

# **Documentation of**

## **The 2013 IDI Valuation Table Workbook Version 1.3.xlsm**

### **Joint American Academy of Actuaries/Society of Actuaries Individual Disability Tables Work Group**

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#### **Individual Disability Tables Work Group**

Robert W. Beal, MAAA, FSA, Co-Chairperson; Tables Subgroup Chairperson  
Douglas W. Taylor, MAAA, FSA, Co-Chairperson; Logistics Subgroup  
Chairperson

David M. Andreeae, MAAA, FSA  
Jay A. Barriss, MAAA, FSA  
Kathryn A. Campbell, MAAA, FSA  
Carl Desrochers, MAAA, FSA, FCIA, Margins Subgroup Chairperson  
Richard N. Ferree, MAAA, FSA  
Gregory A. Gurlik, MAAA, FSA  
Brian D. Holland, MAAA, FSA  
John A. Luff, MAAA, FSA, FCIA  
William A. Obert, MAAA, FSA, Credibility Subgroup Chairperson  
Marianne C. Purushotham, MAAA, FSA  
Todd M. Petersen, MAAA, FSA  
Mark S. Seliber, MAAA, FSA  
Jonathan E. Stinson, MAAA, FSA  
Nathan J. Worrell, MAAA, FSA

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## **Introduction**

This document describes the layout and functionality of the workbook called [2013 IDI Valuation Table Workbook Version 1.3.xlsm](#)<sup>1</sup>. The workbook was developed by the Individual Disability Table Work Group (IDTWG) of the American Academy of Actuaries to calculate individual disability income (IDI) claim costs, net premiums, active life reserves, and disabled life reserves using the 2013 IDI Valuation Table, and to compare these values to those based on the 85 Commissioner's Individual Disability Tables (CIDA and CIDC). Version 1.3 replaces Version 1.2, which was released in October 2015.

The workbook calculates claim costs, active life reserves, and disabled life reserves for the various tables from first principles. There may be future revisions to this workbook as additional functionality is added or corrections are made.

The workbook is being released with no cell protections. Any user modifications to the workbook are the user's responsibility. Users should store an unmodified version of this workbook before making any modifications that might support their analysis of the 2013 IDI valuation table.

The workbook requires at least 40 megabytes of storage. It is designed to run on Excel® 2007 and later versions.

Any questions, feedback or suggested corrections regarding the workbook should be directed to Bob Beal, who may be reached at 207-771-1201 or by email, [bob.beal@milliman.com](mailto:bob.beal@milliman.com).

The remainder of this document describes the content of the various tabs comprising the workbook.

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<sup>1</sup> This model is a prototype version and is not designed or intended to be relied upon for any purpose other than creating illustrative examples of its use. This model is provided on "AS IS" basis without warranty of any kind. The American Academy of Actuaries will not provide any debugging or other repair or technical support due to possible coding issues in this prototype. This model is copyrighted (Copyright © 2016) by the American Academy of Actuaries. All rights reserved. It may not be reproduced or distributed without permission of the American Academy of Actuaries.

## **Tab: Edits and Corrections**

This tab lists the various edits and changes to the workbook since Version 1.0.

The changes from Version 1.2 to 1.3 are as follows:

- The employer-sponsored incidence modifier has been expanded to reflect underwriting type.
- The contract incidence modifier has been expanded to include key person, which gets the same incidence modifier as the overhead expense contracts.
- The 2017 CSO mortality has been added as an option for the valuation mortality table to be used in the calculation of active life reserves.
- The formatting of the various valuation mortality tables has been improved.
- The end durations for benefit periods to 65, to 67, and to 70 and have been shortened by  $\frac{1}{2}$  year to reflect that disablement is expected to fall in the middle of the year of incurral.
- The end duration for the life benefit period has been expanded to age 119.5.

**Tab: ALR Calc – Calculates Active Life Reserves**

This tab calculates active life reserves (ALR) based on the specified input, which are provided in cells D9 to D29. The following describes the input parameters, which are in blue cells in the workbook:

- *Contract Type* (cell D9). The user selects accident and sickness (AS), accident only (AO), sickness only (SO), Overhead Expense (OE), or Key Person (KP).

Note that the workbook is not set up to calculate active life reserves for disability buy-out (DBO) coverages.

- *Occupation Class* (cell D10). The user selects an occupation class of M, 1, 2, 3, or 4.
- *Issue Age* (cell D11). The user selects any issue age from 20 to 69.
- *Gender* (cell D13). The user selects either male or female.
- *Smoker Status* (cell D14). The user selects nonsmoker (NS), smoker (SM), or aggregate (AG). No *Smoker Status* adjustments are applied to the 85CIDA claim incidence and termination rates.
- *Elimination Period* (cell D15). The user selects an EP of 0, 7, 14, 30, 60, 90, 180, 360, or 720 days. Note that 0-day EP is for accident only.
- *Benefit Period* (cell D16). The user selects a benefit period (BP) of 6M, 12M, 18M, 24M, 30M, 36M, 60M, to 65, to 67, to 70, or life.
- *Interest Rate* (cell D17). The user may input any interest rate.
- *Select COLA* (cell D18). The user may choose to inflate benefits using a cost-of-living adjustment.
- *COLA%* (cell D19). The user may input any annual inflation rate. This will be applied on a compound basis without any cap until age 65. [Note: The cost-of-living benefit adjustments do not increase after age 65].
- *Market* (cell D20). The user selects employer sponsored (ER Spons) or individual billed (Individual).
  - The employer sponsored modifiers vary by three underwriting types.
  - ES-IU = ER Spons individual underwriting, ES-VGSI = ER Spons voluntary guaranteed standard issue (GSI), and ES-MGSI = ER Spons mandatory GSI.
  - No market adjustments are applied to the 85CIDA incidence or termination rates.

- *Premium Pay To Age* (cell D23). Calculated net premiums are level at issue and are paid until the premium pay to age (e.g., 65). The user can input any premium pay to age greater than the issue age, not to exceed age 70.
- *Coverage To Age* (cell D24). This is the age at which disability coverage ceases. The user can input any coverage to age greater than the issue age, not to exceed age 70. Typically, the premium pay to age and the coverage to age are the same, but they do not have to be.
- *Minimum BP* (cell D25). The user inputs the number of days in the minimum BP (e.g., 720). This is applicable to benefit periods to 65, to 67, and to 70. The benefit period cannot be less than the EP plus the minimum BP. The calculations assume 360-day years and 30-day months.
- *Select Limiting BP* (cell D26). The user selects “yes” or “no.” This limiting BP applies to the shorter term BP (e.g., 60M). This option is provided because some IDI products limit the BP for a short-term BP so that it does not exceed the long-term BP (e.g., to 65) at the higher attained ages.
- *If Yes* (cell D27). If “yes” is selected in cell D26, the user selects the limiting BP from to 65, to 67, or to 70.

Note that Issue State is not a variable in the final 2013 IDI Valuation Table.

The last two input parameters apply to the ALR calculation methodology:

- *ALR Method* (cell D28). The user selects net level premium (NLP) or 2-year preliminary term (2PT).
- *Mortality / Lapse* (cell D29). The user selects from the following mortality or lapse assumptions to be used in the calculation of the net premiums and ALRs:
  1. 58CSO—the 1958 Commissioner’s standard ordinary mortality table by gender;
  2. 80CSO—the 1980 Commissioner’s standard ordinary mortality table by gender;
  3. 01CSO—the ultimate 2001 Commissioner’s standard ordinary mortality table by gender;
  4. 17CSO—the ultimate 2017 Commissioner’s standard ordinary mortality table by gender;
  5. Policy Lapse—Sample policy lapse rates are stored in the “Mortality and Lapse Rate” tab to be used in lieu of the CSO tables; or
  6. Policy Lapse\_GR—The sample policy lapses (from #4), capped using the statutory minimum reserve limitations on pricing policy lapses for guaranteed renewable policies.

Please note the following:

- The 2001 and 2017 CSO mortality tables stored in the workbook do not vary by smoker status.
- The mortality tables in the workbook are all Age Last Birthday.
- The stored policy lapse rates in the mortality and lapse sheets should not be viewed as endorsed assumptions; they are hypothetical. The stored policy lapse rates vary only by issue age and policy year. The user will need to modify the workbook if more differentiation in the policy lapse rates is preferred.

Once the input parameters are specified, the user hits the **Run Claim Cost Calcs** macro button, which causes the claim costs and the ALRs to be calculated. The claim costs are calculated in the “CC and DLR” tab and pasted back into the “ALR Calc” tab.

The key output in the ALR Calc tab is as follows:

- A comparison of active life terminal reserves based on 85CIDA and the 2013 IDI Valuation Tables, reflecting the user’s input specifications (columns I, J, and K). The ALRs reflect the ALR method specified by the user;
- A comparison of the claim costs based on 85CIDA and 2013 IDI Valuation Table, reflecting the user’s input specifications that were used in the derivation of the active life terminal reserves. See columns N and O;
- A comparison of net premiums based on 85CIDA table and the 2013 IDI Valuation Table, reflecting the user’s input specifications. [Note: Net premiums for both the NLP and 2PT methods are calculated, although only ALRs reflecting the specified ALR method are displayed, as described above]; and
- Graphs of the active life reserves and claim costs under the two sets of morbidity assumptions are provided beginning in cell A62.

Users may need to revise the scales in the graphs depending on the displayed values. There are intentionally no print areas in the workbook. Users will need to set their own print areas if they wish to print.

The details of the active life reserve calculations are provided to the right of column R. Users are encouraged to become familiar with the formulas.

## **Tab: CC and DLR Calc – Calculates Claim Costs and Disabled Life Reserves**

This tab calculates the claim cost for a single attained age based on the 2013 IDI Valuation Table adjusted by the specified input parameters and for the 85CIDA table. The sheet also projects the resulting disabled life reserves for the 2013 IDI valuation, 85CIDA, and 85CIDC tables.

The input parameters in cells C7 to C25 are defined similar to the input parameters in ALR calc; diagnosis has been added in cell C21 and is used only in the calculation of DLRs. Note that when the **Run Claim Cost Calcs** macro is run in the “ALR Calc” tab, diagnosis is automatically set to AG.

*Cause* is not a variable, but is rather a function of contract type in Tab CC and DLR Calc. *Cause* is set to Com if Contract Type is AS, KP, or OE, to Acc if Contract Type is AO, and to Sck if Contract\_Type is SO.

The workbook is not set up to calculate claim costs for DBO coverages.

When the macro **Run Claim Cost Calcs** is run in “ALR Calc,” the input parameters specified in that sheet are pasted in this sheet.

*Cause* (cell C26) is set to “Com” if the Contract\_Type is AS or OE, to “Acc” if the Contract\_Type is AO, and to “Sck” if the Contract\_Type is SO.

The user can run single attained age calculations in “CC and DLR” without having to use the macro in “ALR Calc” by changing the input parameters, which are in blue cells in the workbook. The resulting claim incidence modifiers are displayed in cells D30 to D33. The combined incidence modifier in cell D34 is the product of the modifiers in cells D30 to D33.

The resulting claim termination rate (CTR) modifiers are found in columns AY to BB.

The detailed calculations behind the claim costs and DLRs are to the right of column N. Users are encouraged to become familiar with the formulas.

The following are key output in the “CC and DLR Calc” tab:

- The resulting claim costs, along with the incidence rates and present value of future benefits (PVFB) for the specified attained age are displayed in cells G17 to I23; and
- Projected DLRs for the specified age at disablement, based on 85CIDA and 85CIDC claim termination rates, are shown in columns AO and AP; those based on the 2103 IDI valuation table are shown in columns BS and BT.

In the calculation of DLRs, the selected Diagnosis code is used unless the Contract Type is AO, in which case the Cause termination modifier is used.

The valuation table incidence margin is located in cell C38 and the termination margins are located in cells C42 and C43. For valuation purposes, companies cannot change the margins, except as permitted under the regulations. However, the user can test the impact of the margins on reserves by setting these margins to zero.

### **Tab: Incidence Modifiers**

This tab consists of tables containing the various claim incidence modifiers, which are applied to the 2013 IDI Valuation Table incidence rates (not CIDA):

*Contract Modifier.* This varies between AS, AO, SO, KP, and OE contracts. Note that KP and OE contracts share the same incidence modifier.

*Market Modifier.* These vary between employer-sponsored and individually billed. The employer-sponsored incidence modifier varies by underwriting type.

*Benefit Period Modifier.* These vary by benefit period, occupation class, and elimination period.

*Smoker Status Modifiers.* These vary by smoker status, occupation class, gender, and elimination period.

Note that *State* is no longer an incidence modifier in the 2013 IDI Valuation Table. Other than the removal of State as an incidence modifier, the incidence modifiers since Version 1.0 have not changed.

### **Tab: Termination Modifiers**

This tab contains the various CTR modifiers, which are applied to the 2013 IDI Valuation table CTRs (not CIDA or CIDC). These factors are by annual claim durations: Year 1, year 2, years 3-5, years 6-10. They are not applied to the ultimate durations (i.e., years 11+). Note that the Termination Modifiers in Version 1.3 have been revised since Version 1.0.

*Contract Modifier.* This varies between OE contracts and all other. For AS, AO, SO, and KP contracts, the contract termination modifier is 1.00. For OE contracts, the termination modifier varies by claim duration. OE and KP do NOT share the same termination modifiers.  
**[Note that the documentation for version 1.2 of the workbook incorrectly stated that the OE termination modifier applied to KP and DBO contracts.]**

*Benefit Period and COLA Modifiers.* These vary by type of benefit period, with and without cost-of-living adjustment (COLA).

*Diagnosis Modifiers.* There are 15 Diagnosis Groupings, which have been revised since Version 1.0. Details related to the diagnosis mapping are provided in the Diagnosis Groupings tab.

*Cause.* Termination modifiers by Cause have been added for the purpose of calculating ALRs for Accident Only and Sickness Only contracts and DLRs for Accident Only contracts.

Note that *State* is no longer a termination modifier in the final 2013 IDI Valuation Table.

### **Tab: Diagnosis Groupings**

There are 15 Diagnosis Groupings, which have been revised since Version 1.0. The assignment of ICD9 and ICD10 codes to these 15 Diagnosis Groupings, and the mapping of the Diagnosis Groupings to five sets of termination modifiers (Very Low, Low, Mid, High, and Very High) are provided in this tab.

### **Tab: Incidence Compare – Compares Incidence Rates per 1,000 of Exposed Lives**

Columns A to R in this sheet allow the user to compare the unmodified IDI base table incidence rates to the 85CIDA incidence rates for specified occupation class (cell C3), gender (cell E3), and elimination period (cell G3). Please note that the incidence rates for the new SOA Individual Disability Experience Committee (IDEC) occupation class M are compared to the 85CIDA occupation class 1 rates.

To the right of column T, the sheet compares the unmodified 2013 IDI Base Table incidence rates by occupation class for the specified gender (cell W2) and elimination period (cell Y2).

### **Tab: CTR Compare – Compares Claim Termination Rates**

This tab allows the user to compare the CTRs at all durations for 15 specified scenarios, by inputting values in columns C-Q, rows 11-20. The user also specifies the CTR basis (CIDA, CIDC, 2013 IDI Valuation for ALR, and 2013 IDI Valuation for DLR) in cell C8 and then hits the **Paste CTRs** macro button to compute the CTRs for each scenario. The specified CTR adjustment factors are applied if the IDEC basis is selected. The CTRs reflect the termination modifiers for the selected parameters. The user may change the number of scenarios to be displayed by adding or deleting columns.

### **Tab: Claim Cost Compare – Compares Claim Costs**

This tab allows the user to compare the claim costs at all policy years from the specified attained ages to age 69, for the specified eight scenarios represented by each of columns D through K. The user specifies the morbidity basis (CIDA, 2013 IDI Valuation) in cell D7. The user hits the **Compare CC** macro button to compute the claim costs. The appropriate incidence and

termination rate are applied to the base IDEC incidence and CTRs to derive the claim costs that are displayed. The user may change the number of scenarios to be displayed by adding or deleting columns.

**Tab: ALR Compare – Compares Active Life Reserves**

This tab allows the user to compare ALR terminal factors under various scenarios. The user specifies the morbidity basis (CIDA, 2013 IDI valuation) in cell D7. The user hits the **Paste ALR** button to compute the ALRs.

**Tab: DLR Compare – Compares Disabled Life Reserves**

This tab allows the user to compare DLRs under various scenarios. The user specifies the morbidity basis (CIDA, CIDC, 2013 IDI valuation) in cell C7. The user hits the **Paste DLR** button to compute the DLRs.

**Tab: 2013 IDI Base Incidence Rates**

This tab contains all of the 2013 IDI base claim incidence rates per 1,000 of exposed lives for attained ages 20 to 70. They vary by occupation class, gender, elimination period, and cause (accident vs. sickness). These incidence rates are before the application of any incidence modifiers or reserve margins.

**Tab: 2013 IDI Base CTRs – Select**

This tab contains the 2013 IDI base CTRs for the select durations. These termination rates are before the application of the termination modifiers or reserve margins.

**Tab: 2013 IDI Base CTRs – Ultimate**

This tab contains the 2013 IDI base ultimate CTRs. These termination rates are before the application of reserve margins.

**Tab: 85CIDA Incidence Rates**

This tab contains all of the 85CIDA incidence rates per 1,000 exposed lives. They vary by the 85CIDA occupation class (1, 2, 3, and 4), gender, elimination period, and cause (accident vs. sickness).

**Tab: 85CIDA CTRs**

This tab contains all of the 85CIDA termination rates. They vary by occupation class (1, 2, 3 and 4), gender, elimination period, and cause (accident vs. sickness). The ultimate CTRs are included in this sheet, along with the select CTRs.

**Tab: Mortality and Lapse Rates**

This tab contains the various CSO mortality rates and a sample set of policy lapse rates that can be selected in the ALR Calc sheet.

**Tab: Lookups**

This tab contains miscellaneous ranges required for the calculation of claim costs.