) They ought to permit valid comparisons from product type to product type. Thus, AAID is consistently expressed for all product types as a proportion of the total reserves exposed during the whole period since inception of the contract.

4. Model Operation

A computer model was built to implement the methodology described here. Based on an assumed projection period, investment assumptions, and product assumptions (including an assumed valuation interest rate), the model performs the year-by-year calculations to determine interest available and interest required and then summarizes the year-by-year results in terms of the four aggregate statistics just defined.

The model has the capacity to vary the assumed valuation interest rate until it achieves a specified target value for any one of the four aggregate statistics. Typically, for a given set of assumptions (including a very pessimistic interest rate assumption), we target the model to produce a value of zero for Statistic (1), the average annual excess interest rate over the project period. The model gives back the valuation interest rate which must be assumed in order to produce that target value (i.e., which makes average interest available in the pessimistic scenario equal average interest required by the valuation rate). The valuation rate thus produced can be translated into a weighting factor.

B. PRODUCT ASSUMPTIONS

1. Life Insurance

For annual and single premium life insurance —

- Issue age: 35 ;
- Mortality: Table K, Male;
- Persistency, annual premium: 75% of LIMRA 1971-72 Expected Lapse Rates, Table 3, durations 1 thru 10, 1.75% lapse rates, durations 11 and over; single premium: 1.75% lapse rates, all durations;
- Federal income Tax: Menge Formula applied to net level premium reserves; i.e., phase I tax is charged against investment income;
- Administrative expense: none for annual premium, 10 basis points for single premium;
- Net premiums and reserves: Commissioners Reserve Valuation Method.

2. Deferred Annuities

(a) Individual Deferred Annuities

For annual and single premium deferred annuities –

- Issue ages: 30, 45, 50, 55, and 60, maturing at age 62;
- Mortality: 1971 IAM Table, Male;
- Persistency: annual premium deferred annuities, same as for annual premium life, above; single premium deferred annuities: 2% lapse rate, all durations;
- Federal Income Tax: nonqualified, same as life insurance; qualified, 15 basis points is charged against investment income;
- Administrative expense: 25 basis points;
- Settlement basis: Cash value at maturity; no death benefits;
- Net premiums and reserves: First year premium equals 80% of renewal premiums. (For single premium, not applicable.)

(b) Group Deferred Annuities

For single premium deferred annuities –

- Issue ages: same as Individual;
- Mortality: 1971 GAM Table, Male;
- Persistency: not applicable; no cash value during deferral period;
- Federal Income Tax: qualified only, 15 basis points is charged against investment income;
- Administrative expense: 25 basis points;
- Settlement basis: Life income only; no death benefits;
- Net premiums and reserves: Single premium at tested valuation interest rate and mortality basis.

3. Single Premium Immediate Annuities**(a) Individual Single Premium Immediate Annuities**

- Issue age: 62;
- Mortality: 1971 IAM Table, Male;
- Persistency: not applicable;
- Federal Income Tax: same as Deferred Annuities, above;
- Administrative expense: 25 basis points;
- Net premiums and reserves: Single premium at tested valuation interest rate and mortality basis.

(b) Group Single Premium Immediate Annuities

Same as for Group Deferred Annuities

4. Guaranteed Interest Contracts

- Single deposit with guaranteed interest accumulating to maturity;
- Lump sum payable at maturity; both market value and book value payments were tested;
- Maturity: all durations from 1 to 25 were tested;
- Federal Income Tax: Phase I tax based on "interest paid" treatment for guaranteed interest amounts is charged against investment income;
- Net premiums and reserves: on a "year-of-receipt" basis, each annual increment to the guaranteed fund is valued as the price of a bond whose coupon is the guaranteed rate and which is priced to yield to maturity the valuation interest rate applicable to that increment.
- Interest required: includes each year an additional amount sufficient to pay x% of the surplus strain incurred on that year's increment to the guaranteed fund, where x is equal to 100 times the ratio of the initial deposit to the sum of the initial deposit and all annual fund increments (this is to assure that the valuation rate on the original deposit makes provision for a reasonable portion of the surplus strain that will be incurred on subsequent fund increments if reference rates decline over time).

C. INVESTMENT ASSUMPTIONS

1. Trend of Reference Rate

Both decreasing and increasing trends were tested.

- (a) Decreasing: 9% initially declining $\frac{1}{4}$ % per year to 4% in the 21st and subsequent years.
- (b) Increasing: 9% initially increasing $\frac{1}{4}$ % per year to 14% in the 21st and subsequent years.

2. Adjustments to Reference Rate

Adjustments to convert reference rate to annual effective rate earned:

- (a) First year's investments only: +.45% to reflect average margin between company investments and Moody's AA utilities; for conservatism, this margin is eliminated for all investments made after the first year. The effect is to relate short term products more closely to current yields while introducing a layer of conservatism for longer term products.
- (b) Nominal to effective yield: +.2% (assumes nominal rate is based on semi-annual coupons)
- (c) Investment expenses: -.2%
- (d) Credit risk: -.1% (to provide for default on interest and/or principal)

3. Repayment of Invested Assets

- (a) Normal industry experience for scheduled repayment of investments:

<u>Year</u>	<u>Percent of Original Investment Remaining at Beginning of Year</u>	<u>Repayment as a Percent of Original Investment</u>
1	100.0%	2.0%
2	98.0	2.5
3	95.5	3.0
4	92.5	3.5
5	89.0	4.0
6	85.0	5.0
7	80.0	6.0
8	74.0	7.0
9	67.0	7.0
10	60.0	7.0
11	53.0	6.5
12	46.5	6.0
13	40.5	5.5
14	35.0	5.0
15	30.0	4.5
16	25.5	4.0
17	21.5	3.5
18	18.0	3.5
19	14.5	3.0
20	11.5	2.5
21	9.0	2.0
22	7.0	2.0
23	5.0	2.0
24	3.0	1.5
25	1.5	1.5
26	0.0	—

(b) **Unscheduled prepayment of invested assets:**

<u>Decline in Reference Rate</u>	<u>Prepayment Survival Percentage</u>
.50%	100%
1.00	95
1.50	85
2.00	70
2.50	50
3.00	15
3.50	5
4.00	0

(c) **Prepayment penalty: One semi-annual coupon (assumed to be taken into investment income at time prepayment occurs)**

TEST RESULTS AND RECOMMENDED WEIGHTING FACTORS

<u>Product Type</u>	<u>Average Annual Interest Available</u>	<u>Average Annual Interest Required</u>	<u>Annual Excess Interest Avg/Worst Avg</u>	<u>Annual Interest Deficiency Avg/Worst Avg</u>	<u>Implied Weighting Factor</u>
1. <u>Life Insurance</u>					
Annual Premium Life (D)	5.55%	5.55%	.00/.00%	(.45)/(.45)%	.43
Single Premium Life (D)	6.03	6.03	.00/.00	(.53)/(.53)	.51
Recommended Weighting Factor--Valuation					.35
Nonforfeiture					.40

(D) Indicates decreasing reference rate trend.

(I) Indicates increasing reference rate trend. Shown only when this assumption leads to a lower implied weighting factor.

TEST RESULTS AND RECOMMENDED WEIGHTING FACTORS

<u>Product Type</u>	<u>Average Annual Interest Available</u>	<u>Average Annual Interest Required</u>	<u>Annual Excess Interest Avg/Worst Avg</u>	<u>Annual Interest Deficiency Avg/Worst Avg</u>	<u>Implied Weighting Factor</u>
2. <u>Deferred Annuities</u>					
(a) Issue Ages Under 45:					
Ind. Ann. Prm. Non-Qual.--					
Issue Age 30(D)	4.87%	4.87%	.00/.00%	(.38)/(.38)%	.31
45(D)	7.06	7.06	.00/(.31)	(.12)/(.43)	.68
Ind. Sngl. Prm. Non-Qual--					
Issue Age 30(D)	5.51	5.51	.00/.00	(.52)/(.52)	.42
45(D)	7.55	7.55	.00/(.22)	(.23)/(.45)	.76
Ind. Sngl. Prm. Qual--					
Issue Age 30(D)	5.68	5.68	.00/.00	(.30)/(.80)	.45
45(D)	7.74	7.74	.00/(.42)	(.34)/(.76)	.79
Gr. Sngl. Prm. Qual.--					
Issue Age 30(D)	5.37	5.37	.00/.00	(.74)/(.74)	.40
45(D)	6.14	6.14	.00/.00	(.66)/(.66)	.52
Recommended Weighting Factor					.40

(D) Indicates decreasing reference rate trend.

(I) Indicates increasing reference rate trend. Shown only when this assumption leads to a lower implied weighting factor.

TEST RESULTS AND RECOMMENDED WEIGHTING FACTORS

<u>Product Type</u>	<u>Average Annual Interest Available</u>	<u>Average Annual Interest Required</u>	<u>Annual Excess Interest Avg/Worst Avg</u>	<u>Annual Interest Deficiency Avg/Worst Avg</u>	<u>Implied Weighting Factor</u>
2. <u>Deferred Annuities</u>					
(b) Issue Ages 45-54:					
Ind. Ann. Prm. Non-Qual.--					
Issue Age 45(D)	7.06%	7.06%	.00/ (.31) %	(.12)/ (.43) %	.68
55(D)	8.84	8.84	.00/ (.51)	(.05)/ (.51)	.97
55(I)	8.19	8.19	.00/ (.08)	(.65)/ (.72)	.87
Ind. Snpl. Prm. Non-Qual.--					
Issue Age 45(D)	7.55	7.55	.00/ (.22)	(.23)/ (.45)	.76
55(D)	9.34	9.34	.00/ (.42)	(.02)/ (.42)	1.06
55(I)	8.02	8.02	.00/ (.08)	(.55)/ (.62)	.84
Ind. Snpl. Prm. Qual.--					
Issue Age 45(D)	7.74	7.74	.00/ (.42)	(.34)/ (.76)	.79
55(D)	9.50	9.50	.00/ (.79)	(.03)/ (.79)	1.08
55(I)	8.11	8.11	.00/ (.14)	(1.02)/ (1.16)	.85
Gr. Snpl. Prm. Qual.--					
Issue Age 45(D)	6.14	6.14	.00/ .00	(.66)/ (.66)	.52
55(D)	7.26	7.26	.00/ .00	(.63)/ (.63)	.71
Recommended Weighting Factor					
(D) Indicates decreasing reference rate trend.					.60
(I) Indicates increasing reference rate trend. Shown only when this assumption leads to a lower implied weighting factor.					

2. TEST RESULTS AND RECOMMENDED WEIGHTING FACTORS

<u>Product Type</u>	<u>Average Annual Interest Available</u>	<u>Average Annual Interest Required</u>	<u>Annual Excess Interest Avg/Worst Avg</u>	<u>Annual Interest Deficiency Avg/Worst Avg</u>	<u>Implied Weighting Factor</u>
<u>2. Deferred Annuities</u>					
(c) Issue Ages over 54:					
Ind. Ann. Prm. Non-Qual.--					
Issue Age 55(D)	8.84%	8.84%	.00/ (.51)%	(.05)/ (.51)%	.97
55(I)	8.19	8.19	.00/ (.08)	(.65)/ (.72)	.87
60(D)	10.73	10.73	.00/ (1.24)	(.17)/ (1.24)	1.29
60(I)	7.41	7.41	.00/ (.09)	(.85)/ (.93)	.74
Ind. Sngl. Prm. Non-Qual.--					
Issue Age 55(D)	9.34	9.34	.00/ (.42)	(.02)/ (.42)	1.06
55(I)	8.02	8.02	.00/ (.08)	(.55)/ (.62)	.84
60(D)	11.28	11.28	.00/ (1.41)	(.20)/ (1.41)	1.38
60(I)	7.38	7.38	.00/ (.09)	(.83)/ (.91)	.73
Ind. Sngl. Prm. Qual.--					
Issue Age 55(D)	9.50	9.50	.00/ (.79)	(.03)/ (.79)	1.08
55(I)	8.11	8.11	.00/ (.14)	(1.02)/ (1.16)	.85
60(D)	11.53	11.53	.00/ (2.61)	(.37)/ (2.61)	1.42
60(I)	7.43	7.43	.00/ (.15)	(1.53)/ (1.69)	.74
Gr. Sngl. Prm. Qual.--					
Issue Age 55(D)	7.26	7.26	.00/ .00	(.63)/ (.63)	.71
60(D)	7.88	7.88	.00/ .00	(.63)/ (.63)	.81
Recommended Weighting Factor					.80

(D) Indicates decreasing reference rate trend.

(I) Indicates increasing reference rate trend. Shown only when this assumption leads to a lower implied weighting factor.

D. TEST RESULTS AND RECOMMENDED WEIGHTING FACTORS

<u>Product Type</u>	<u>Average Annual Interest Available</u>	<u>Average Annual Interest Required</u>	<u>Annual Excess Interest Avg/Worst Avg</u>	<u>Annual Interest Deficiency Avg/Worst Avg</u>	<u>Implied Weighting Factor</u>
3. <u>Single Premium Immediate Annuity</u>					
Individual Non-Qualified (D)	7.65%	7.65%	.00/.00%	(.41)/(.41)%	.78
Individual Qualified (D)	7.87	7.87	.00/.00	(.65)/(.65)	.81
Group Qualified (D)	8.06	8.06	.00/.00	(.60)/(.60)	.84
Recommended Weighting Factor					.85

(D) Indicates decreasing reference rate trend.

(I) Indicates increasing reference rate trend. Shown only when this assumption leads to a lower implied weighting factor.

3. TEST RESULTS AND RECOMMENDED WEIGHTING FACTORS

<u>Product Type</u>	<u>Average Annual Interest Available</u>	<u>Average Annual Interest Required</u>	<u>Annual Excess Interest Avg/Worst Avg</u>	<u>Annual Interest Deficiency Avg/Worst Avg</u>	<u>Implied Weighting Factor*</u>
4. <u>Guaranteed Interest Contracts</u>					
(a) Guarantee Period 10 years or less:					
Market Value Contract--					
5 years (D)	9.07%	9.07%	.00/ (.08)%	.00/ (.08)	1.02
10 years (D)	8.70	8.70	.00/ (.04)	(.01)/ (.05)	.98
Book Value Contract--					
5 years (D)	9.73	9.73	.00/ (.94)	(.07)/ (.94)	1.16
5 years (I)	8.49	8.49	.00/ (.09)	(.65)/ (.74)	.89
10 years (D)	9.01	9.01	.00/ (.55)	(.05)/ (.55)	1.09
10 years (I)	8.88	8.88	.00/ (.05)	(.48)/ (.52)	.92
Recommended Weighting Factors--Market Value Contracts					1.00
Book Value Contracts					.90

(D) Indicates decreasing reference rate trend.

(I) Indicates increasing reference rate trend. Shown only when this assumption leads to a lower implied weighting factor.

*Weighting factor corresponding to valuation rate required on initial deposit. Later fund increments were valued based on the then current reference rates and weighting factors, producing a hybrid rate in the average annual interest required column.

D. TEST RESULTS AND RECOMMENDED WEIGHTING FACTORS

<u>Product Type</u>	<u>Average Annual Interest Available</u>	<u>Average Annual Interest Required</u>	<u>Annual Excess Interest</u> <u>Avg/Worst Avg</u>	<u>Annual Interest Deficiency</u> <u>Avg/Worst Avg</u>	<u>Implied Weighting Factor*</u>
4. <u>Guaranteed Interest Contracts</u>					
(b) Guarantee Period 10+ to 20 years:					
Market Value Contracts--					
10 years (D)	8.70	8.70	.00/ (.04)	(.01)/ (.05)	.98
15 years (D)	8.14	8.14	.00/ (.06)	(.03)/ (.09)	.93
20 years (D)	7.51	7.51	.00/ (.15)	(.02)/ (.17)	.93
Book Value Contracts--					
10 years (D)	9.01	9.01	.00/ (.55)	(.05)/ (.55)	1.09
10 years (I)	8.88	8.88	.00/ (.05)	(.48)/ (.52)	.92
15 years (D)	8.40	8.40	.00/ (.39)	(.02)/ (.39)	1.06
15 years (I)	9.36	9.36	.00/ (.01)	(.41)/ (.42)	.94
20 years (D)	7.94	7.94	.00/ (.74)	(.00)/ (.74)	1.18
Recommended Weighting Factors--All Contracts					.95

(D) Indicates decreasing reference rate trend.

(I) Indicates increasing reference rate trend. Shown only when this assumption leads to a lower implied weighting factor.

*Weighting factor corresponding to valuation rate required on initial deposit. Later fund increments were valued based on the then current reference rates and weighting factors, producing a hybrid rate in the average annual interest required column.

D. TEST RESULTS AND RECOMMENDED WEIGHTING FACTORS

<u>Product Type</u>	<u>Average Annual Interest Available</u>	<u>Average Annual Interest Required</u>	<u>Annual Excess Interest Avg/Worst Avg</u>	<u>Annual Interest Deficiency Avg/Worst Avg</u>	<u>Implied Weighting Factor*</u>
4. <u>Guaranteed Interest Contracts</u>					
(c) Guarantee Period over 20 years:					
Market Value Contracts--					
20 years (D)	7.51%	7.51%	.00/ (.15)%	.02/ (.17)%	.93%
25 years (D)	6.89	6.89	.00/ (.33)	.00/ (.33)	.99
Book Value Contracts--					
20 years (D)	7.94	7.94	.00/ (.74)	.00/ (.74)	1.18
25 years (D)	6.98	6.98	.00/ (.49)	.00/ (.49)	1.07
Recommended Weighting Factor--All Contracts					.90

(D) Indicates decreasing reference rate trend.

(I) Indicates increasing reference rate trend. Shown only when this assumption leads to a lower implied weighting factor.

*Weighting factor corresponding to valuation rate required on initial deposit. Later fund increments were valued based on the then current reference rates and weighting factors, producing a hybrid rate in the average annual interest required column.

E. SENSITIVITY TESTS

The foregoing results were tested for sensitivity to changes in the assumptions. These tests included changes in the mortality, persistency and issue age assumptions for the various product groups. The investment assumptions were also tested for sensitivity. Changes tested included various alternate trends in the reference interest rate and introduction of unscheduled prepayment of principal. The target statistics were also tested for sensitivity. As a result of this testing, it was concluded that changes in the implied weighting factors resulting from these sensitivity tests were not significantly large enough to warrant changes in the recommended weighting factors or introduction of additional variables.