

## ProVal Changes Log

This log documents code changes that may produce different execution results. These differences may be those that are readily predictable or anticipated, apply in theory to certain input combinations, or are discovered after the fact. This log does not include fixes of syntax or execution errors; such fixes merely allow execution to proceed rather than changing previous results.

### ProVal version 3.23

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xx/xx/xxxx	In Screen Data, no longer flag inactive records with negative benefit amounts as an error under the test "Inactive – missing annual benefit amount". Inactive records with missing benefit amounts will still be flagged.
xx/xx/xxxx	<p>In Experience Studies in German mode, changed measurements for those active (or terminated vested) records who decrement due to retirement, death, or disability in the year, so that the following two points will hold:</p> <ul style="list-style-type: none"><li>• Exposure to the other decrements is 1/2 rather than 1, representing the 1/2 year they are exposed before mid-year decrement.</li><li>• They are also counted as inactives for 1/2 year exposure to inactive mortality.</li></ul>
xx/xx/xxxx	In ProVal PS, if combining an OPEB plan with a pension plan, the PBO will now sum the pension PBO and the OPEB APBO. Previously, only the ABO included the OPEB APBO amount.
xx/xx/xxxx	In OPEB mode scaling factors, apply scaling factors for future working lifetime as described. Previously, when the future working lifetime was 0, the scaling factor for future working lifetime was used explicitly.
xx/xx/xxxx	In OPEB mode scaling factors, fixed application of scaling factors for the denominator of future working lifetime to retirement and future working lifetime to full eligibility.
xx/xx/xxxx	In Canadian mode, fixed experience lump sums when the checkbox to set pre-commencement mortality to zero for inactives and actives after decrement was checked.
xx/xx/xxxx	In Deterministic and Stochastic Forecasts, improved interpolation/extrapolation of results in certain special cases.
xx/xx/xxxx	In Gain/Loss, changed the treatment of gain/loss for spouses, for participants that are inactive at the beginning of the period, non-participating at the end of period, and mapped to 'Lived'. Previously, we assumed the spouse died. Now, we assume the spouse lived.
xx/xx/xxxx	In OPEB mode Gain/Loss, added a new source to capture the gain/loss due to expected versus actual lapse rates. This will affect participants that are eligible at the beginning of period for a benefit that has lapse rates apply.
xx/xx/xxxx	In German mode Gain/Loss, fixed gain/loss due to active decrements and other implicit assumptions changes if a participant is eligible for the same benefit twice (through multiple benefit promises). These incorrect amounts offset each other, so the total gain/loss amount was correct.

### ProVal version 3.22

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05/07/2026	In Canadian mode, fixed solvency incremental cost when there is more than one employee contribution definition included in the excess contribution calculation.
05/04/2026	Fixed non-PPA amortization calculations if the underlying interest rates were duration based spot rates. Previously, they were treated as forward rates.

05/04/2026	In German mode, applied rounding to the Pensionskasse risk capital (Part A, B and C) if rounding of the liabilities was selected by the user.
03/31/2026	Under the GASB accounting standard, fixed accounting roll forwards that were greater than 2 years and used actual benefit payment overrides. Previously, the discounting of benefit payments in the second year was incorrect.
03/19/2026	In German mode, fixed rounding of Tax Reserve for inactive records. Previously, the liability used in the Tax Reserve calculation was summed across benefits before the rounding took place, whereas for the Teilwert, the rounding took place before the summation. The related Gap will also now be rounded.
03/13/2026	In an OPEB mode multi-year experience study, fixed display of subtotal results by year if the plan definition includes an inactive selection expression and the active decrement, election or lapse probability reports are selected. The total report and individual results were correct.
03/13/2026	In Deterministic Forecasts using a GASB accounting standard, changed the output saved for deferred liability and deferred asset gain/loss to be as of end of year. Previously, the beginning of year value was saved.
03/13/2026	Fixed the inactive liability for benefits that apply COLAs that vary by duration from commencement, and the benefit commences at date (or age) defined by field. Previously, a spurious extra year of COLA might have been given in the year of commencement depending on the rounding of the exact ages at commencement and at the valuation date.
03/11/2026	Fixed Ultimate Cost calculation for year 1 in a forecast with an accounting measurement date more than one year after the valuation date.
03/11/2026	In US Qualified Pre-PPA and Multiemployer Val Sets & Forecasts, fixed supplemental cost amortization with duration based spot rates. Previously ProVal was treating the rates as forward rates.
03/10/2026	In German mode, fixed the lump sum payment form value if deferred to a fixed date in the calendar year following the year of decrement, the contingency is retirement, the valuation date is not December 31, the lump sum dates fall before the valuation date anniversary (for example, lump sums paid on January 31 and valuation date is March 31) and the participant is born in the second half of both the valuation year and the calendar year. Previously, the payment form value and the liability were set to zero.
02/25/2026	In US Qualified mode with a PPA & CAS law type, fixed the calculation of CAS actuarial assets when the "exclude admin expenses from asset g/l" is checked. Previously, this parameter was ignored.
02/17/2026	In US Qualified mode with a PPA & CAS law type, fixed the PPA lump sum factor when not using underlying assumptions for Target PPA liabilities and using different conversion interest assumptions for Actuarial Liability and PPA. Also, fixed CAS lump sum factor in a CAS core projection with a non-zero Sensitivity Fraction less than one in Future Valuation Assumptions when the CAS liability conversion is not using underlying interest rates.
02/09/2026	In US Qualified mode with PPA & CAS law type, when the MAL interest rate is forecast based on corporate bonds, the historical averaging has been changed to a calculation that is independent of the PPA valuation interest rate assumptions. Previously, the PPA Max Tax interest rates could affect the MAL interest rate calculation.
01/24/2026	In Experience Studies, fixed active retirement decrement results if rates are by coded field or vary by service and the post-termination retirement rate coded field or service parameters differ from the active retirement rate parameters. Previously, the post-termination retirement rate coded field and service parameters were used to look up retirement rates for active participants.

- 01/13/2026 Fixed Benefit Formula Component accrual rates based on points (age+service) with a Service Definition that applies a cap. Previously incorrect accrual rates may have been used.
- 01/09/2026 In German Jubilee valuations, fixed sharp retirement when the Actuarial Retirement Age is the age on the valuation date, and the rounded age is less than the exact age. Previously, some of those records may have received both retirement and jubilee benefits at that age.
- 01/02/2026 In German mode, fixed Administration Factors' calculation of monthly commutation function Nx.
- 12/29/2025 Fixed points-based accrual rates using unrounded service, in the year of 100% retirement, if a participant is within 1 point of the next rate. Previously, part of the final year's accrual may have been credited at the next rate.
- 12/07/2025 In a gain/loss, fixed continuing Vested Valued as Active gain/loss due to a database field when the expected end of period value is based on projected employee contributions. Previously, in a case where employee contributions are not applicable to a participant because the participant's status is Vested Valued as Active, the expected end of period value was set to zero; now, the expected end of period value for the field will be set equal to the beginning of period value for that field.
- 11/25/2025 In Experience Studies, fixed results if pre/post commencement mortality and inactive post-decrement death benefit if the lurking benefit commencement parameters (when you switch to a non-post decrement death payment form) differ from the post-decrement death coverage commencement parameters.
- 11/17/2025 In German mode, fixed benefit eligibility for death and disability benefits that used the #DECSTOP operator in their benefit formula if the option to apply eligibility prior to averaging benefits was selected in Valuation Assumptions > Decrements. Previously, everyone was assumed to be eligible for these benefits.
- 11/16/2025 In Experience Studies in German mode, added evaluation of the disability decrement for Terminated Vested records. Previously, it was only evaluated for active employees.
- 11/14/2025 In German mode, in Jubilee valuations, fixed calculation of the 10-year rule, so that it now is measured from Date of Funding. Previously, it was measured from the Benefit Promise Date. (Here, the "10-year rule" refers to the rule by which a Tax reserve cannot be recognized for Jubilee benefits for a member who has less than 10 years of service.)
- 11/11/2025 In experience studies, apply post-termination retirement rates to vested valued through active participants. Previously the active retirement rates were used. Also fixed validation of sex field for vested valued through active participants if census data referred to census specifications which may have resulted in vested valued through active participants being excluded from processing.
- 11/3/2025 In German mode, removed the age 25 limit for orphans in a Pensionskasse run. Previously, payments to orphans stopped at the earlier of the "orphan normal age" specified by the user and age 25. If an orphan was over the orphan normal age but under 25 on the valuation date, a 1-year temporary annuity was paid. Now, payments stop at the orphan normal age, even if after age 25. If an orphan is over the orphan normal age on the valuation date, a 1-year temporary annuity is paid, even if older than 25.
- 10/23/2025 In non-US Qualified modes, improved calculation of contribution to avoid negative assets if an accounting only run, the measurement date is not equal to the valuation date and no cost method is specified.
- 10/13/2025 Improved calculation of contribution to avoid negative assets if there is a market value override. Also, no longer calculate a contribution to avoid negative assets in

a Valuation Set or the last year of a forecast since there is no projection of assets in that year.

- 10/10/2025 In German mode, made the following fixes for the Pensionskasse Risk Capital:
- Assumed a full year of payments in the last year of the mortality table. For example, if 100% death is at age 110, we now assume a full year of payments between ages 110 and 111. Previously, roughly half-year of payments, i.e.  $(1-k(12))$  for monthly annuities, were assumed in that year.
  - Ensured that the annuity values are not averaged at decrement. Previously, the annuity values were being averaged if RT 1983 applies.
- 10/9/2025 In German mode, fixed death-in-service benefits if using RT 1983 and the spouse age difference varies by member death age. Previously, we averaged  $a(y(x))$  and  $a(y(x+1))$ , where the end-of-year annuity was based on the age difference at member death age + 1. Now, we average  $a(y(x))$  and  $a(y(x)+1)$ , where both annuities are based on the same age difference - the one at member death.
- 10/01/2025 In German mode, made the following fixes for the PSVaG liability in Pensionskasse runs:
- Fixed the liability for decrementing actives in core projections. Previously, these were set to zero.
  - For retirees, changed the lookup age from rounded age on the valuation date to attained age on the valuation date.
  - For retirees, stopped applying the 20% annuity adjustment to the PV factors of temporary annuities (these should only have the  $2\% \times$  remaining temporary period adjustment).
- 09/25/2025 In Core Projections in German mode, fixed PSVaG liability for decrementing actives. In the case of 100% retirement probability at a given age, this resulted in zero PSVaG liability for decrementing actives in valuation years following the year of retirement. The PSVaG liability for decrementing actives for death and disability will also be affected by this fix, but to a lesser extent.
- 09/08/2025 In a forecast with an accounting known asset value override, fixed issue where a contribution in a contribution schedule made as of the last day of the measurement period was excluded from the roll forward of assets. This issue was dependent on the fraction of year that known assets were entered.
- 09/08/2025 In a PPA & CAS Forecast where all participants are included in the CAS liabilities, fixed small discrepancy between the PBGC NAR liability and the PBGC NAR CAS liability due to interpolation.
- 09/08/2025 Changed the behavior of Expression Sets on the Individual Results database run after the valuation is complete, to only apply to the records in the Individual Results database file that have been updated or added by the Valuation (when "delete all existing records" is not checked).
- 09/08/2025 In U.S. Public mode, fixed Vested Valued as Active subtotal accounting projected benefit payments. Previously they were displaying as zero.
- 09/08/2025 In US Qualified mode with a PPA & CAS law type, fixed the calculation of expenses included in CAS normal costs when no actuarial liability method was selected.
- 09/08/2025 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:
- ProVal\_WeightedRetAge\_acctg (Weighted Average Retirement Age (Accounting)) is a new report that calculates the Weighted Average Retirement Age based on accounting assumptions.

- ProVal\_CAS\_Cost (Assignable Pension Cost) has a new tag to display the assignable pension cost as of the beginning of the year.
- ProVal\_CAS\_Rollfwd (Prepayment Credits and Unallowable Amount) changed the tag 'CPC\_Boy' to 'APC\_Boy' when the calculation was fixed to include the assignable pension cost instead of the computed pension cost.
- ProVal\_USMaxPPA (Maximum Tax Deductible Contribution) has a new tag if the option to use the Pre-MAP-21 minimum required contribution is used in the calculation.

#### ProVal version 3.21

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09/05/2025	Fixed the calculation of expected end of period liability in a gain/loss when an inactive has a deferred joint and survivor benefit and the spouse is based on assumptions at commencement.
08/26/2025	In German mode, in Jubilee valuations, fixed the Date of Funding. Previously, it was being set based on the Benefit Promise date.
08/22/2025	In German mode, fixed cash balance and career average benefit components at sharp retirement dates if hired in the second quarter of the valuation year (for example, valuation date is 3/31/2025 and hire date is 7/5/2000), if the allocation date is different from the valuation date. Previously, the benefit component at allocation date preceding the decrement date was shifted one year back.
08/07/2025	In German mode, fixed retirement benefits if they contain a subformula with both the #ValType operator and an accrual definition.
08/01/2025	In German mode, fixed Jubilee promises for participants <u>hired</u> on the second day of the month. It was previously possible to get both a Jubilee and retirement benefit in the same year.
07/23/2025	Update mortality table rounding methodology for IRS 2024+ (dynamic) mortality tables with valuation dates in 2026 and later pursuant to Notice 2025-40.
07/21/2025	Fixed GASB roll-forward for end of period gain/loss event when there is a partial year roll-forward and a benefit payment override in the event.
07/21/2025	In a GASB valuation set when administrative expenses are paid out of assets but not included in service cost, fixed calculation of deferred inflows and outflows to generate a loss.
06/13/2025	In US Qualified mode with a PPA & CAS law type, fixed the roll forward of the CAS prepayment credit and unallowable amount in a forecast when the assignable cost limitation applies and/or when there is an end of year additional contribution.
06/09/2025	In German mode, fixed the pairing of Jubilee and ancillary benefits when the eligibility service for the ancillary benefit is a non-integer number.
06/09/2025	In pension modes, fixed lump sums with installments where the number of installments goes beyond the last age in the mortality table. Previously, the total lump sum amount was divided over the number of installments entered by the user, even though ages beyond the last age were not valued. Now, the total lump sum amount is divided over the lesser of the number of installments entered by the user and the period to the last age.
06/03/2025	In German mode, fixed gain/loss results if using a custom regulatory table, have the option selected to 'use regulatory data as of the valuation date for all years' and have a non-zero value entered in the valuation assumptions for the increase rates for the table. Previously, the increase rates would be used to determine the expected liability in the gain/loss, even though they were not used in the valuation.

05/19/2025	In German mode, fixed Attribution service for PBO and Eligibility for Jubilee benefits for members born on the 2nd day of a month. The calculation errors being corrected were introduced with the 3.20 update on 12/18/2024.
04/18/2025	Updated 2024 Schedule SB benefit payment schedule attachment (line 26b) to show annuity substitution benefit payments instead of liability benefit payments in accordance with 2024 instructions. You will need to rerun the underlying valuations to get the annuity substitution payment stream.
04/07/2025	In German mode, fixed the current retiree liability for Cantelli benefits, if the life insurance piece is paid to married only, and the individual method applies. Previously, the life insurance part of this liability was set to zero.
03/31/2025	Fixed the in-deferral COLA rate used for post-termination retirement benefits in Canadian Solvency liabilities when the Solvency COLA differs from the ongoing liability. Also fixed the in-deferral COLA rate used for post-termination retirement benefits in pre-PPA liabilities when a COLA applies to the main liability but not to the PBGC liability.
03/28/2025	Fixed 3rd year net amount recognized and gain/loss in a forecast if contributions are entered in a contribution schedule and a contribution made during the 2nd fiscal year is not applied to expected return on assets.
03/6/2025	For gain/loss analyses on a liability that uses a yield curve library interest rate assumption, ensure that the "interest rate assumption change" and "implicit assumption changes attributable to interest rates" line items in the Liability Gain/(Loss) by Source report are calculated properly.
03/5/2025	In post-decrement death benefits for initial inactives in a core projection with dynamic mortality and beneficiary determined at member death, fixed the mortality used in evaluating deaths prior to the projected valuation date. Previously, this mortality was normalized using a mix of calendar year tables, instead of using only the table applicable at the projected valuation date. In our testing, this fix changed the post-decrement death liability itself by only about 0.0003%, which was further diluted in the overall liability.
03/03/2025	In the US HCE/NHCE Determination tool fixed the Date of Hire Methodology in the Top Paid Election (20%) Parameters. Previously, the Date of Birth Methodology was being used.
02/27/2025	In US Qualified mode with PPA&CAS law type, when selecting EAN level % as the CAS AAL cost method, ProVal was only properly reflecting a choice to impute salaries from valuation date when EAN level % was also turned on for Actuarial Liability.
02/19/2025	In US Qualified mode with PPA&CAS law type, if employee contributions are reflected, the CAS employee contribution normal cost offset may have used the actuarial liability interest/mortality assumptions rather than the CAS actuarial liability interest/mortality assumptions.
02/13/2025	Fixed calculation of employee contributions if mid-year decrements were assumed.
02/11/2025	In Public Mode accounting valuations, fixed vested valued as active projected benefit payments. Previously, they would display as zero.
02/10/2025	a. In US Qualified mode with a PPA & CAS law type, fixed PPA at-risk active projected benefit payments. Previously, they would display as zero.
1/22/2025	Fixed vested liability by decrement if there are plan amendments.
1/13/2025	Fixed stochastic output by trial for cumulative employer contributions if an end of year additional contribution applies.

- 1/13/2025 Changed core projections with a COLA override where COLA assumption sensitivities are not applicable to not apply the COLA variation to that benefit in the sensitivity runs.
- 1/13/2025 Fixed calculation of the Geometric Efficient Frontier. Previously, the mixes generated were not necessarily efficient. Also fixed the calculation of standard deviation when populating geometric means from a CMS.
- 1/13/2025 In a ProVal PS forecast, if there are fewer than 8 benefit definitions, fixed PBGC at-risk results in very rare cases.
- 1/13/2025 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:

- The following new reports were added to U.S. Qualified mode with a law type of PPA and CAS:
  - ProVal\_CASMktAssets (Market Assets (CAS basis)),
  - ProVal\_DevCASAssets (CAS Assets),
  - ProVal\_CAS\_UAL (CAS Unfunded Liability),
  - ProVal\_CASBase (CAS Amortization Bases),
  - ProVal\_CAS\_Amort (CAS Amortizations),
  - ProVal\_CAS\_Cost (Assignable Pension Cost) and
  - ProVal\_CAS\_RollFwd (Prepayment Credits and Unallowable Amount).
- ProVal\_USMaxPPA (Maximum Tax Deductible Contribution) has new tags to display the Max Tax US segment or effective interest rates.
- ProVal\_AggNCCan (Minimum Funding Normal Cost (Canadian mode)) has new tags to show normal cost as a percent of hours, if hours are applicable.
- Public Mode and OPEB mode Valuation Set Events with underlying valuations run in ProVal 3.21 or later, ProVal\_Acctg\_Funded Status (GASB 67/68 Balance Sheet) has the following tag changes to support splitting the inactive roll forward of liabilities between in-pay status and deferred:

Description	Old Tag	New Tags
Beginning of period inactive liability	inactliab_val	inactliab_valp inactliab_vald
Expected benefit payments for inactives	EBP_boyinact_eoy	EBP_boyinactp_eoy EBP_boyinactd_eoy
Discounted expected benefit payments	TotalBPdiscinact_eoy	TotalBPdiscinactp_eoy TotalBPdiscinactd_eoy
Inactive benefit payments used to roll forward	inactchange_prorated_eoy	inactchange_proratedp_eoy inactchange_proratedd_eoy
Inactive interest cost	Interest_Cost_rfactinact_eoy	Interest_Cost_rfactinactp_eoy Interest_Cost_rfactinactd_eoy
End of period inactive liability	val2inact_eoy	val2inactp_eoy val2inactd_eoy

Inactive benefit payments for first 12 months of a roll forward	EBP_boy1inact_eoy	EBP_boy1inactp_eoy EBP_boy1inactd_eoy
Inactive benefit payments for months 13 – 24 of a roll forward	EBP_boy2inact_eoy	EBP_boy2inactp_eoy EBP_boy2inactd_eoy
Inactive benefit payments for months 25 - 36 of a roll forward	EBP_boy3inact_eoy	EBP_boy3inactp_eoy EBP_boy3inactd_eoy
Total inactive benefit payments discounted to boy for a roll forward longer than 12 months	Totalchginact_eoy	Totalchginactp_eoy Totalchginactd_eoy

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#### ProVal version 3.20

- 12/6/2024 In German mode, fixed exclusions of records with invalid spouse date of birth (DOB) if the Individual Method was selected for actives but not for terminated vested (or vice versa). In this case, ProVal previously excluded spouses with an invalid DOB, regardless of whether the member is active or terminated vested.
- 12/5/2024 In German mode, fixed career average and cash balance components for participants hired in the year preceding the valuation date and whose birthday is in the second half of the valuation year, if the accrued benefit provided by the user is as of the allocation date preceding the valuation date and the allocation date falls on valuation date anniversaries. Previously, the liability under these conditions was set to zero under both the PUC and the UC methods.
- 12/3/2024 In Canadian mode Valuation Sets & Forecasts, fixed the calculation of surplus under Alberta & Saskatchewan Applicable Law Selections.
- 12/2/2024 Fixed evaluation of the #NOATTRIB operator when the #NOATTRIB expression was only referenced by a subformula, there are no initial inactive participants, and all participants were eligible for all benefits. Previously, the #NOATTRIB expression evaluated as zero in this situation.
- 11/15/2024 In German mode, in runs with Jubilee promises, fixed retirement eligibility calculations when a record's Actuarial Retirement Age (ARA) is not a whole age (e.g. a date is used in the ARA definition), and the jubilee date falls in the same decrement year as the ARA. Previously, the retirement benefit may have been incorrectly treated as payable or not payable. In addition, the calculation of Actuarial Retirement Date was corrected.
- 11/5/2024 Fixed the Wage Base selected in Custom Operators of type "AVGWB" (in the topic "Average Wage Base Parameters"). Previously, if you set the Wage Base to be "(Canadian) YAMPE", "(German) BBG", "(German) BBG-KV" or "(U.K.) LEL", ProVal instead used "BBG", "BBG-KV", "LEL" or YAMPE, respectively. To correct, open each Custom Operator of type "AVGWB" where the Wage Base is set to one of the four values above (and was last modified after April 30, 2024). Then, select the topic "Average Wage Base Parameters", make sure the correct wage base is selected, click "OK" and then "Replace".



- 10/22/2024 In German mode, fixed gain/loss source due to change in regulatory items, when 'use reg data as of valuation date for all prior years for actives' is checked, but prior years values are still used in the calculation, e.g. BBG calculations.
- 9/23/2024 Changed validation of COLA start date database field. Previously, participants may have been excluded for an invalid or missing value in this field, even if their benefits did not have valuation COLAs applied.
- 9/10/2024 In OPEB mode, fixed spending accounts if increase rates apply, the spending account is restated at Medicare age, and the spending account covers both a member and a spouse benefit (and the member is not the same age as the spouse). Previously, the capped post-Medicare claims for the younger spouse were overstated. Both actives and inactive were affected.
- 8/26/2024 Fixed Gain/Loss results when using a spread gain method and there are end of period Vested Valued through Active records with non-zero salaries. The total gain/loss amount was correct, but some amounts were allocated to the wrong buckets.
- 8/22/2024 Fixed PBGC and CAS Inactive Counts for Vested Valued as Active Participants when their count field was not equal to 1 or if some records were excluded for count purposes.
- 8/21/2024 Fixed experience benefit payments to the spouse for inactive participants under joint Life or Post-Decrement Death Benefit payments forms where the beneficiary is determined at member death. Headcounts on projected valuation dates may also be affected if the above benefits are present. This bug was introduced with the 12/19/2023 update to version 3.19.
- 8/21/2024 In OPEB mode, fixed the annual limits on reversionary annuities if the timing of claims is middle-of-year or end-of-year, and the mortality discounting is adjusted accordingly. Previously, if only one benefit was included in the annual limit, the payment in the year of member death was incorrectly ignored. If multiple benefits were included in the annual limit, the payment in the year of member death was included but the limit was not applied to the payment in that year.
- 8/21/2024 Fixed experience benefit payments to the spouse for inactive participants under joint Life or Post-Decrement Death Benefit payments forms where the beneficiary is determined at member death. Headcounts on projected valuation dates may also be affected if the above benefits are present. The bug was introduced with the 12/19/2023 update to version 3.19.
- 8/5/2024 In German mode, made small changes to calculation of SVR. Now the Earnings Points (Entgeltpunkte) are rounded to 2 decimal places after multiplication by the Attribution Factor (Zugangsfaktor). Also, for records born on July 1 of any year, the rounded age at 1/1/2003 has been corrected.
- 7/30/2024 In experience studies, if an eligibility criteria row is specified by plan constants, ignore that row for participants with blank plan constants. This is consistent with the treatment in valuations and core projections. Previously, these participants would be considered eligible.
- 7/26/2024 In German mode, fixed Teilwert liabilities in Deferred Compensation promises, when the PSVaG liability is not being run (as is common in Core Projections), and there are promises that not all members are eligible for. Previously, the UC liability was not being correctly taken into account.
- 7/17/2024 Fixed J&S conversion factors and administration factors that use age by year mortality improvement scales. This bug was introduced in ProVal 3.20.
- 7/15/2024 In German mode:
- Fixed benefit components with projection for terminated vested participants and post-termination benefits of active participants. If there is a conflict

between the "Vesting" topic and the "Project/Freeze" topic in a benefit component, the Vesting topic now takes precedence. For example, if the user indicated in the "Project/Freeze" topic that the benefit is projected to age 55 with service and interest credits, but then checked "Freeze service and interest credits at termination" in the Vesting topic, the benefit will now be frozen at termination.

- Fixed benefit components for post-termination benefits of active participants. The Pure Unit Credit results at retirement dates were previously set equal to the results at valuation date anniversaries. Now they reflect the actual (sharp) retirement dates. This affects mostly cash balance components where interest continues after termination.
- Fixed cash balance components under PVB, UC & PUC if hired in the year preceding the valuation date and the birthday in the year of hire is less than 6 months after the date of hire (for example, valuation date is 1/1/2024, hire date is 10/1/2023 and date of birth is 7/1/yyyy or 11/1/yyyy). In those cases, the PVB for decrements in the valuation year was missing the accrued balance, and the UC b.o.y. and e.o.y were both set to zero.
- Fixed the UC e.o.y. results for career average and final average components for decrements in the valuation year to reflect accrual only to the sharp retirement date (previously, a full year of accrual was granted). This only affected career average components where the allocation in the year of decrement is set to either "None" or "Partial year".
- Fixed cash balance PVB, PUC and UC results if the sharp retirement dates are exactly one year after the valuation date anniversaries in the year of final retirement. Previously, ProVal was missing 1 full year of interest in the final retirement year in the PVB and PUC results and included a spurious accrual in the UC results.
- Fixed results for the State Pension (SVR). Previously, the calculations were off by up to 3% for some records.
- Ensure that the Teilwert 1992 adjustment for Tax Reserve is not applied to participants hired after 12/31/1992. Previously, this adjustment may have been applied to participants hired in 1993.

7/11/2024	Fixed CAS Minimum Accrued Liability emerging inactive projected benefit payments when EAN is selected as the CAS Actuarial Accrued Liability cost method.
6/11/2024	Changed validation of COLA start date database fields. Previously, participants may have been excluded for an invalid or missing value in this field, even if they were not eligible for the benefit to which the COLA applied.
6/7/2024	In German mode, in Valuations & Core Projections, fixed the test for excluding inactive records with a Certain Only payment form. Previously, those whose current ages were within one half year of the end of their certain periods may have been incorrectly included or excluded.
6/4/2024	In German mode, fixed the timing of cash balance interest for retirement benefits under the pure unit credit method. Previously, interest stopped at valuation date anniversaries. Now, it extends to the sharp retirement dates.
5/20/2024	In non-German pension modes, changed initial inactive participant experience spouse mortality to start at member death if all joint life and post-decrement death benefits have the beneficiary determined at member death. Initial inactive participants who have at least one spouse benefit determined at valuation date or at commencement will continue to start experience spouse mortality at the valuation date.

5/9/2024	In the gain/loss tool for U.S. Qualified PPA & CAS runs, fixed explicit interest rate gain/loss when the end of period valuations used different valuation assumptions than the beginning of period valuations.
5/7/2024	Fixed calculation of CAS Minimum Actuarial Liability optional form conversion factor when interest sensitivities were applicable, optional payment forms were present, the CAS Minimum Actuarial Liability optional payment form conversion factor interest rate was set to "underlying liability interest rate", and the CAS Minimum Actuarial Liability valuation interest rate was set to "use PPA Funding rates". In this case, the interest sensitivity was being double counted when calculating the MAL optional payment form conversion factor.
5/3/2024	Fixed German Cantelli benefits to reflect the spouse fraction and the exact half year timing in the present value of the life insurance component of the benefit.
4/26/2024	Fixed J&S conversion factors calculated in benefit formula component tables and used in optional form conversions when there is a spouse under age 15 to use zero for mortality under age 15. Previously ages under 15 were using the age 15 mortality rate.
4/26/2024	In a core projection with plan amendments and benefits with the amendment contingency adding to 100% election probability, fixed potential issue where the emerging inactive headcounts was set to zero.
4/26/2024	In German mode, use pre-commencement interest during a deferral period after retirement, death or disability. Previously, the post-commencement interest rate was used during this period.
4/26/2024	When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column: <ul style="list-style-type: none"> <li>• ProVal_USPreMAP21MinPPA (Pre-MAP-21 Minimum) has new tags to show the development of the Pre-MAP-21 UC Funding Target.</li> <li>• ProVal_AggNCQual (Minimum-basis Normal Cost) has new tags to show normal cost as a percent of hours, if hours are applicable.</li> <li>• ProVal_SolvDef (Solvency deficiency) has new tags to display the target percentage and solvency funding target for applicable provincial law selections of Ontario, British Columbia, and Manitoba.</li> </ul>
4/26/2024	In Gain/Loss, fixed results for a record active at beginning of period and non-participating at end of period if the plan pays lump sums, the non-participating cash-out selection is "Yes," and the decrementing active expected benefit payment for new vested records selection is zero.
4/26/2024	In Gain/Loss, fixed potential incorrect results analyzing benefits received by decrementing actives when there are employee contributions.
4/26/2024	In Canadian mode, the Solvency special payment checkbox has been repurposed to the Ignore solvency & windup for statutory calculations checkbox. Therefore, if checked previously, we may have considered windup for the Maximum Tax Deductible calculation and now it will be ignored.
4/26/2024	In plans with a Minimum Liability, fixed additional minimum liability calculation when PPA attribution is applied.
4/26/2024	In plans with a Minimum Liability, fixed the mortality used in the additional minimum liability's normal cost calculation. Previously, the normal cost under any liability measure (e.g. PPA) could vary depending on the mortality used in Actuarial Liability.
4/26/2024	Fixed employee contribution normal cost offset when an interest and/or mortality other than the ongoing valuation basis was specified. Previously, the regular

ongoing valuation basis interest and mortality could have inadvertently been used for some other bases. Also fixed the PPA Max Tax normal cost offset for employee contributions when middle of year timing has been specified.

4/26/2024 Fixed expected benefit payments for decrementing actives for OBRA, RPA, Maximum Contribution, Solvency and Windup bases. The liabilities for decrementing actives are not affected (only the EBPs) and only core projection results are affected.

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ProVal version 3.19

4/1/2024	In a core projection with new entrants and employee contributions, apply the contribution timing parameter for new entrants.
3/1/2024	Fixed potentially incorrect attribution service when attributing to eligibility, eligibility includes a points criteria, and eligibility service has fractional accruals and no rounding. This will not impact a participant who has additional non-points-based eligibility requirements, and they satisfy those requirements before the points requirement.
1/26/2024	In Canadian mode Valuation Sets & Forecasts with an Applicable Provincial Law selection of Quebec, fixed the calculation of ongoing surplus for purposes of the maximum tax-deductible contribution. Previously it was missing the PfAD.
12/28/2023	In Canadian mode core projections, fixed lump sum and late retirement factors that are set to use valuation interest rate in valuation assumption conversion factors and are set to use the valuation benchmark in the valuation assumptions sensitivities topic of projection assumptions. Previously, the the low and high valuation interest rate sensitivities may not have moved the factors in tandem with the underlying valuation interest rates.
12/1/2023	Fixed experience spouse mortality for initial inactives to ensure unique experience regardless of benefit provisions. Experience spouse mortality for initial inactives with benefits that determine beneficiary at member death now always starts at the valuation date (except in German mode where it starts at member death). The age difference is looked up at that point too, if defined by table.
11/20/2023	In Valuation Sets with an event that only has accounting liabilities and is immediately after an event that only has funding liabilities, fixed the calculation of accounting plan and assumption changes.
11/17/2023	In an OPEB valuation set, fixed the EAN liability and normal cost if the funding and accounting sensitivities selected differ. Previously, they were set to the funding sensitivity instead of the accounting sensitivity.
11/15/2023	Fixed rounding of the end of year additional contribution if paid after the end of the plan year. This could have caused a \$1 difference between this contribution amount to meet a funding target and funding balances needed to be waived to meet the same target.
11/15/2023	In US Qualified mode, fixed the waived balance output item if waiving to meet a funding target and the amount to waive is greater than the funding balances.
11/13/2023	In U.S. DC ADP/ACP Tests, fixed determination of who is Otherwise Excludable when using Immediate entry dates, so that they are Otherwise Excludable if they would have entered before the last day of the plan year being tested. Previously, their theoretical entry dates were compared to the first day of the plan year.
11/08/2023	In the HCE/NHCE determination tool: <ul style="list-style-type: none"> <li>• Revised the threshold for determining a highly compensated employee based on ownership to be greater than 5% (instead of greater than or equal to 5%) in the current or prior year.</li> </ul>

- Revised the top paid election parameters age calculation. The option to freeze service at date of termination now also applies to the age calculation, so both age and service will be frozen.
  - Revised the count of the entire control group for the number of employees in the top paid election (top 20%) to be the number of employees on the prior year's payroll if a lookback database is selected.
- 11/02/2023 Fixed the experience spouse age difference for initial inactives if set by table. Previously, the first value of the table was used (set to 0 by the system). Now, it uses the value corresponding to the age on the valuation date. Usually, the age difference is looked up at the age at which the beneficiary is determined (which can vary by benefit), but on experience basis ProVal determines the beneficiary at the valuation date to ensure unique experience across all benefits. This issue was introduced with our change of experience spouse mortality on 8/10/2023.
- 11/01/2023 Fixed the "use valuation interest rate" option in a lump sum factor benefit formula component in accounting valuation assumptions if the underlying valuation interest rates are duration from valuation date spot rates. Now, we will always use the "Discount to val. date, adjust to decrement (annuity sub.)" method. This is consistent with the interest rate treatment for accounting valuation assumption optional payment form conversions that use the underlying valuation interest rates as well as the treatment for PPA funding valuation assumption lump sum factors that use the underlying liability interest rates.
- 10/31/2023 Fixed decrementing active headcounts for RPA/Max Contribution basis. Previously the wrong mortality may have been used which impacted emerging inactive expected benefit payments.
- 10/27/2023 Fixed rounding of expected return on assets when the unrounded expenses end in precisely 0.5.
- 10/18/2023 Fixed spouse mortality for initial inactives if the box "Use retired member mortality prior to member death" was unchecked in the Valuation Assumptions but checked in the Projection Assumptions. Previously, the spouse mortality on the valuation basis was set as if the Valuation Assumptions box was checked as well.
- 10/6/2023 Fixed results in a forecast if overriding asset values at the end of the first year, there is no contribution schedule, there is no receivable for the 1st year, but there is a first year contribution.
- 10/3/2023 In German mode, for inactive joint and survivor and post-decrement death benefits, ensure that beneficiary is always determined at member death, even if the benefit was opened in another mode and set to a different option.
- 9/29/2023 Fixed Gain/Loss Analysis, when benefit payments with interest are stored in a database field and there are more than 500 records. Previously, only the benefit payments for the last block of 500 records was used.
- 9/27/2023 When a German State Pension custom operator (#SVR) is based on a salary definition with a custom limit, ensure that the salary limit for the correct calendar year is used. Previously, it may have been off by a year.
- 9/26/2023 In German mode, fixed lump sums paid on a fixed date in the year after the year of decrement if using a fixed interest specified within the payment form. Previously (since our August 10, 2023 update), the fixed date was not accurately reflected.
- 9/26/2023 In Gain/Loss, fixed expected spouse mortality in 'liability gain/(loss), by source' report and individual results, when there are inactive REA or J&S benefits with beneficiary determined at valuation date or at commencement, and using retired member mortality for beneficiaries prior to member death.

9/25/2023	In Nondiscrimination Accrual Rates Tool, fixed calculation of permitted disparity factor when current age equals SSNRA. Previously in that specific case, SSNRA would be used to choose the factor. As per Regulation 1.410(a)(4)-7, the factor should be at the lesser of 65 or testing age.
8/18/2023	In German mode, if stochastic decrements apply and the Collective Method is used for spouse mortality, prevent spouse deaths prior to member death. Also, apply the half year adjustment in the year of member death before rolling the dice. This way, the mean from a stochastic run with enough trials will match the probability-weighted run.
8/18/2023	Fixed post-decrement death benefits and the spouse-only portion of joint life benefits if the beneficiary is determined at member death (or if the box "Use retired member mortality prior to member death" is checked) and fractional percent male is used.
8/18/2023	In a Canadian mode stochastic forecast, fixed application of solvency surplus when the option to adjust ongoing bases during the solvency period was not selected. Previously, in rare cases, bases may have been written down when they should not have been.
8/18/2023	In a PPA stochastic forecast, fixed results if PPA interest rates are forecasted using a parallel shift and there is a first or second year interest rate benchmark override in stochastic assumptions. This is rare and dependent on how trials are grouped together.
8/10/2023	When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column: <ul style="list-style-type: none"> <li>• ProVal_USCredBal (Credit Balances) has new tags if the options to waive balances to meet a % of Funding NAR FTAP and to waive balances to meet a % of Max Tax UC NAR FTAP are both specified.</li> <li>• ProVal_PBGCPremPPA (PBGC Premium) has a new tag to display the PBGC effective interest rate.</li> <li>• ProVal_MeasDateBPs (Measurement Date Benefit Payments) columns to show the Present Value of EBO, PBO, and Service Cost.</li> <li>• ProVal_SpotRateIC (Spot Rate Method Interest on PBO &amp; Service Cost) is a new Valuation Set report that displays the calculation of interest on PBO and service cost under the spot rate method.</li> </ul>
8/10/2023	Fixed issue where unique inactive experience mortality was not used across benefits with different commencement ages or different beneficiary determined at parameters. This created the possibility that a member (or a spouse) could die in experience for one benefit and not for another. This change only affects experience survival for initial inactives in a core projection.
8/10/2023	Fixed emerging inactive headcounts, if a participant receives different benefits within a contingency depending on the year of decrement (e.g. ages into eligibility for a new benefit). Previously, only one of these benefits was included in the emerging inactive headcount. This may also change the emerging inactive average age and percent male.
8/10/2023	For in-svc benefits, fixed the 'eligible for only one year' option, if an 'or earlier date' is specified for eligibility. Previously, the eligibility would continue until one year after the eligibility age/svc/points criteria was met.
8/10/2023	Changed lump sum payment forms with installments and a constant interest to ignore all COLA parameters. ProVal allows you to specify the interest on the lump sum installments either through the COLA assumptions or by entering a constant interest rate in the payment form itself. Previously, if you used a constant interest,

ProVal ignored all COLA rates but used the COLA timing parameters and required you to check the "apply COLA" box in the corresponding benefit definition. Any COLA caps defined in the benefit definitions were also honored. Now, we ignore all COLA parameters if using a constant interest on the installments.

- 8/10/2023 Fixed experience decrements if you have 100% termination and have checked the box "Continues after retirement eligibility" under Projection Assumptions > Decrements > Termination. Previously, if a participant was eligible for retirement, the termination rate was set to 0% and the retirement rate was set to 100%. Now, we leave the termination rate at 100% and set the retirement rate to 0%.
- 8/10/2023 For PPA runs, when determining the most valuable optional payment form for At-Risk liabilities, when normal and optional forms are virtually as valuable, the normal form will be given preference. Previously, the optional form may have been given preference.
- 8/10/2023 In a PPA Core projection, fixed NAW projection if the underlying projection assumptions included the national average wage. Previously, the NAW assumption from the current year instead of 2 years prior were used. If the NAW was not set up in the underlying projection assumptions, ProVal used inflation. This treatment has not changed.
- 8/10/2023 In Canadian mode, fixed bug allowing invalid values to be saved for Optional Forms conversion factors, which could have caused Solvency interest to be applied to the optional forms conversions when the dialog box appeared to indicate that no override would be used. This could have happened in rare cases when Solvency was turned off in the Valuation Assumptions, then the Optional Forms Conversion Factors were specified, and then Solvency was turned back on.

#### ProVal version 3.18

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- 6/29/2023 Fixed accounting Valuation Set results if running other than the accounting baseline sensitivity with a plan change event, the measurement date is after the valuation date, and a yield curve is used. Previously, the interest rate used to roll forward the liability was adding the interest sensitivity amount twice. Also fixed the Accounting Liability Sensitivities exhibit if the accounting methodology interest method is the individual spot rate method, the measurement date is after the valuation date, and interest sensitivities apply.
- 6/26/2023 Fixed the schedule of active participant data (age/svc scatter) when the credited service is based on a service definition with a cap applied.
- 4/27/2023 If percent married in projection assumptions varies by coded field, skip validation of coded field for inactive records. Previously a gain/loss would run and treat inactives who are missing the field as non-participating, potentially creating a large system change gain or loss and offsetting unreconciled amount.
- 4/27/2023 In a Canadian mode stochastic forecast, allow a scalar Solvency Transfer Value interest rate assumption to be forecast to a yield curve. Previously, scalar transfer value interest rates were assumed to remain scalar in a forecast.
- 4/19/2023 Fixed bug in Canadian mode core projections that included accounting assumptions (in addition to funding). The Ongoing basis election probabilities were being used for Solvency rather than the Solvency election probabilities (when they are different).
- 4/12/2023 Fixed inactive benefits with commencement date and benefit change date (from the inactive payment form) falling in the same year. The two corresponding partial year adjustments are now synchronized.

4/6/2023	Fixed Section 420 Transfer calculation under PPA to use the funding target calculated under section 430 without interest rate smoothing under subsection (h)(2)(C)(iv).
3/30/2023	In valuations, the linear to decrement service field will always be validated if specified. Previously, it was only validated in a valuation if the PUC or UC actuarial liability cost method was selected. This field was always validated for core projections, when specified. Therefore, gain/loss may have excluded records for missing data who were included in the valuation runs.
3/29/2023	Fixed potential overstatement of inactive average age and percent male when interpolating results to exact age and viewing by subtotal.
3/24/2023	Fixed valuation and core output for vested liabilities split by decrement if scaling factors apply. The total liabilities and liabilities by benefit were correct.
3/17/2023	Emerging inactive headcount fixes: <ul style="list-style-type: none"> <li>• In US Qualified and Universal modes, eliminate the double counting of emerging inactive headcounts in certain cases where participants are potentially eligible for more than one benefit and at least one of those benefits has a special benefit formula for attribution.</li> <li>• In non-German pension mode core projections, fixed emerging inactive headcounts and benefits in force for post-termination retirement benefits for participants who have terminated but not yet retired. Previously: <ul style="list-style-type: none"> <li>○ If participants had multiple termination benefits, which they become eligible for at different points in time, benefits for which they were not eligible at termination may have been included.</li> <li>○ Participants who were expected to die before retirement were not included.</li> <li>○ Benefits in force were incorrectly reduced by an additional survival factor and a monthly adjustment.</li> </ul> </li> <li>• In non-German pension mode valuations, fixed emerging inactive headcounts for post-termination retirement benefits. Previously participants who have terminated but not yet retired were not included.</li> </ul>
3/7/2023	In a forecast using an accounting roll forward longer than 1 year using the effective discount rate method, fixed the accounting expected benefit payments.
1/18/2023	In German mode if the Individual Method applies, fixed optional form conversion factors and lump sum components based on joint life and post-decrement death benefit payment forms. Previously, the spouse survival to member death age was based on the mortality specified in the conversion factors. Now it is based on the retiree mortality specified in Valuation Assumptions > Decrements. Also, ensured that spouse survival for this purpose starts at the original valuation date, if paid to married only. Previously, spouse survival could start earlier.
1/18/2023	In German mode if the Individual Method applies and the retiree mortality is pre/post-commencement, changed the spouse survival to use only the post-commencement mortality. This way, the experience spouse survival will not vary by benefit or by lump sum component.
1/6/2023	Fixed post-decrement death benefit optional form conversion factors if defined with interest and mortality, beneficiary is determined at decrement, the option "Joint life if married; corresponding life annuity if single" is selected (Valuation Assumptions > Election Probabilities) and the percent electing J&S is not equal to 1 (Valuation Assumptions > Other Valuation Parameters). Previously, the percent electing J&S was applied to the post-decrement death benefit conversion factors.



Please note that we continue to apply the proportion married to the conversion factors in this case.

- 12/20/2022 For LTD valuations:
- For all LTD tables, reversionary annuities were being payable upon both death and recovery instead of just death.
  - For the CIA 2009-2015 table, life insurance was being incorrectly paid after the last published select rate.
  - For the CIA 2009-2015 table and U.S. 1987 NAIC table, for participants who became disabled prior to age 25, expected lifetime was incorrectly extending past when the participant was no longer on LTD.
- 12/19/2022 In German mode for valuations as of December 31, fixed the numbering of years for individual results by year for Expected & Projected benefit payments. Previously, they were shifted by one year.
- 12/12/2022 In Gain/Loss, fixed 'liability gain/(loss), by source' and 'status reconciliation for gain/loss' reports when there are vested valued through active participants. Previously vested valued through active participants were not included. Individual results and sample lives were accurate. This bug was introduced in 3.18.
- 12/9/2022 In an ASC715 or IAS 19 Valuation Set with the measurement date after the valuation date and using the individual spot rate method with the annuity substitution benefit payment method, fixed accounting liability sensitivities and plan change amount, if applicable, to ensure the roll forward liability uses the expected benefit payments, not the annuity substitution benefit payments.
- 12/6/2022 In German core projections, fixed Modified Teilwert if the Teilwert parameters applied German statutory rules. Previously, the Teilwert parameter was erroneously being applied to the Modified Teilwert calculation.
- 12/6/2022 In Canadian mode, fixed the future expected benefit payments individual results fields for Vested Valued as Active participants. Previously, these individual results fields were incorrectly displaying zero values.
- 12/1/2022 Fixed potential incorrect cumulative accrual rate when accrual rate varies by age or there are new rates as of an effective date and the accrual service is based on a service definition that applies a cap.
- 11/18/2022 In a stochastic forecast that combines funding only core projections with accounting only core projections that reference separate plan definitions with different benefits, improved interpolation of liabilities in some rare situations.
- 11/9/2022 In US DC ADP/ACP tests, fixed the calculation of HCE's average deferral ratio to include all deferrals even if the total deferrals exceed the 402(g) limit.
- 11/4/2022 In a forecast, fixed accounting assets if the measurement date is more than 12 months beyond the accounting date and a known asset value override is entered.
- 11/3/2022 In US DC ADP/ACP tests, fixed calculation of refunds. Previously, some HCEs could see a reduction of 0.01% too much in the determination of the dollar amount, and some HCEs could get a reduction of \$0.01 too much in the apportionment of the dollar amount.
- 11/1/2022 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:
- ProVal\_CanMin (Minimum Required Contribution) has new tags to display the solvency interest rates. It also has new tags if the Manitoba 2021 Amendments to the Pension Benefit Act are applicable.

- ProVal\_PBGCPremPPA table (U.S. PBGC Premium (PPA)), ProVal\_PBGCPrem (U.S. PBGC Premium), and ProVal\_FundTgt (Funding Target) have new tags to display the participant count and loads, if applicable, by status.
- ProVal\_RecFAS87\_158 (ASC 715: Reconciliation of Funded Status / Balance Sheet Entries), ProVal\_RecFAS106\_158 (ASC 715: Reconciliation of Funded Status), and ProVal\_ReclAS19R (IAS 19: Reconciliation of Funded Status / Balance Sheet Entries) has new tags in a forecast if the measurement date is more than one year after the valuation date.
- ProVal\_Funding\_Rollforward (Funding Liability at Valuation Date) has new tags if overriding funding benefit payments with actual amounts.
- ProVal\_AccountingSens (Accounting Liability Sensitivities) has new tags to display duration if ASC 715, IAS 19, or CICA 3462 is applicable and interest sensitivities are available.
- ProVal\_FundingSens (Funding Liability Sensitivities) is a new Valuation Set report that displays the sensitivities run in the underlying valuations.

11/1/2022	In Valuation Sets & Forecasts with a liability override, fixed projected benefit payments when a status code existed in the override that did not exist in the baseline.
11/1/2022	Fixed results if the PVFS, valuation salary, & total salary salary definition was set to be different than the census specification salary definition and also used in a custom operator. Previously, the census specification salary definition was incorrectly being used for PVFS, valuation salary and total salary.
11/1/2022	When yield curve forecasting, improved interpolation for rare trials where the duration is less than -54 years. Also, fixed issue so running a deterministic forecast for a single trial of a stochastic forecast will always match the results for that trial within the stochastic forecast if a trial processed in the same block had a duration of more than 54 or less than -54.
11/1/2022	Eliminate the double counting of pension emerging inactive headcounts in certain cases where participants are potentially eligible for more than one benefit.
11/1/2022	In Valuation Sets & Forecasts, fixed the rounding of administrative expenses in the projection of assets.
11/1/2022	Fixed calculation of elapsed time from the liability calculation date to the measurement date under the GASB accounting standard when the roll forward period was greater than 1 year but less than 2. Previously, the wrong year was used to determine if the fractional part of the second year was a leap year.
11/1/2022	Fixed linear attribution with beginning of year decrements when a participant had 0 attribution service on the valuation date and was immediately eligible for a non-zero benefit. Previously, ProVal calculated a liability associated with decrementing in years when the attribution service is 0. Now the liability will be 0.
11/1/2022	In excess return and compound excess return calculations, use accounting return when the basis is an accounting liability. Previously, the funding return was always used.
11/1/2022	For PPA plans where at-risk participant loads are applicable and a PBGC headcount override is entered in the Asset & Funding policy, ProVal will now use the overridden PBGC headcount to calculate the loads.
11/1/2022	Prior year benefit payment override is now entered by annuity, lump and life insurance amounts. Settlement calculations previously estimated the lump sum

payments by ratioing the total benefit payment override entered ratioed by the fraction of expected benefit payments that were lump sums; direct entry of lump sums will improve accuracy of settlement calculations.

- 11/1/2022 Set asset return to zero if the asset is negative.
- 11/1/2022 In pension modes, if the fraction married assumption varies by coded field, no longer exclude inactive records missing the coded field.
- 11/1/2022 In Valuation Set output based on the GASB accounting standard with a roll forward period greater than 1 year, blank out the detail splits of accounting expected benefit payments (active/inactive and by benefit/status codes).

#### ProVal version 3.17

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- 09/01/2022 Fixed stochastic forecast results in the second year if the valuation benchmark is applicable. The change is related to the difference between the medium valuation benchmark interpolation point entered in projection assumptions and the lump sum benchmark yield at time 0 as entered in stochastic assumptions.
- 09/01/2022 Fixed stochastic forecast results if the individual spot rate method is used for calculating accounting expense, the underlying accounting interest rates are duration based, and the accounting discount rate does not vary in stochastic assumptions. Previously, the wrong interest rate may have been used to calculate interest on expected benefit payments for the interest cost amount.
- 09/01/2022 Fixed stochastic results for a pay as you go plan if some benefit payments are negative (in other words, benefit payments are flowing *into* the plan). This should be very rare.
- 09/01/2022 When using replacement ratios for retirement rates and there are benefits with an alternative Entry Age Normal NC formula, fixed sample life results and individual result fields PVFBfa, PVFSfa, and PVFLfa.
- 08/29/2022 Fixed Late Retirement Factor with a Certain & Life payment form if there are no lump sum factors also being valued. Previously, the Late Retirement Factor was treated as a Life Annuity.
- 08/03/2022 In OPEB Mode, fixed trend sensitivities exhibit (available if only trend is run in underlying valuations) if some underlying valuations did not run any sensitivities.
- 07/29/2022 In Gain/Loss, fixed results when there are multiple valuations and one of them contains vested valued through active participants and an additional minimum liability.
- 07/29/2022 Fixed new entrant experience decrement rates if hired with past service and there is a 100% experience termination rate prior to the year of entry.
- 07/27/2022 Fixed Canadian mode stochastic forecast results when solvency gains were applied by reducing the amortization periods of existing solvency bases but the option to allow amortization periods to reduce to 0 years was not selected. Previously, the wrong trials may have had solvency amortizations adjusted.
- 07/26/2022 Fixed stochastic forecast when the measurement date is after the valuation date and rolling forward the PBO by adjusting the benefit payment streams if there is an additional minimum liability. Previously, the additional minimum liability for the first trial (for the block) was inadvertently being subtracted from the liability (and normal cost) for all trials.
- 07/26/2022 In a stochastic forecast where the valuation date and measurement date differ, fixed projection of accounting assets to end of year if overriding an asset value

- between the first and second year. Previously, we were using a 0% accounting return on assets.
- 7/20/2022 In a Canadian mode stochastic forecast under the Federal applicable law provision, fixed the calculation of additional contribution required due to a plan amendment. Previously, the wrong trial may have been referenced in the calculation.
- 7/6/2022 In a forecast, if a known asset override is entered during the 2nd plan year and there is a 1st year contribution schedule, fixed results if a contribution receivable from the first year is made after the known entered asset date. Also, in a stochastic forecast, with a known accounting asset value during the 2nd fiscal year and a contribution receivable payable during the 2nd fiscal year, fixed yield calculated to project accounting assets from the middle of the 2nd year to the end of the year.
- 7/5/2022 In DC Allocations, fixed amount recharacterized as Catch-up when it exceeds the 414(v) Catch-up Limit (this is the individual result with default name zDeferralRechar).
- 6/21/2022 In US Qualified mode, fixed accounting expected return on contributions if a prior year end of year additional contribution is made at a specified date that is during the current fiscal year and a deterministic schedule is applicable for the current fiscal year. Previously, the expected return on assets was double counting the end of year additional contribution.
- 6/21/2022 Fixed administrative expenses amount and/or return in accounting assets if there is a fiscal year administrative expense override but no other expenses assumed in the run.
- 6/16/2022 In Government Forms Schedule MB extract, fixed Expected Increase in Current Liability to exclude administrative expenses.
- 5/12/2022 Fixed experience benefit payments for subtotals when new entrants are included in the Core Projection.
- 5/9/2022 In OPEB mode, reflect the decrement timing specified in Projection Assumptions for experience benefit payments. A bug introduced with ProVal version 3.17 caused OPEB experience benefit payments to be calculated at beginning of year.
- 5/9/2022 In German mode, fixed the death benefit mortality for actives if using a pre-/post-commencement type of mortality table for retirees or spouses and the Individual Method applies.
- 4/28/2022 In OPEB gain/loss, fixed bug analyzing table and constant benefit formula component sources, when the component has an increase rate table which stops at a specified age. Previously, increase rates were not being applied at any age when determining the expected end of period value.
- 4/7/2022 In Gain/Loss, fixed runs with 2 or more Valuations that had the same non-participating status codes in the Census Specifications but different parameters in the non-participating status topic of the gain/loss. Previously, ProVal was using the non-participating status parameters from the first valuation that had the same non-participating status codes.
- 4/6/2022 In an OPEB Core projection, fixed results if the underlying projection assumptions were populated from valuation assumptions in ProVal 3.17 and the valuation assumption sensitivities are non-zero.
- 3/11/2022 Improved interpolation when forecasting to a yield curve when the benefit definitions included in the underlying liability vary depending on the interest sensitivity run. For example, this may apply to the At-Risk liability if an annuity payment form is the most valuable at the baseline sensitivity, but a lump sum payment form is most valuable at a high sensitivity.

3/11/2022	<p>When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:</p> <ul style="list-style-type: none"> <li>• ProVal_Ctrb_Policy (Employer Contribution) has new tags if a second end of year additional contribution funded ratio is applicable.</li> <li>• In Canadian mode, if the attained age cost method is used, the development of Normal Cost was moved from the ProVal_AggNC (Development of Normal Cost) to the ProVal_AggNCCan (Minimum Funding Normal Cost) exhibit. In addition, ProVal_AggNCCan has new tags in a forecast if triennial valuations apply and new tags in Ontario, Quebec, and British Columbia to display the Pfad on expenses.</li> <li>• ProVal_RecFAS35 (Statement &amp; Reconciliation of PVAB) has a new tag in forecast exhibits to display the prior year interest rate.</li> <li>• ProVal_ProjMin (Minimum Required Contribution Projection) is a new report for Canadian Valuation Sets with triennial valuations applicable that estimates contributions for the 3 years following the valuation date.</li> </ul>
3/11/2022	Fixed approximate effective interest rate used in a forecast when an effective interest rate does not converge because there are both positive and negative projected benefit payments. This is a very rare situation which usually ended with a DOMAIN ERROR.
3/11/2022	In Canadian mode, fixed application of ITA maximum to benefit definitions included in the excess contributions. Previously, the ITA maximum was determined assuming immediate commencement (and reduced by the application early retirement reduction factors) rather than based on the deferral age defined by the payment form for that benefit definition.
3/11/2022	If accounting benefit payments are rolled forward, improved the ABO benefit payment roll forward and subsequent liability because we now calculate an ABO k factor. Previously, we assumed the k factor was 0.
3/11/2022	In US Qualified and Universal Present Value of Plan Benefits exhibit, improved reconciliation exhibit if an accounting yield curve is assumed. We now calculate and use an ABO EIR. Previously, we used the PBO EIR.
3/11/2022	<p>In core projections with middle of year experience decrements:</p> <ul style="list-style-type: none"> <li>• Fixed emerging inactive results to reflect middle of year timing of decrements. This affects benefits that are temporary or deferred for a number of years and modified cash refund annuities.</li> <li>• In OPEB mode, fixed emerging inactive results to reflect a middle of year benefit amount for benefits that vary by decrement.</li> <li>• Fixed benefits in force for vested valued as active participants. Previously, a ½ year of payment was used, instead of the full amount.</li> </ul>
3/11/2022	Changed vested liability details by decrement. Now the vested liability will be assigned to decrements based on the underlying decrement rates used to calculate it. Previously, vested liability was assigned to a decrement based on the contingency of the benefit definition used to calculate the liability. The prior method of assigning vested liability to decrements can be replicated by displaying the details by benefit definition and aggregating the benefit definitions initiated by the same contingency.
3/11/2022	Fixed PPA Max Tax and PBGC projected benefit payments for emerging inactives when there are post-termination retirement benefits with optional form conversion factors based on underlying interest rate assumptions. Previously, the PPA Funding interest rate was used.

3/11/2022	In forecasts, ensure that PBPs and EIRs are interpolated on the inflation dimension.
3/11/2022	In a forecast, improved the interpolation of the Funding (Actuarial) Liabilities if corresponding projected benefit payments are available and a yield curve is assumed.
3/11/2022	When calculating an automatic refund of employee contributions (including the return of excess contributions feature in Canadian mode), the timing of employee contributions (beginning, middle, or end of year) will be based on the employee contribution timing parameter in Valuation Assumptions (under Liability Methods). Previously, employee contributions were always assumed to be made at the end of year.
3/11/2022	The individual results items for present value of salary at first funding age (PVFSfa) and present value of benefits at first funding age (PVFBfa) are now as of each participant's funding age. Previously they were adjusted to the valuation date. The values for PVFBfa now also excludes the present value of future employee contributions.
3/11/2022	The calculation of the normal cost rate in Canadian and Universal modes under the average entry age cost method has been revised to use the present value of benefits and present value of salary as of the first funding age. Previously, the present values were adjusted to the valuation date. Participants over the 100% retirement age on the valuation date will now have a 0 for present values of salary and benefits at first funding age. Previously, these values were incorrect and not properly discounted.
3/11/2022	When populating an excess basis efficient frontier, ignore years with Stochastic Assumption overrides that impact liabilities. Additionally, if the option to shift simulated and prepend overrides is selected in the Stochastic Assumptions, the asset class and liability return years are now synchronized.
3/11/2022	In a Canadian stochastic forecast if the windup liability equals the solvency liability fixed the Windup liability if there is a solvency yield curve override. Previously, it was not reflecting the solvency yield curve override.

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ProVal version 3.16

2/18/2022	Fixed gain/loss total liability by source, if there is a gain/loss due to vested valued as active benefit received. Previously, the unreconciled, dynamic mortality, and change in average normal cost rate sources were incorrect.
2/4/2021	PPA end of year additional contribution fixes: <ul style="list-style-type: none"> <li>• Fixed rounding if the target liability is a PBGC or Max-Tax basis to round up the target liability.</li> <li>• Fixed rounding if a specific date was entered for the end of year additional contribution timing. The increase in prefunding balance is now consistent with the contribution amount. Previously, they may have differed by \$1.</li> <li>• If the liability target is a Max-Tax liability, the valuation and measurement dates differ, and the end of year additional contribution timing is end of plan year, fixed contribution amount discounted to beginning of prior plan year, which is used to roll forward the pre-funding balance.</li> </ul>
2/1/2022	In OPEB Mode, if an inactive spending account is applicable, fixed validation of balances if specified by field. Previously, participants with missing values were not excluded from the run.

2/1/2022	In Canadian mode, fixed retirement rate lookup in a solvency run with retirement rates determined by age and service as of the valuation date.
1/20/2022	Fixed PPA funding and max tax not-at-risk active liability and normal cost projected benefit payments for benefits with custom PPA attribution applicable. Previously, ProVal was not replacing the excess with total (excess + acc'd). This did not impact the PPA EIR projected benefit payments.
1/14/2022	Fixed multiemployer vested liability when linear proration is applied to unit credit. Previously the proration was applied twice.
1/11/2022	Fixed assumption change calculated in an assumption change forecast event if the underlying core projections have plan amendments.
12/22/2021	In OPEB mode, fixed age by duration lapse rates when there is a lapse assumption of 1.
12/9/2021	Fixed total gain/loss liability by source, if there is a gain/loss due to vested valued as active benefit received. Previously, this was excluded from the total.
12/2/2021	Excluded inactive records if they have a temporary benefit with the temporary period defined by a database field and the value of that field is blank. Previously, these records were not excluded and, even though the temporary benefit itself had zero liability, any other benefits were included in the liability.
11/3/2021	In OPEB mode, fixed results if a service based table is referenced in an inactive benefit and set in valuation assumptions and there is no other reason inactive decrement service would be required. Previously, we were not setting decrement service.
10/28/2021	Fixed results for post-termination retirement benefits with a lump sum optional form calculated as the present value of the normal form deferred to an age when the benefit formula contains tables with lookup at commencement age. The lookup should be done at the deferral age. Previously, it was done at retirement age.
09/28/2021	Fixed PPA not-at-risk projected benefit payments in a core projection for emerging inactive participants who were assumed to have terminated but not yet retired by some future valuation date if the actuarial liability was not run. In that case, they were being based on the actuarial liability unit credit basis rather than the PPA not-at-risk basis which could have resulted in zero projected benefit payments or an incorrect or non-converging effective interest rate.
9/15/2021	In a PPA deterministic forecast that uses a deterministic contribution schedule and then pays quarterly and final when due, fixed the present value of employer contributions. Previously, it was ignoring the deterministic schedule.
9/13/2021	Fixed Liability Return based on PPA Funding Liabilities if segment rates are used. Previously, the Max Tax rates were being used.
7/28/2021	Fixed results when running a gain/loss with a basis of PUC or PBO, if the PPA liability basis of Max Tax not at risk (UC) had been selected previously and remained ghosted on the screen. Previously, ProVal would incorrectly turn off PUC calculations, resulting in a nonzero value in the system change bucket.
7/13/2021	In a multiemployer core projection with vested liabilities turned off, eliminated emerging inactive multiemployer vested liability.
7/13/2021	In a GASB Valuation Set with only inactive participants and an end of year gain or loss event, recognize the liability gain or loss fully in the current year expense. Previously it was not recognized.
7/13/2021	In experience studies, fixed inactive mortality results if a unisex improvement scale was applied. Previously, the scale was only applied to male members.

7/13/2021	In German mode, fixed mortality sensitivity for disabled mortality when the option "Change to retired member mortality at actuarial retirement age" is checked in valuation assumptions. Previously, the sensitivity was not applied to the disabled mortality (prior to actuarial retirement age).
7/13/2021	Extended the allowable range for decrement scaling factors from 0-2 to 0-5. This may result in additional records being included.
7/13/2021	<p>When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:</p> <ul style="list-style-type: none"> <li>• ProVal_DevActAssets (Actuarial Assets) has new tags for the new N-Year Adjusted Market Values method.</li> <li>• ProVal_USMinPPA (Development of Minimum Required Contribution) and ProVal_USPreMAP21MinPPA (Development of Pre-MAP 21 Minimum) have new tags to display the segment rates if segment rates are used.</li> <li>• ProVal_UALAmort431 (Development of 431(b)(8) Amortization), ProVal_UALMort (Development of Minimum Basis Amortization) and ProVal_Asset_Val_Method (Development of Market Value Method and Development of Spread Gain Method) have new tags if Multiemployer 431(b)(8)(A) and (B) ARPA relief apply.</li> <li>• ProVal_Funding_Rollforward (Development of Funding Liability at Valuation Date) and ProVal_DevExpense (Development of GASB Expense) have new tags to display the salary scale if used in the roll forward.</li> <li>• ProVal_Contrib_Policy (Development of Employer Contribution) has new tags in Public mode if the NC+SC rate-setting option applies.</li> <li>• ProVal_RecCICA3462 (CICA 3462: Reconciliation of Funded Status / Balance Sheet Entries), ProVal_RecFAS87_158 (ASC 715: Reconciliation of Funded Status / Balance Sheet Entries), ProVal_RecIAS19R (IAS 19: Reconciliation of Funded Status / Balance Sheet Entries), and ProVal_RecGASB6768 (GASB 67/68 or 74/75: Reconciliation of Balance Sheet Liability) have new tags to split the gain/loss and assumption change pieces of the change in obligation and new tags if liabilities are rolled forward to show the active/inactive split.</li> <li>• ProVal_AccountingSens (Development of Accounting Liability Sensitivities) is a new report for IAS19 and GASB EOY Valuation Sets to show the development of the baseline, high and low liability sensitivities if run in the underlying valuation.</li> </ul>
7/13/2021	In Valuation Sets and Forecasts that use the spot rate interest cost method and roll liability forward to the measurement date, changed roll forward to always use the benefit payment method. Previously, the user may have selected the liability roll forward method which produced inconsistent results.
7/13/2021	In Canadian mode, fixed benefit eligibilities for solvency liability when there were eligibility exceptions coded in at least one benefit definition. Also extended the check for optimal age for participants not yet eligible for retirement to always check up to the 100% retirement age. Previously, based on an option, the optimal age check may have ended at first eligibility for retirement as determined on an ongoing basis.
7/13/2021	In OPEB LTD valuations using the CIA 2009-2015 LTD table, changed 100% death to occur in the first month following the last rate in the table. Previously, the 100% death was spread over the 12 months after the end of the table.



- 7/13/2021 In Valuation Sets with a measurement date after the valuation date, a plan or assumption change event, and use the spot rate interest cost method, fixed the calculation of the liability associated with the plan or assumption change event at the measurement date. Previously the liability change was rolled forward from the valuation date using the liability roll forward method rather than the benefit payment roll forward method. Note that the issue was only in the calculation of the change amount, the final liabilities are unchanged.
- 7/13/2021 In a forecast, fixed emerging inactive liability portion of an assumption change.
- 7/13/2021 In a PPA deterministic or stochastic forecast where the projected benefit payments for a liability are zero but the corresponding normal costs are not, fixed the PPA PBGC and PPA MAX TAX effective interest rates. Previously, the PPA Max Tax PUC NAR NC benefit payments were being used instead of the PPA Funding NAR NC benefit payments and the PPA Max Tax UC NAR NC benefit payments respectively.
- 7/13/2021 Fixed validation of modified cash refund temporary period if set by database field. Previously, participants with missing values were not excluded from the run but included with a zero payment form value.
- 7/13/2021 For post-termination retirement benefits, when lump sum optional forms are based on the normal form deferred to an age, use the early retirement factor at the deferral age (or retirement age if later) instead of assuming an early retirement factor of 1.
- 7/13/2021 In ProVal PS, fixed stochastic forecasts with a first year asset override. Previously, the override was being ignored in PS. To reproduce prior results, uncheck "Override returns with known asset values-to-date" on the Assumptions tab.

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ProVal version 3.15

- 5/13/2021 In OPEB LTD valuations using the CIA 2009-2015 LTD table, fixed the conversion of annual to monthly rates during the select period (after the first 60 months of disability). This fix ensures that the cumulative survival over 12 months will exactly equal the published annual survival rate. This is consistent with how the conversion is done in all other LTD tables.
- 5/6/2021 In German mode, fixed gap calculation if retired, disabled or survivor this year and terminated vested last year. The gap should have been reset but was not.
- 4/26/2021 In Universal mode, fixed results if interpolating to exact age and inactive benefits have temporary, deferred, or certain periods specified by date or number years.
- 4/1/2021 Fixed gain/loss results for active decrements when there are decrement rates by benefit. Previously, the probability of receipt used to calculate the end of period inactive liability using actual decrements was not adjusted for rates by benefit.
- 3/29/2021 Revised how ProVal treats an inactive participant payment form with a temporary period stop before the benefit commencement. We now value this participant with a zero benefit. Prior to this fix, this participant would have been excluded even if eligible for another inactive benefit.
- 3/22/2021 In stochastic forecast, fixed the Canadian mode non-indexed liability and the German mode Teilwert liability. Also, in US Qualified mode, under the "pre-PPA and PPA" law type, fixed the PPA max tax liability. Previously, they were missing the emerging inactive liability.
- 3/19/2021 In Canadian modes, fixed solvency & windup calculations for benefit definitions that have the earliest unreduced age benefit parameter checked. Previously, the earliest unreduced age was determined across the decrement for all benefit definitions that were identified as an earliest unreduced age benefit and now it is determined separately for each benefit definition.

3/16/2021	In Canadian mode, fixed windup liability results if there are lump sum factors that use valuation assumption COLAs and the checkbox "COLAs only apply to Windup Liability" is selected. Previously, the COLAs were not being applied to the lump sum factors for the windup liability.
3/5/2021	Fixed first year accounting expected benefit payments if the measurement date is after the valuation date, expected benefit payments are rolled forward to the measurement date, an accounting rollforward override of first year expected benefit payments is entered, an accounting expense expected benefit payment override is not entered, and the individual spot rate method is not selected. Now the expected benefit payments for the year starting on the measurement date will reflect the roll forward override.
3/3/2021	Fixed the #COMIMAGE and #COMMYEAR operators in advanced COLA expressions to return a rounded value. This affects inactive benefits with commencement specified by a date or number of years.
3/3/2021	Fixed COLA tables by duration by changing the rounding used in the lookup. This affects inactive benefits with commencement specified by a date or number of years. Previously year 0 for duration was the year when the first payment occurred, now it is the year starting on the rounded commencement date.
2/25/2021	Fixed lump sum factors for decrementing actives in a core projection if late retirement components exist. Only lump sum factors created after a late retirement component was created are affected.
2/23/2021	In a Canadian mode stochastic forecast under Ontario and British Columbia provincial laws, fixed the calculation of the provision for adverse deviation. Previously the benchmark interest rate was based on the annuity purchase rate instead of the government benchmark yield.
2/16/2021	Ensure survival rates in OPEB mode U.S. LTD valuations do not become negative. Negative survival rates were previously possible for some combinations of parameters.
2/16/2021	Fixed the forecasted PPA Max Tax Unit Credit effective interest rate when the underlying core projection(s) contained vested valued as active participants with optional forms or lump sum factor benefit formula components that used "underlying" interest rate assumptions. Previously, ProVal was using the not-at-risk projected benefit payments in the calculation of the Max Tax Unit Credit effective interest rate rather than the Max Tax Unit Credit effective interest rate projected benefit payments.
2/12/2021	In U.S. Qualified pre-PPA & PPA valuations and core projections, fixed the PPA EIR projected benefit payments, used to calculate the effective interest rate, if there were optional forms which used the underlying liability interest rate.
2/8/2021	In Public mode when there is a roll forward of funding results, also roll forward valuation pay, total pay, and expected employee contributions with salary scale.
2/5/2021	Fixed double counting of administrative expenses in ASC 715 when expenses are included in the expected return on assets component of expense and accounting assets use N-Year asset smoothing based on a market-related value of expense, weighted average or corridor method.
2/4/2021	Fixed expected benefit payments (valuation basis) for emerging inactive in a core projection. This fix affects <ul style="list-style-type: none"> <li>benefit payments to spouses from post-decrement death benefits with beneficiary determined at decrement, when the member has both decremented and died between the original valuation date and the projected valuation date.</li> </ul>

	<ul style="list-style-type: none"> <li>• benefit payments for emerging inactive in lump sum experience interest rate sensitivity runs in a core projection</li> <li>• other benefits where the benefit amount is affected by assumptions which differ between projection and valuation.</li> </ul>
2/1/2021	Fixed minimum benefits in COLA limits for emerging inactive in core projections. These were previously ignored if all COLA rates were zero in both valuation and projection assumptions.
1/28/2021	In PPA runs, if the CARES Act applies, fixed rounded values when discounting employer contributions. This is most likely to impact results when rounding is a value greater than \$1.
1/8/2021	In pension modes, when evaluating the gain/loss from initial inactive member death between the two valuation dates, ensured that the survivor mortality based on retired member mortality is not affected if the box "Use retired members mortality prior to member death" is checked.
1/8/2021	In pension modes, fixed spouses in the inactive headcount if the box "Use retired members mortality prior to member death" is checked and Joint Life payment forms exist with beneficiary not determined at member death.
1/7/2021	Fixed mortality calculation when using custom dynamic tables with an improvement scale where the minimum age of the table is greater than 15.
1/5/2021	In Canadian mode, for solvency/windup liabilities, for post-termination retirement benefits, changed lookup age for the ITA dollar maximum from current age to commencement age. This is consistent with the treatment of non-post-termination retirement benefits.
1/5/2021	In Canadian mode, for vested liabilities, for benefit definitions with an adjustment to the ITA maximum specified by table, and for excess contributions, fixed the ITA maximum.
1/5/2021	In Canadian mode, fixed benefit formula component table lookups for post-termination retirement benefits when calculating solvency liability. Previously, the age and service were always frozen at the valuation date.
1/5/2021	When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column: <ul style="list-style-type: none"> <li>• The following exhibits had changes to resolve duplicate access tags: <ul style="list-style-type: none"> <li>• ProVal_ARC_Policy (GASB Annual Required Contribution)</li> <li>• ProVal_ContNeth (Minimum Contribution - Netherlands funding rules)</li> <li>• ProVal_FAS87 (ASC 715: Development of Pension Expense) if expenses are included in the expected return on assets or there is a curtailment or settlement.</li> <li>• ProVal_RecCICA3462 (CICA 3462: Reconciliation of Funded Status / Balance Sheet Entries).</li> <li>• ProVal_RecFAS87_158 (ASC 715: Reconciliation of Funded Status / Balance Sheet Entries) if the measurement date is after the valuation date and liabilities are rolled forward using the benefit payment method.</li> <li>• ProVal_DevActAssets (Actuarial Assets) and ProVal_DevMkrRelAssets (Market-Related Assets) if the corridor method is used with no additional boundaries.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• ProVal_ReclIAS19R (IAS 19: Reconciliation of Funded Status / Balance Sheet Entries).</li> <li>• ProVal_ErCtrb (Development of Employer Contribution) in modes with no statutory constraints if there is an end of year contribution and if running Netherlands.</li> <li>• ProVal_CanMinBase (Funding Amortization Bases) and ProVal_UALAmort (Minimum Basis Amortization) if Quebec Bill 57 applies.</li> <li>• ProVal_WindLiab (Windup Liability) is a new report detailing the Windup Liability in Canadian mode.</li> <li>• ProVal_RecGASB6768 (GASB 67/68 or 74/75: Reconciliation of Balance Sheet Liability) has new tags to display future recognition of deferred outflows and inflows.</li> <li>• ProVal_USPreMAP21MinPPA (Development of Pre-MAP 21 Minimum) has new tags to display the Pre-MAP 21 effective interest rate and FTAP.</li> <li>• ProVal_SolvDef (Development of Solvency Deficiency) has removed the transfer value calculation (it has been moved to the new Windup Liability report)</li> <li>• ProVal_CanMin (Minimum Required Contribution) and ProVal_CanMax (Maximum Tax Deductible Contribution) has new tags to display the normal cost before expenses and the PfAD percentage. Tags were also modified in places where the windup liability is now used in the calculation in place of the solvency liability. Also, fixed a duplicate tag if Quebec Bill 57 applies and applies letters of credit to ongoing payments.</li> <li>• ProVal_AggNC and ProVal_AggNCCan (Development of Normal Cost) has new tags to show the Pfad percentage. Also fixed a duplicate tag if the Pfad is applied to the non-indexed liability.</li> </ul>
1/5/2021	For forecasts with the measurement date after the valuation date, actual benefit payments are now adjusted for timing. Actual benefit payments displayed on the Demographic & Cash Flow topic of deterministic output is no longer adjusted for overrides. Separate plan year and fiscal year actual benefit payments, adjusted for overrides, are displayed on the Funding and Accounting tabs
1/5/2021	In modes other than U.K., German and OPEB, inactive payment forms that commence (or have a temporary or certain period stop) at a date or after a number of years will not round the deferral (or temporary or certain) period to whole years. This change was not made for payment periods that are specified by an age. This change was also not made if there is both a start and stop period and one is based on an age and the other on a date. No change was made, for example, when the start of the period was defined by a date but the end was defined by a constant age.
1/5/2021	For lump sum inactive payment forms, and all inactive payment forms in U.K. and German modes, that commence (or have a temporary or certain period stop) at a date, changed the rounding method used to determine the deferral (or temporary or certain) periods.
1/5/2021	In Canadian mode, when calculating solvency liability, always calculate the value of automated excess contributions on a transfer value basis.
1/5/2021	In Canadian mode, modified the transfer ratio and the maximum tax deductible contribution calculations to use the windup liability and assets.

1/5/2021	In Canadian mode, fixed the solvency incremental cost if there is an active solvency liability scaling factor. Previously, it was not applied to the solvency incremental cost.
1/5/2021	In Canadian mode, fixed the non-indexed liability for benefits with a modified cash refund payment form.
1/5/2021	In Canadian mode Valuation Sets and Forecasts, applied the decrement adjustment to employee contributions.
1/5/2021	In Canadian mode Valuations Sets and Forecasts, the ongoing normal cost available in output now includes the value of any provision for adverse deviations.
1/5/2021	In Canadian mode, apply election probabilities when calculating excess contributions. Previously, they were ignored. If there are optional payment forms, the sum of all payment forms will be applied to the normal form.
1/5/2021	To allow ProVal's calculations to reflect potential longevity to age 126, the oldest age allowed by the system has been increased from 120 to 126. When <no rates> is selected under the decrement topic of valuation assumptions for inactive/post-decrement mortality, zero mortality rates will now be assumed to extend to age 126 rather than to age 120 (plus the spouse age difference, or 30 for tables or actual spouse DOBs) which was the previous limit.
1/5/2021	In a forecast if overriding the first year investment return with actual asset values, administrative expenses are determined as a percentage of market value of assets, and the beginning of year funding and accounting market value of assets are different, fixed the calculation of the return for accounting assets in the first forecast year to reflect the accounting administrative expenses.
1/5/2021	In a Valuation Set or Forecast using a contribution policy of pay-as-you-go and including administrative expenses in the accounting expense, fixed the calculation of expected return on assets. Previously, the expected contributions for the plan included administrative expenses but the benefit payments did not, resulting in a non-zero expected return on assets.
1/5/2021	Previously, when a gain/loss was performed using the entry age normal method when the average EAN technique was turned on, it was previously based on the entry age normal method. Now, it will be based on the average EAN method.
1/5/2021	In Universal mode, using the average entry age normal technique with exact age interpolation may produce small differences due to rounding.
1/5/2021	Fixed bug in the calculation of accounting expected return on assets in the second year of a forecast if a contribution receivable specified in the contribution schedule is not included in EROA. The contribution was previously being included when it should not have been.
1/5/2021	For new entrants in a Core Projection that override service related fields in the New Entrant Specifications, the parameters of any service definitions referenced will now be applied except for the current service field. This change may mean a previously run Core Projection will abort if a service definition requires a database field for future accruals and that field does not exist on the new entrant database.
1/5/2021	Fixed GASB 67/68/74/75 expense if pay as you go in a forecast if actual benefit payments are overridden in the first year.
1/5/2021	In Universal mode, fixed PUC/UC results for Belgian reserves prior to the valuation date. This affected mostly the capital at projected valuation dates in core projections, which was built using zero premiums between the original valuation date and the projected valuation date, effectively setting it equal to the starting capital on the original valuation date. Valuation PUC/UC liabilities and normal cost may also be affected for participants past the reserve payment age on the valuation date since ProVal uses the capital at the payment age and the

payment age in this case is prior to the valuation date, ProVal ended up using the incorrect premiums prior to the valuation date to back into the capital on the payment age.

1/5/2021 Fixed expected benefit payments for decrementing actives on OBRA and Maximum Contribution bases. The liabilities for decrementing actives are not affected.

1/5/2021 In pension modes, fixed life expectancy for participants with no benefits assumed to be payable at current and future decrement ages if there were benefits assumed to be paid at decrement ages prior to the valuation date.

#### ProVal version 3.14

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12/2/2020 In US Qualified Valuation Sets & Forecasts improved the calculation of late penalty interest in a leap year to conform with plan years. Previously, the penalty interest period and the denominator may have been inconsistent.

12/2/2020 In US Qualified PPA Valuation Sets & Forecasts with the CARES Act applied, fixed issues with non-calendar year plans.

- When ProVal calculates a deferred contribution more than two years from the valuation date (e.g., a 11/1/18 plan year with a deferred contribution made on 12/31/20), previously the 2020 EIR was used to defer and discount these contributions. Now, ProVal will require you to input the 2021 EIR to discount these contributions. Similarly, if you enter a prior year contribution in the schedule that is payable more than 2 years after the prior valuation date, ProVal now requires you to enter the discounted contributions receivable amount.
- Fixed forecasted assets if contributions were made more than two years after the valuation date.
- Improved the deferral interest calculation to conform with plan years. Previously for purposes of determining the portion of a year that contributions were deferred under the CARES Act, ProVal always used a denominator of 366.

11/23/2020 In German mode, fixed rounding of Tax Reserve for Active and Terminated Vested records when rounding is selected in Other Valuation Parameters. Previously, the Teilwert was not rounded at the Benefit Promise level before calculating the Tax Reserve.

11/16/2020 In Canadian mode forecasts with an applicable law selection of Alberta, fixed the application of triennial valuations to no longer require attaining 85% ongoing and solvency funded ratios to qualify for a partial valuation.

11/12/2020 For US Qualified plan Valuation Sets and Forecasts, if the CARES Act is applied, updated discounting of contributions for plan years prior to 2020 that satisfy quarterly requirements. This change is based on our discussions with a representative from the IRS who clarified that their intention was that deferred quarterly contributions should satisfy the same amount of the minimum required contribution as if they were made on the original due date. Therefore, the interest rate to use to defer the quarterly payments is the same as the interest rate that should be used to discount the payments to their original due date. Previously, we were only using the 2020 EIR to discount to 8.5 months after the end of the plan year.

10/23/2020 When rolling forward GASB results to a measurement date greater than 1 year after the valuation date, fixed the calculation of GASB end of year assumption and plan changes to capture the impact of a change in salary scale.

10/21/2020 In Canadian mode core projections, fixed calculation of automated excess contributions if there was more than one benefit definition included in excess

contribution calculations. Previously, for all benefit definitions after the first one included, the valuation interest and mortality assumptions were used instead of the experience interest and mortality assumptions.

- 10/08/2020 In a stochastic forecast, fixed supplemental cost amortization if the funding interest rate is a yield curve and the amortization period is greater than 30 years.
- 09/22/2020 Fixed rounding of assumption changes in a GASB event.
- 09/22/2020 Per PBGC press relief PR20-4, allow prior year contributions delayed by the CARES Act to be included in PBGC Assets.
- 09/16/2020 Fixed issue displaying total percent male in Valuation Set or Deterministic output as 200% if the participant count was zeroed out using scaling factors.
- 09/15/2020 In ProVal PS, fixed bug running a deterministic scenario if there are experience lump sums paid and the Year 0 benchmark yield differed from future benchmark yields.
- 09/14/2020 Fixed inactive PPA, RPA/OBRA, and Canadian solvency liabilities if processing joint life or post-decrement death benefits where the beneficiary is determined before member death if the box "Use retired member mortality prior to member death" is checked where available within the same assumption set. For example, if the actuarial liability in a PPA run uses alternative mortality and the above box is checked in that alternative mortality dialog. Or if the above box is checked in Canadian ongoing liability and calculating solvency liabilities.
- 09/11/2020 In U.K. Pension mode, fixed the scaling factor being applied to the active PPF liability. Previously, it was incorrectly applying the active PVFB scaling factor instead of the active PPF scaling factor.
- 09/10/2020 In Canadian mode, apply the scaling factor for funding EEC offset to the Non-indexed employee normal cost.
- 09/01/2020 Fixed rare issue, whereby a benefit which should have evaluated to zero might have been stored instead as an infinitesimally small number, which could have erroneously been considered non-zero for certain purposes. In one example, this resulted in spurious trillion dollar expected benefit payments when there was a post-termination benefit whose benefit was zero upon decrement but non-zero at later payment ages. In another example, participants that should have been excluded from the active life expectancy calculation were erroneously included because their benefit amount was considered greater than zero.
- 09/01/2020 In Gain/Loss, when using middle of year decrements, fixed interest on expected benefit payments for lump sums for decrementing actives.
- 08/27/2020 In U.S. Qualified mode, only include contributions made by the PBGC filing deadline in the assets for the PBGC Premium calculation.
- 08/26/2020 Fixed post-termination retirement eligibility for vested liabilities when the benefit has eligibility exceptions and vested liability eligibility is based on decrement age.
- 08/11/2020 Fixed results in Canadian mode with Solvency Liability turned on calculating a non-indexed liability that contains lump sum factor benefit formula components where the interest rate is specified (not set to use ongoing liability interest rate) and the solvency interest is set to "use liability interest rate." In that case, the lump sum factors for the non-indexed liability was using the ongoing liability interest rate rather than the interest rates specified for the lump sum factor.
- 08/11/2020 Fixed projected employee contributions in year of 100% termination in the projected demographic output. This does not affect the present value of future employee contributions.
- 08/07/2020 In Canadian mode, fixed the calculation of the maximum tax deductible contribution to ensure that it is never less than the unfunded solvency liability.

07/21/2020	Fixed Valuation Set event accounting unrecognized amount if the underlying runs used a full yield curve, the measurement date is after the valuation date, and the underlying benefit payments differ between the baseline and subsequent events.
07/21/2020	Fixed additional rounding issues in Valuation Set GASB events.
07/14/2020	Fixed rounding in Valuation Set GASB events to be consistent in order of rounding across all events.
07/14/2020	In Valuation Set GASB end of year events, fixed roll forward of the GASB liability if the rollforward period is more than one year. Previously, it excluded the second year of benefit payments in the roll forward.
07/12/2020	In German mode, fixed rounding of Projected Benefit Payments (and Year 20XX Expected Benefit Payments in Individual Results) for Terminated Vested records from nearest 0.01 to nearest 1 (when the user has elected for liabilities to be rounded in Other Valuation Parameters).
06/26/2020	Fixed erroneous record exclusions if missing coded field values if the coded field was only used in COLA overrides, but ghosted, because constant COLAs were assumed. These records were excluded even if data defaults were defined for the coded fields.
06/23/2020	In Gain/Loss, fixed calculations for Vested Valued as Active records when the plan has an Additional Minimum Liability (due to a Minimum Liability in the Plan Definition). Previously, some amounts were erroneously shown in System Changes.
06/23/2020	In Public and OPEB mode, fixed roll forward of funding liability when the roll forward period is greater than 1 year and the funding method is projected unit credit.
06/08/2020	Fixed expected retirement rates for vested valued through active records in a multi-year study. Previously, the expected retirement rates were correctly generated for the first year but additional years were set as 0.
06/05/2020	In German mode, fixed #SVR values for Terminated Vested participants in tax/funding runs to use the applicable value from the year of termination (not the valuation year), even when the box "Use regulatory data as of the valuation date for all years for actives" is checked.
05/29/2020	<p>In Valuations and Core Projections, changed the calculation of Optional Forms Conversion Factors when there are multiple liability assumptions bases (e.g. some liabilities have duration-based interest and some do not) and one of these other conditions is true</p> <ul style="list-style-type: none"> <li>• There is a Post-decrement Death Benefit payment form where assumed member commencement age is by database field (or by ARA in German mode).</li> <li>• Spouse age difference is determined by data for some records</li> </ul> <p>Previously, the conversion factor may have been calculated as zero.</p>
05/21/2020	In Public mode, if GASB, fixed rounding of employee contribution variables in a valuation set with a rollforward of liabilities greater than 1 year.
05/14/2020	In OPEB mode core projections, fixed projected benefit payments if an inactive participant is past the valuation assumption 100% mortality age but not the experience assumption 100% mortality age.
05/06/2020	Fixed potential incorrect lump sum factors using generational mortality for new entrants entering in the final year of a core projection.
04/27/2020	Set actual plan year contribution equal to actual benefit payments for GASB expense purposes when contribution policy is pay-as-you-go.



- 04/27/2020 Fixed calculation of settlement in an ASC 715 forecast in the year prior to a plan amendment.
- 04/24/2020 Fixed experience basis optional form conversion factors for deferred lump sums without life contingencies where conversion factors were based on interest and mortality. Previously, the conversion factors were erroneously using mortality during the deferral period.
- 04/20/2020 For vested liabilities, fixed service used to determine post-termination retirement eligibility, if different from service used to determine benefit eligibility.
- 04/09/2020 If there is a payment form of type 'Lump Sum, Life Contingencies' in OPEB mode, or 'Modified Cash Refund Annuity' in any other mode, and the deferral age or period is set using a plan constant, and the plan constant value is missing for some participants, then exclude those participants.
- 03/11/2020 Fixed stochastic results if there is a curtailment and the amortization basis is switched to life expectancy. The issue manifests in the block of trials after a curtailment is encountered.
- 02/28/2020 In Canadian mode stochastic forecasts, fixed forecast years where some trials had an ongoing gain and some trials had an ongoing loss to ensure that previously established bases for the loss trials were not adjusted.
- 02/18/2020 In the multi-factor and explicit capital market simulators, the corporate and government benchmark yields are allowed to be below zero.
- 02/18/2020 If using retirement rates by replacement ratio, the replacement ratio will now be calculated based on salary in the year prior to retirement.
- 02/18/2020 If using a service based salary merit scale table, and salary is projected before hire age or after 100% retirement age (e.g., for PIA) fixed service used for table lookup.
- 02/18/2020 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:
- ProVal\_CanMin (Minimum Required Contribution), ProVal\_CanMinBase (Funding Amortization Bases), ProVal\_UALAmort (Minimum Basis Amortization), and ProVal\_CanMax (Maximum Tax Deductible Contribution) have new tags if the Ontario Stronger Fairer Act's PfAD applies to the non-indexed liability.
  - ProVal\_RecCICA3462 (CICA 3462: Reconciliation of Funded Status / Balance Sheet Entries) has removed the 'Annual\_change' tag if the accounting liability is rolled forward.
  - ProVal\_RecFAS87\_158 (ASC 715: Reconciliation of Funded Status / Balance Sheet Entries) has removed the 'Svc\_Cost\_boy' tag if the accounting liability is rolled forward.
  - ProVal\_ReclIAS19R (IAS 19: Reconciliation of Funded Status / Balance Sheet Entries) has removed the 'Total\_annual' tag if the accounting liability is rolled forward.
  - ProVal\_RecGASB6768 (GASB 67/68 or 74/75: Reconciliation of Balance Sheet Liability) has removed the 'total\_annual' tag if the accounting liability is rolled forward.
  - ProVal\_RecGASB6768 (GASB 67/68 or 74/75: Reconciliation of Balance Sheet Liability) and ProVal\_Funding\_Rollforward (Funding Liability at Valuation Date) have new tags if the liability is rolled forward more than one year.

- ProVal\_AggNC and ProVal\_AggNCCan (Development of Normal Cost) have new tags if the Ontario Stronger Fairer Act or Quebec Bill 57 apply.
- 02/18/2020 Under middle of year decrements, for benefits with a Modified Cash Refund payment form, changed experience and expected benefit payments to match projected benefit payments for benefits with a Modified Cash Refund payment form.
- 02/18/2020 In Valuation Sets, fixed the rounding when calculating an assumption change. Previously, the changes attributable to actives and inactive were separately determined, rounded and then added together to determine the total change. Now the change is determined based on the total of active and inactive liability and then rounded.
- 02/18/2020 Under the GASB accounting standard, changed the rounding of average expected service lives in Valuation Sets and Forecasts. Previously it was unrounded in output but now is rounded.
- 02/18/2020 When rolling forward accounting results to a measurement date that is after the valuation date, changed the rounding. Previously, service cost and benefit payments were added together and then rounded. Now service cost and benefit payments are rounded separately before adding together.
- 02/18/2020 Fixed minimum benefits (under "COLA Limits" in the benefit definitions) for decrementing actives if the COLA rates were set to 0% in the assumptions. Previously, the minimum benefit was ignored for decrementing actives in this particular case.
- 02/18/2020 In Canadian mode, fixed results if a lump sum factor uses the funding mortality assumption, the mortality varies by coded field, and a database field scaling factor is applied to the funding mortality. Previously, the scaling factor was ignored.
- 02/18/2020 In gain/loss analysis, fixed continuing active gain/loss by source so that a change in the value of a database field that was selected prior to being referenced by the valuation salary definition and then subsequently referenced by the valuation salary definition, will not contribute to the database field source.
- 02/18/2020 Fixed vested as active records being excluded if they were missing data for fields only used in benefit selection expressions. Previously, they were included and not valued for those benefits instead of being excluded from the run.
- 02/18/2020 Fixed beneficiary mortality in post-decrement death benefits with beneficiary determined at the earlier of member death and member commencement:
  - if member commencement occurs prior to the projected valuation date in a core projection. Previously, we used valuation, instead of experience, mortality between member commencement and the projected valuation date. Only decrementing actives in a core projection were affected.
  - if the member decrements after the assumed member retirement age. Previously, the spouse was assumed at member retirement age instead of at decrement.
- 02/18/2020 Fixed benefits in force:
  - for active post-decrement death benefits in a core projection with beneficiary determined at decrement.
  - for inactive joint life benefits with beneficiary at member death and fraction when only member alive different from 1. Previously, this fraction was not applied.
- 02/18/2020 For post-decrement death benefits with beneficiary determined at member death:

- fixed expected benefit payments for non-PVB bases using their own mortality tables (such as RPA).
- fixed experience benefit payments in the last year of a core projection.
- fixed experience benefit payments and benefits in-force when coverage commences or ceases at a fixed age.

02/18/2020 In a core projection, fixed spouse mortality for decrementing actives if using a variable age difference and valuing benefits with different "beneficiary determined at" (for example, a Joint Life benefit with beneficiary at commencement and a Post-Decrement Death Benefit with beneficiary at member death).

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02/07/2020 In a GASB Valuation Set with a year end event and a contribution policy of pay-as-you-go and administrative expenses are paid from the plan, fixed the calculation of the expected return on assets for the end of year event.

02/07/2020 Fixed EAN calculations when the employee contribution methodology is "Level contributions for NC, with accrued liability" and the Plan Definition has a Minimum Liability. Previously, the employee contribution liability was subtracted from the total before application of the Minimum Liability.

02/07/2020 If using retirement rates by replacement ratio and an alternative benefit formula for EAN normal cost, fixed PVB projected benefit payments and the present value of employee contributions.

02/07/2020 In German mode, fixed results when applying COLA sensitivities to a COLA that occurs every X years.

02/07/2020 Fixed results for inactive benefits with COLA overrides that vary by coded field if any participants are missing the coded field. ProVal incorrectly assumed a zero COLA instead of excluding the record for missing data.

12/16/2019 Fixed interest cost and expected return on assets under ASC715 and IAS19 if the measurement date is after the valuation date, the roll forward method is benefit payments, accounting roll forward benefit payments are overridden, and accounting expense benefit payments are not overridden. The benefit payments used to calculate interest cost and expected return on assets were before adjustments for the roll forward override, instead of after.

12/13/2019 Fixed potential issue applying a year by age of improvement mortality improvement scale to a fixed year if the first person in the group being processed is over 100% retirement age.

12/12/2019 In Pension modes, fixed calculation of Payment Form Values when the only Payment Forms needing Contingent Annuitant mortality are J&S with fractions 0, 1, 0 (i.e. "Only member is alive" is 1 and the others are 0).

12/2/2019 In Canadian mode, fixed application of surplus under a provincial law selection of Alberta and British Columbia to reflect that only 20% of the available surplus may be applied in any given year.

11/22/2019 Fixed the calculation of experience employee contributions in a core projection for participants over the 100% experience retirement age when middle of year decrements were used or if the employee contribution timing parameter was set to beginning of year, middle of year, or same timing as PVFS where the PVFS timing was set to middle of year and adjusted for survivorship. Previously the participants over 100% experience retirement age may have had non-zero experience employee contributions.

- 11/15/2019 In OPEB mode, fixed allocation of lifetime maximum when allocated between multiple benefits including a reversionary annuity and claims are paid either mid-year or end of year.
- 11/14/2019 In OPEB mode, fixed results if valuing a spending account, the annual increase changes at Medicare age but the balance is not renewed at Medicare age, and the annual credit increase rates vary pre/post Medicare age. Previously, we used the pre-Medicare increase rates for the post-Medicare age annual increase amount.
- 11/11/2019 Fixed experience study expected mortality, if rates are by coded field and at least one of the tables contains an adjustment factor specified by a database field. Previously, factors for the wrong participant were sometimes being applied.
- 11/11/2019 In Canadian mode, fixed new entrant liability in a core projection when calculating solvency liability by blending annuity purchase and transfer value liabilities and selecting the option to use only IAP upon reaching unreduced payment age. Also fixed the solvency liability when blending annuity purchase and transfer value liabilities and basing the transfer value on the termination benefit and the eligibility for annuity purchase was before the eligibility for a retirement benefit.
- 10/25/2019 In Canadian mode, fixed lump sum factors with mortality specified as <use funding assumptions> if the funding mortality assumption was specified by coded field and used a fully generational mortality scale. Previously, the mortality scale was calculated as if the participant was age 0 on the valuation date.
- 10/25/2019 Fixed calculation of payment form values for annuities when the underlying mortality was unisex, mortality improvements were fully generational, and the mortality improvement scale was sex distinct. Previously, the male improvement scale was used for all records.
- 10/15/2019 In pension modes, fixed valuation basis expected benefit payments for decrementing actives in a core projection when either benefit-related assumptions (such as salary scale) differ between valuation basis and experience basis or a post-decrement death benefit is present. This change does not affect valuations. It also does not affect the results for initial inactives and continuing actives in a core projection.
- 10/04/2019 Fixed fraction married adjustment for post-decrement death benefit active headcounts.
- 10/03/2019 In a core projection, fixed calculation of a PIA custom operator that "assumes computation age attained at decrement" and had the projection assumption experience salary merit scales assumption different than the valuation assumption salary merit scale assumptions when the PIA calculation starts prior to date of hire. Previously, the switch from the valuation basis to the experience basis merit scale was not at the correct point in time.
- 9/26/2019 In German mode, for risk benefits, adjusted COLAs payable every X years.
- 9/25/2019 Fixed results when an OPEB lifetime maximum or spending account is allocated over multiple inactive benefits and pre/post commencement mortality is assumed. Previously pre-commencement, instead of post-commencement rates were used in determining the allocation of the maximum between the benefits.
- 9/19/2019 In German mode, fixed rounding of expected benefit payments for terminated vested records to be nearest 1 instead of nearest .01.
- 9/19/2019 For German Term Vesteds, changed the rounding method used to determine starting year for in-deferral COLAs.
- 9/11/2019 In Canadian mode, if running the Stronger, Fairer Ontario Act, fixed calculation of the maximum contribution so the unfunded ongoing liability includes the provision for adverse deviations.

- 9/11/2019 In Canadian mode, fixed the calculation of the minimum required contribution (MRC) when the contribution policy was set to 'minimum plus surplus'. Previously, the MRC would be calculated without applying surplus which led to an issue for well funded plans and the calculation of the maximum tax deductible contributions. Also fixed the application of surplus so that it is only permitted when there are no special payments.
- 08/29/2019 Fix record exclusions in cores and gain/loss if PPA, actuarial liability is run, alternative mortality is not selected, but underlying values exist and are based on a coded field which is not used elsewhere in the run.
- 08/27/2019 In Canadian mode stochastic forecasts, fixed the solvency amortization interest rate if the accounting interest rate was forecast to a full yield curve and the solvency interest rate was not, or if the accounting interest rate was forecast to the full corporate yield curve and the solvency interest rate was forecast to the government yield curve.
- 08/22/2019 In a PPA forecast, fixed credit balance being applied to a contribution if quarterlies are due, the prior year minimum required contribution is greater than zero, the current year minimum required contribution is zero, in the Asset & Funding Policy > forecast analysis topic, the "pay quarterlies based on 100% prior year MRC.." is checked and credit balance is used to cover contributions. In that case, ProVal was previously assuming that the quarterlies based on the prior year MRC were paid with cash instead of credit balance.
- 08/13/2019 In German mode, fixed rounding of PVFB, EBO, PBO, and ABO for Terminated Vested members, if the user has selected for liabilities to be rounded (in Valuation Assumptions > Other Valuation Parameters). Previously, these were rounded and summed in a different order from other liabilities.
- 08/09/2019 In Public mode Valuation Sets & Forecasts, fixed the Service Cost detail by benefit. Previously the detail did not add up to the total Service Cost because the detail had interest applied to the end of the year but the total Service Cost was as of the beginning of year.
- 08/08/2019 In OPEB mode, fixed spouse experience mortality in the year in which a lifetime maximum is reached. The issue occurred only if there was at least one single life benefit to the member and at least one spouse benefit.
- 07/15/2019 In Experience Studies, fixed active decrement results if benefit definitions that apply only to vested valued through active participants are included in the plan and the retirement eligibility for those benefits is earlier than for the active retirement benefits. Previously, benefits that applied to vested valued through active participants were included in determining active retirement eligibility.
- 07/12/2019 Fixed Canadian LTD calculations. Previously, rates used may have been off by 1 month. Additionally, ProVal may have zeroed out one additional month when zeroing out rates during the elimination period.
- 07/11/2019 Fixed results when running a GASB Valuation Set with more than two end of year events. Previously, the results (service cost, liability, etc.) for the third and later events were being pulled from the wrong event.
- 07/01/2019 In a core projection, fixed experience COLAs applied to decrementing active benefits in the high and low inflation sensitivity scenarios if COLA valuation assumptions vary with changes in interest rates.
- 06/21/2019 Fixed results for benefit formula component subformulas used in post-termination retirement benefits that contain both an accrual definition and an age based component (e.g., a table, a constant with increase rates applied, or a #MAXBEN operator).

- 06/19/2019 Fixed projected total/valuation salary displayed in Valuation Output when weighting records by count. Previously, we were double counting the count. This was introduced with ProVal 3.13.
- 06/14/2019 For GASB end of year events, when rolling forward the bases to end of year, we now roll forward each base individually. Previously we rolled forward in aggregate.
- 06/13/2019 If using a sex distinct table in a Payment Form and a fractional percent male, round the deferral age to the nearest age (instead of rounding up).
- 06/11/2019 In German mode, fixed potential incorrect accruals in first year in Career Average and Cash Balance components when the accrued benefit on the data is as of the allocation date preceding valuation date.
- 06/10/2019 In German mode, fixed potential incorrect turning off of jubilee eligibility if the jubilee and associated benefit have the same eligibility date.
- 06/04/2019 Fixed EAN Normal Cost benefit for benefits commencing at post-termination retirement age with an alternative EAN Normal Cost benefit formula which is identical to a formula for a benefit that does not commence at post-termination retirement age.
- 05/29/2019 Fixed rollforward of first year assets if there is a contribution schedule, the measurement date is after the valuation date, there are contributions receivable in the schedule between the valuation date and measurement date, and there are contributions receivable entered in the schedule after the measurement date that do not equal the contribution receivable amount entered in the Asset & Funding Policy.
- 05/21/2019 In PPA valuation sets and forecasts, fixed the Pre-MAP 21 shortfall amortization if overriding the shortfall amortization interest rates. Previously, ProVal was not using the overridden rates for the Pre-MAP 21 calculation.
- 05/21/2019 In PPA valuation sets and forecasts, ensure that the target normal cost is not below zero.
- 05/21/2019 In Canadian mode Valuation Sets & Forecasts that have an Applicable Law Selection of Ontario, changed the calculation of the provision for adverse deviation added to the normal cost to be based on the gross normal cost. Previously, the PfAD was only added to the employer normal cost. Also fixed the calculations of available surplus, surplus threshold, and the validation of ongoing amortizations entered in the Asset & Funding Policy.
- 05/21/2019 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:
- Spurious tags for +/-1% trend sensitivities have been removed, They are still available in the ProVal\_TrendSensitivities exhibit.
  - ProVal\_Contrb\_Policy (Employer Contribution) and ProVal\_ARC\_Policy (GASB 25/27 or 43/45 Annual Required Contribution) have new tags for the option to not contribute if funded ratio is greater than a threshold.
  - ProVal\_Contrb\_Policy (Employer Contribution) removed the schedule of plan year cash contributions if PPA and paying quarterlies and final when due and added a schedule of contributions if PPA and using an Asset & Funding Policy contribution schedule, a Deterministic contribution schedule or paying quarterlies and final when due.
  - ProVal\_Asset\_Val\_Method has new tags if Canadian mode and Ontario Bill 57 applies.

- ProVal\_GASB68 (GASB 68: Development of Pension Expense) has new tags if there are employee contributions.
  - ProVal\_RecGASB6768 (GASB 67/68 or 74/75: Reconciliation of Balance Sheet Liability) has new tags if there are GASB End of Year events.
  - ProVal\_CanMin (Minimum Required Contribution) and ProVal\_CanMinBase (Funding Amortization Bases) have new tags if Quebec Bill 57 or Ontario Stronger Fairer Act apply.
- 05/21/2019 In public and OPEB modes with an end of year GASB event and rolling forward accounting liabilities, we will now use the underlying valuation date as the liability calculation date. Previously, we assumed the same timing as the beginning of year run. Similarly, if no rollforward benefit payment override is specified in the end of year event, expected benefit payments will be used to roll forward the end of year liabilities. Previously, we used the rollforward benefit payment override as specified in the Asset & Funding policy that pertains to the beginning of year liabilities.
- 05/21/2019 When determining the liability gain/loss under GASB 68 for an end of year gain/loss event, the expected liability is now calculated using the gross service cost. Previously, the expected liability was determined using the employer portion of the service cost only.
- 05/21/2019 Fixed rounding to honor the user's rounding parameter for the benefit payments used to roll forward the liability to a measurement date after the valuation date.
- 05/21/2019 Under middle of year decrements, adjusted the calculation of expected benefit payments and experience benefit payments to match projected benefit payments. In core projections, this also changed benefits in force for emerging inactive.
- 05/21/2019 For benefits using COLAs with timing other than end of year, fixed benefits in force for decrementing actives. Previously the benefits in force was the annual benefit payments including the COLA increase during the year.
- 05/21/2019 In OPEB mode, fixed inactive projected benefit payments for a deferred lump sum to member payment form with no life contingencies and emerging inactive projected benefit payments for a lump sum to member payment form.
- 05/21/2019 Changed PPA EIR projected benefit payments for LS optional forms using a mortality table for conversion which is not an IRS 2018-2019+(MP16-17) Applicable Mortality for 417(e) (dynamic) mortality table in effect as of the valuation date.
- 05/21/2019 In Canadian mode, improved the structure of how ongoing and solvency amortization bases are maintained in ProVal. Previously, bases with fractional periods remaining were split into two equivalent bases with integer periods that produced the same amortization payment. Additionally, bases with the same amortization period were combined. Now each base is individually maintained.
- 05/21/2019 In Canadian mode, when establishing ongoing amortization bases, combined assumption changes with actuarial gain/losses to create a single base rather than two bases. This improved the handling of gains.
- 05/21/2019 Fixed results if PPA stochastic forecasting, NC+SC contribution policy, and the actuarial liability uses a duration based rate because it was set equal to PPA rates.
- 05/21/2019 For Dynamic Asset Allocation with Canadian Solvency, smoothed assets are now actuarial assets, not Solvency Assets.
- 05/21/2019 For German TVs, ensured that non-SVR accrual basis components are always frozen at termination. This was not always the case for operators such as #MAXSAL.

4/29/2019 In PPA forecasts, improved at-risk liabilities if the option to use the most valuable optional form at each decrement age is selected. Previously, if the most valuable payment form changed depending on the underlying Core Projection sensitivity, the interpolation by benefit could produce skewed results. ProVal will now “collapse” benefits before interpolating at-risk liabilities when this option is selected. That is, instead of processing each form of benefit separately, we combine benefit amounts for forms of a similar type.

4/18/2019 Fixed attribution rates for cash balance post-termination retirement benefits, when the accrued balance is set by a database field and accruals are zero.

3/21/2019 In core projections, fixed historical salaries using -100% merit increases for a calendar year preceding the valuation year.

3/7/2019 Fixed accrued benefit used for vested liability calculations for post-termination retirement benefits containing cash balance components.

2/25/2019 In core projections, fixed experience benefit payments for emerging inactives when either a lump sum benefit formula component with ‘when used in a death benefit, base primary mortality on the deceased member’s age/sex’ selected is referenced in the formulas of both a death benefit and a non-death benefit, and the same lump sum factor mortality is used for both valuation and projection assumptions or excess contributions are specified in Canadian mode and a death and non-death benefit are included in the calculation of excess contributions.

2/19/2019 In German mode, fixed projected accrual rates for benefit formula components using projected service (or service continuing after termination) and age based accrual rates or accrual rates with new rates effective as of a date.

2/19/2019 In German mode, fixed projected accrual rates for benefit formula components using projected service and accrual allocation in year of decrement set to ‘none’.

2/19/2019 In German mode, for cash balance and career average benefit formula components, if freezing accruals at 100% retirement age, use the accrued benefit at freeze age, not the accrued benefit at the allocation date.

1/29/2019 In all pension modes, for active post-decrement death benefits with beneficiary at member death (or earlier of member death and member commencement), ensured spouses always survive to the end of the year of member death (or the earlier of member death and member commencement, or middle of the year of member death in German mode, or decrement age if later), even if either the valuation or the experience spouse mortality rates are set to 1.000 (including when the spouse mortality table runs out).

1/22/2019 Fixed results in an accounting only Valuation Set or Deterministic Forecast if there are administrative expenses and the lurking parameter “include admin expenses in contribution” is checked in the percent of payroll contribution policy parameters. If there are no funding results, we set the contribution policy to 0% payroll and were erroneously applying that parameter.

1/22/2019 In German mode, for EAN cost methods, with a salary scale applied, fixed the salary used to calculate the past earnings points for the #SVR operator. All years prior to the valuation should use the valuation year salary.

1/22/2019 In German mode, for Terminated Vested participants, fixed bug where the #SVR operator could be freezing the BBG, Interim Average Income, and Current Pension Value one year too soon.

1/22/2019 In German mode, fixed the calculation of the Default Entry Age in the #SVR operator. The calculation now uses the salary and the Interim Average Income from the valuation year, rather than the previous year.



- 1/17/2019 If using replacement ratio retirement rates, fixed the benefit used in the replacement ratio for an alternative EAN NC formula. Only benefits that are payable immediately upon retirement should be included.
- 1/16/2019 In all pension modes, exclude from emerging inactive headcounts participants with no corresponding benefits, for example members whose continuation percentage is 0% after their spouse dies. For benefits for which the continuation percentage ("fraction of J&S benefit received when") parameter was defined by field, this could have resulted in different headcounts for runs which ran the participant separately versus when running with other participants whose continuation percentage (for the same benefit) were not zero.
- 1/16/2019 In OPEB mode, improved emerging inactive headcounts so that the greatest headcount of each contingency (other than in-service benefits) is added together, rather than taking the greatest headcount of all benefits. When there is at most one benefit per contingency, the total emerging inactive headcount will equal the sum of the headcounts for each benefit (excluding in-service benefits).
- 1/16/2019 Fixed PPA PBGC liability in a stochastic forecast if PBGC rates are set equal to Max Tax rates, Max Tax rates use the full yield curve, the yield curve is being overridden in the underlying capital market simulation, and the overridden PBGC curve differs from the overridden Max Tax curve. Similarly, fixed Actuarial Liability and normal cost in a PPA stochastic forecast if actuarial liability rates are set equal to PPA funding rates, PPA funding rates use the full yield curve and the yield curve is being overridden in the underlying capital market simulation.
- 12/17/2018 In all pension modes, for inactive post-decrement death benefits with beneficiary at member death (or earlier of member death and member commencement), ensured that spouses always survive to the end of the year of member death (or the earlier of member death and member commencement, or middle of the year of member death in German mode). This also applies when the valuation or the experience spouse mortality rates are set to 1.000, including when the spouse mortality table runs out. This fix does not apply in German mode if the Individual Method is used for inactives and spouse data is provided. Actives are not affected.
- 12/7/2018 In German mode, for Terminated Vested participants, changed the starting year for in-deferment COLAs to be the year of termination, rather than the valuation year.
- 11/30/2018 In German mode, fixed the first age at which a Teilwert liability can be shown. Previously, if a record had a Transfer Value, then a liability would be shown as early as the Funding Age. Now, the liability will be zero until the year following Funding Age.
- 11/29/2018 Fixed PBO plan change in an OPEB Valuation Set if the measurement date is after the valuation date, the underlying interest rate is a yield curve, and a subsequent event changes the yield curve.
- 11/29/2018 In German mode, fixed negative accrual rates at valuation anniversaries if projecting to sharp ages.
- 11/16/2018 Fixed Entry Age Normal calculation, if there is an alternative EAN NC formula specified, and retirement rates are by replacement ratio. The present value of salary or service at the valuation date now reflects the decrement rates based on the original benefit, not the alternative benefit.
- 11/16/2018 Fixed spouse experience mortality for inactive post-decrement death benefits with beneficiary determined at the earlier of member death and member commencement (and where member commencement occurs prior to the projected valuation date) and for German cores where the Individual Spouse Method applies to current retirees. Actives and vested valued as active (including German Vested Terms) are not affected.

11/8/2018	In German mode, fixed components that both project and freeze accrual rates. Additionally, always freeze accruals at sharp retirement ages.
10/15/2018	In German mode, fixed the retirement mortality lookup if disability mortality changes at actuarial retirement age to retirement mortality and the retirement mortality varies by coded field.
10/5/2018	In Experience Study tool, fixed decrement table lookups when decrements are set to "rates by benefit" in valuation assumptions, the corresponding benefits use different eligibility selection expressions, and at least one unmatched active record (that is, in the beginning of year data but not in the end of year data) appears after an unmatched inactive record in the beginning of year data. In this case, any unmatched active records appearing after the first unmatched inactive record could use incorrect tables for the lookups.
10/5/2018	In Experience Study tool, fixed table lookups when decrements are set to "rates by benefit" in valuation assumptions and those rate tables have different maximum ages. Specifically, if the first table defined in valuation assumptions has a younger maximum age than the tables that follow, then the following tables would be limited to the first table's maximum age.
10/1/2018	In German mode, in Career Average and Cash Balance plans, fixed the Rate from Allocation to Decrement (and resulting Accrual to Decrement), for records born in the second half of the year (relative to the valuation date) when there are variable accrual rates. This fix also fixes the accrual to allocation in the first year, under the conditions stated above, when the accrued benefit on the valuation date is not set to zero. A similar fix on 6/22/2018 affected only Accounting runs, and only those records hired in the first half of the year. This current fix affects Accounting valuations for those hired in the second half of the year, as well as Tax valuations for those whose Date of Funding is at a later age than Date of Hire.
9/26/2018	In German mode, fixed benefits deferred to actuarial retirement age (ARA), if using COLA expressions with the #COMMA operator, optional payment forms (if converted using benefit component tables), annuities certain, different pre- and post-commencement interest rates, lump sums with installments (if a temporary period applies), or COLA tables that vary by duration from commencement. Projected benefit payments for any lump sum payment forms deferred to ARA may also be affected.
9/24/2018	In German mode, for final average and basis only components, fixed non-table accrual basis components at decrement for sharp retirement ages.
9/24/2018	In German mode, fixed projected accrual rates for technical pensioners (actives or terminated vested participants over ARA). Previously, the rates were projected to valuation anniversaries.
9/19/2018	Fixed erroneous results for active participants when retirement rates (from active status) differed from post-termination retirement rates and the data contained both "vested valued through active" and "active" participants. In this case, "active" participants processed after a "vested valued through active" participant would use the post-termination retirement rates instead of the retirement rates. This issue was introduced with the initial release of version 3.12.
9/17/2018	Fixed PBO plan change in a pension Valuation Set if the measurement date is after the valuation date, the underlying interest rate is a yield curve, and a subsequent event changes the yield curve.
9/6/2018	Fixed core projection individual results if there are plan amendments. We were previously summing both the before and after amendment benefit results.
9/5/2018	In German mode, if current salary is imputed from prior year's salary, fixed salary for participants born in the second half of the year.

- 9/5/2018 For entry age normal methods in German mode, for post-termination benefits with cash balance accruals with accrued benefit specified by a database field and service continuing after termination, fixed expected accrued benefit used to scale prior accruals, for years where the termination age is prior to the last allocation date.
- 9/5/2018 In a core projection, for emerging inactives with post-termination retirement benefits, fixed number inactive, inactive average age, inactive percent male, and benefits in force. Previously, values were not included for those who previously terminated and then retired in the projection year. For benefits in force, values were also not included for those who had previously terminated, but not yet retired in the projection year.
- 9/5/2018 For entry age normal methods in German mode, for cash balance and career average benefit formula components with allocation dates different from the valuation date and accrued benefit amounts set equal to a database field or zero, fixed allocation from prior allocation date to decrement date, for decrement dates before the valuation date.
- 9/5/2018 In German mode, when an active record is younger than the first funding age (FFA) of 27, 28, or 30, but has a vested right to benefits (currently age 25 with 5 years of service), their Teilwert (or actually the Tax Reserve) will now be set equal to zero instead of the Present Value of Vested Benefits (PVVB) valued with 100% termination rates. This was a reversal of a change made on 9/19/2017.
- 9/5/2018 When running vested liabilities, and there are post-termination benefits, fixed service used to determine post-termination retirement eligibility. Previously, projected service at decrement was used, instead of current service.
- 9/5/2018 In German mode, fixed accrual rates in Career Average and Cash Balance components when contractual allocations end at a date in a database field and accrual rates vary by age and age is not interpolated. The bug did not occur when running 1 person at a time, such as when running sample lives.
- 9/5/2018 When running vested liabilities under middle of year decrements, and current age and service is determined at 'MOY', and there are post-termination retirement benefits with service based ERF tables, fixed service used for table lookup. Previously, service at the valuation date was used, instead of at the valuation date + 6 months.
- 9/5/2018 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:
- ProVal\_CanMin (Minimum Required Contribution), ProVal\_CanMinBase (Funding Amortization Bases), and ProVal\_UALAmort (Minimum Basis Amortization) have new tags if the Stronger, Fairer Ontario Act applies.
  - ProVal\_Funding\_Rollforward (Funding Liability at Valuation Date) is a new report in OPEB and Public modes if Funding liabilities are rolled forward from an earlier liability valuation date.
- 9/5/2018 In German mode, fixed liability for "Deferred Compensation Ongoing" benefit promises when the date of benefit promise is on or after 1/1/2001 and there are multiple benefit promises in the plan.
- 9/5/2018 Fixed new entrant results of a Core Projection if a referenced lump sum factor had an underlying payment form whose deferral, temporary or certain period was based on a database field (specifying an age). If the original order of this field in the new entrant database (i.e., before any reordering in Spreadsheet Edit) was not the same as the original order of this field in the census database, an incorrect field value was used for new entrants. Field values for records on the census database were not impacted.

- 9/5/2018 Fixed validation of records if there are missing or invalid values in a database field used to project an accrual definition to an age. Previously, the wrong records may have been excluded.
- 9/5/2018 Improved the effective interest rate in a forecast especially for short duration liabilities by using an average benefit timing more reflective of the underlying core projections. Previously an average benefit timing of 0 was used. Did a similar enhancement for the EIR calculation used to roll forward PBPs from the valuation date to the measurement date for the individual spot rate method liabilities by using an average benefit timing more reflective of the underlying core projections. Previously an average benefit timing of 0 was used.
- 9/5/2018 If the measurement date is after the valuation date, modified the calculated fraction of year between the two dates. ProVal will now use the exact days between the dates divided by 365 + 1 if in a leap year. Previously, ProVal assumed that all years were a leap year and always divided by 366 in this calculation.
- 9/5/2018 Modified leap year methodology when discounting contributions for more than one year, ProVal will now use 1 for the whole year and days/(365 + 1 if leap year) for the partial year. Previously, the calculation was days/365 + 1 if the whole year was a leap year.
- 9/5/2018 For a benefit formula component that is an accrual definition where service is projected to an age in a database field, fixed potential error where the wrong record may have been excluded due to missing or invalid data.
- 9/5/2018 In German mode, changed the calculation of rounded actuarial ages at valuation dates that fall at the ends of months with less than 31 days, when the record's day of birth is greater than the day of the valuation date. For example, a member born 31-Mar-1950 on a valuation date of 30-Sep-2016 will now be rounded to age 67 instead of 66.
- 9/5/2018 In German mode, fixed validation of hire age for Terminated Vested records so that the minimum is 15. Previously, it was erroneously set to 0.
- 9/5/2018 In pension modes, fixed validation of records with Certain & Life and Certain Only payment forms so that they are excluded when the rounded age plus the certain period is greater than 120. Previously, the validation used exact age. For example, a person aged 110.2 years old with a 10 year certain period was incorrectly being excluded, and will now be included.
- 9/5/2018 Changed the methodology for rolling forward accounting liabilities and benefit payments in a valuation set or forecast when the accounting measurement date is after the valuation date, expense is calculated using the individual spot rate method, the benefit payment roll forward method is selected, and an actual benefit payment override is used. See the technical reference article "Roll forward of accounting liabilities" for more details on the new method.

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#### ProVal version 3.11

- 7/27/2018 In German mode, revised the PSVaG calculation to not automatically apply the minimum age for guaranteed benefits.
- 7/27/2018 In German mode, fixed accounting jubilee eligibility if the back-calculation method or mid-year decrements were assumed.
- 7/18/2018 Changed projected headcounts for inactives in a valuation if any joint life or post-decrement death benefits with beneficiary determined at member death to ensure that spouses are not counted until the year after the year of member death. Previously, they were counted starting from the year of member death.

7/13/2018	In Universal mode, when interpolating to exact age, fixed active age, sex, and service in individual results.
7/10/2018	Fixed calculation of emerging inactive life expectancy in future years of a core projection, if there are post-termination retirement benefits.
7/9/2018	In German mode, fixed the minimum age calculation for non-guaranteed benefits when a participant is only eligible for a Deferred Compensation Optional Benefit Promise. The minimum age was correct for other Benefit Promise types and if a Deferral Compensation Option was run with another Benefit Promise type.
6/27/2018	In German funding valuations with regulatory data for all years set equal to the valuation year, changed BBG East, BBG East Miner and CPV East values to reflect the new West/East conversion factors after the valuation date, while still using the West value from the valuation year as the basis for the conversion.
6/26/2018	In future valuation years in a core projection, for benefits commencing at post-termination retirement age, fixed mortality used between termination and retirement, if active and terminated vested mortality differs, and at least one of them is a dynamic mortality table.
6/26/2018	In very rare cases, fixed gain/loss by source related to matching records. The previous results would have been obviously wrong since ProVal would not have matched records properly, so all results would have been considered a gain/loss.
6/25/2018	In German mode, fixed #SVR operator to use rounded up age. Additionally, for a retirement SVR component, the value at actuarial retirement age will be returned for ages before retirement eligibility, if actuarial retirement age has been calculated.
6/25/2018	For benefits commencing at post-termination retirement age, fixed service-based ERF tables to use the service specified for post-termination retirement eligibility. Previously, the date of hire from the census specifications was being used.
6/22/2018	In German mode, in Career Average and Cash Balance plans, in Accounting runs, fixed the Rate from Allocation to Decrement (and resulting Accrual to Decrement), for records born in the second half of the year (relative to the valuation date) when there are variable accrual rates. Also fixed the accrual to allocation in the first year, under the conditions stated above, when the accrued benefit on the valuation date is not set to zero.
6/20/2018	In valuation individual results, fixed active projected benefit payments for years after the number of benefits valued.
6/14/2018	Fixed a possible error where the wrong active participant was excluded if a benefit formula component was a database field type with an expression containing more than one field.
6/12/2018	Fixed vested liability calculations using table components that freeze age for vested liabilities based on an age definition other than nearest birthday.
6/7/2018	Fixed career average and cash balance components with projected accrual rates, custom attribution, and the accrued benefit not set to expected value.
5/23/2018	In German mode, fixed Jubilee eligibility for funding if ARA is the same month as jubilee date. Jubilee eligibility will now be the beginning of the month coincident with or following.
5/22/2018	In German mode, fixed non-table accrual basis components and cash balance component accrual basis at decrement for sharp retirement ages.
5/22/2018	For career average and cash balance components with projection, if the accrued benefit is from a database field or zero, scale projected accrual rates attributable to years at or before the valuation date by the ratio of the database field accrued benefit (or zero) over the expected value. For entry age liabilities, this change ensures that projected values accrued in the past are in line with actual prior accruals.

5/16/2018	In OPEB mode, when the life time maximum is restated at Medicare age, the limit is increased annually with increase rates, and the increase rates are specified by a table with separate rates for Pre/Post Medicare, fixed the post-Medicare lifetime maximum to reflect the post-Medicare increase rates.
5/4/2018	In German mode, fixed individual results for actuarial retirement age and benefits at actuarial retirement age to be current age and benefits at current age, if later.
5/1/2018	Fixed custom variable results if the custom variable expression contains temporary variables and the components are adjusted based on the following year's results (e.g., contribution is adjusted based on an end of year additional contribution).
4/17/2018	Fixed Canadian Solvency projected benefit payments for benefits with payment form commencing at post-termination retirement age.
4/12/2018	For PPA runs, fixed interest on cash contribution that creates a prior year prefunding balance if the prefunding balance is then used to satisfy a quarterly contribution. Previously, we were giving interest on the prefunding balance from the contribution payment date instead of from the valuation date.
4/10/2018	Fixed PPA Max Tax At-Risk projected benefit payments for active participants after decrement. Previously, the Funding Not-at-Risk projected benefit payments were used instead.
4/10/2018	Fixed PBGC projected benefit payments for vested valued as active participants if run with no termination benefits and some benefits were not included in vested liabilities.
3/28/2018	Fixed calculation of lump sum factors (and optional forms) where the deferral age and temporary age were the same.
3/28/2018	Changed percent of end of period liability displayed on gain/loss report to use expected end of period liability instead of actual end of period liability.
3/26/2018	Fixed mortality decrements if a linked table, mortality adjustment factors apply and the table type uses service.
3/26/2018	Fixed bug running experience studies using decrement rates by benefit. Eligibility for determining expected decrements was not being applied correctly if there were participants in the beginning of year database missing from the end of the year database.
3/16/2018	Fixed potential use of incorrect service when running a core projection with new entrants and post-termination retirement eligibility requirements specified by a service definition.
3/15/2018	Fixed benefit amount used in vested liability calculation for post-termination retirement benefits when the first 'retirement' decrement age is also the 100% post-termination retirement age, if middle of year decrements are assumed.
3/15/2018	Fixed experience benefit payments for post-termination retirement benefits for participants who terminate and retire in final projection year, if middle of year decrements are assumed or in German mode.
3/15/2018	For post-termination retirement benefits with lump sum with installments payment forms, fixed potential incorrect payment form value at 100% retirement age, if middle of year decrements are assumed or in German mode.
2/15/2018	Fixed eligibility service used in the post-termination retirement eligibility requirements if there are service overrides specified and middle of year decrements are assumed.
2/12/2018	Fixed Gain/Loss Analysis for Entry Age Normal Accounting method in OPEB mode. This bug was introduced with the release of 3.11.
2/7/2018	Fixed stochastic trial trace and populating deterministic assumptions if fixed income yield is relevant to asset smoothing and the first year asset value is overridden.

- 1/29/2018 Fixed the experience benefit payments for post-decrement death benefits with beneficiary determined at member death. This only affected decrementing actives (members who decrement and die prior to each projection year) and cores with different valuation and projection mortality or fraction married. The change is expected to be negligible as a percent of the total experience payments.
- 1/29/2018 Fixed PPA At-Risk Max Tax UC liability when the "use most valuable form at each decrement age" option is selected. Previously, the most valuable benefit comparison was being done on a Not-at-Risk PBGC liability basis which may have produced a different winner.
- 1/29/2018 Fixed issue that could append extraneous parameters to Valuation Assumptions, resulting in crashes (e.g., DOMAIN ERROR, LENGTH ERROR, etc.) when using the affected assumptions after updating to a higher version of ProVal. ProVal 3.11 will automatically scan for these extraneous parameters and remove them. This issue was introduced in version 3.08 and occurred when Copying (or Saving As New) either (a) Custom Regulatory Table referenced in Valuation Assumptions as the Maximum Compensation Limit for PVFS or (b) Salary Definition referenced in Valuation Assumptions as the Alternative Salary for 415 limits. This fix is included in this log in order to document the conditions and symptoms of the issue, but the issue did not cause results to change
- 1/29/2018 In German mode, fixed the individual results item "zExpBP\_inact\_actg" for disabled participants. Previously, it was not switching to regular mortality rates after actuarial retirement age.
- 1/29/2018 In German mode, fixed post-termination expected benefit payments for participants who terminate prior to the valuation year and retire prior to or on the valuation year.
- 1/29/2018 In German mode, changed the projected BBG, current pension value and general reference value for the new federals (the former East Germany) to reflect the new legislation which brings these values on par with the rest of the country by 2025.
- 1/29/2018 In German cores, fixed expected benefit payments for post-termination benefits, where termination and second decrement are the same year.
- 1/29/2018 Fixed table lookups if a service based table is specified for the adjustment to the Canadian ITA or US 415(b) maximum, or optional payment forms specified by benefit component table and table lookup is set to be age at commencement. If default (<date of hire>) service is specified, ProVal will now look up table values based on rounded attained age minus rounded hire age, consistent with tables throughout ProVal. Previously, fractional service based on date of hire was used.
- 1/29/2018 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:
- ProVal\_CanLOC (Letter of Credit) has new tags if the letter of credit increases or is capped by a user specified amount.
  - ProVal\_GASB\_DefRes (GASB 67/68 or 74/75: Deferred Outflows & Inflows of Resources) has fixed some duplicated tags and added new tags if the Valuation Set GASB Gain or Loss event is reflected.
  - ProVal\_ErCtrb (Development of Employer Contribution) and ProVal\_ARC\_Policy (GASB 25/27 OR 43/45 Annual Required Contribution) has new tags if the contribution is constrained.
  - ProVal\_ErCtrb (Development of Employer Contribution) has new tags if some amortization base types are open.
  - ProVal\_IAS19R (IAS 19: Retirement Benefit Expense) has fixed a duplicate tag.

1/29/2018	In German mode, fixed PVVB for vested actives below first funding age with Career Average or Cash Balance components when service does not continue past termination.
1/29/2018	In German mode, fixed results for terminated vested participants with Career Average or Cash Balance components when service continues past termination. Previously, the benefit from allocation date to decrement date was ignored.
1/29/2018	Fixed validation for spouse data if an inactive record has post-decrement death benefit payment forms but no other joint life payment forms. Now, inactive records will be excluded if beneficiary determined "by data as of valuation date (assumptions used if missing)" and the spouse data is present but invalid.
1/29/2018	In German mode, fixed validation for spouse data used in inactive spouse benefits if the Individual Method for spouses applies to inactives. Now, inactive records will be excluded if spouse data present but invalid.
1/29/2018	In German mode, fixed incorrect calculation of accrual rates in some post-termination benefits.
1/29/2018	In German mode, fixed calculation of experience benefit payments for post-termination benefits.
1/29/2018	In Canadian mode, when a letter of credit (LOC) is used and interest is included in the LOC, fixed the calculation of the minimum contribution when the actual LOC was restricted by the maximum allowed. Also fixed the calculation of the credit balance when an LOC was increasing with interest.
1/29/2018	In German mode, fixed calculation of entry age normal liabilities for post-termination benefits, if there is 100% termination age before 100% retirement age.
1/29/2018	In valuation sets and forecasts with overrides specified for PPA at-risk liabilities, the override will now be applied to emerging inactive liabilities.
1/29/2018	In UK mode, fixed PPF caps used for optional forms. Previously, the cap for the normal form was being used for all optional payment forms.
1/29/2018	In German mode, fixed calculation of expected future working lifetime and active life expectancy.
1/29/2018	In German mode, fixed linear proration to decrement or eligibility attribution under unit credit methods. This is now attributing through termination age, previously it was attributing through second decrement age.
1/29/2018	For funding or GASB 25/27 or 43/45 supplemental cost calculation: <ul style="list-style-type: none"> <li>• if any amortization bases had a fractional payment period, modified result to always assume a payment of one for each whole year and a fractional payment in the last year.</li> <li>• If duration based interest rates were used, fixed issue where first year interest rate was dropped in the discount factor.</li> </ul>
1/29/2018	For normal cost + supplemental cost contribution policies, stopped adding a funding method change base if the actual contribution was different from the normal cost + supplemental cost. Now, any difference between expected and actual contributions will flow through to gain/loss. This will only change the contribution if the gain/loss and funding method change amortization periods are different.
1/29/2018	Modified TUSL (Outstanding balance of amortization bases) variable to honor the eliminate bases when in surplus option. Now, the result will be zero if the plan is in surplus. Additionally, no longer output an actuarial gain/loss unless it is relevant



because used for a normal cost + supplemental cost contribution policy or GASB 25/27 or 43/45 applies.

- 1/29/2018 For GASB 25/27 or 43/45, if bases were eliminated because of surplus, fixed bug whereby we were using them in the calculation of the supplemental cost using maximum amortization period.
- 1/29/2018 Changed calculation of contribution forced to prevent assets becoming negative so that in a forecast interest is assumed to be earned at the actual rate of return. Previously, interest was assumed to be the greater of the funding interest rate and the actual rate of return.
- 1/29/2018 In Qualified mode, changed Valuation Sets & Forecasts to ignore any contributions in a contribution schedule that are two or more years after the valuation date.
- 1/29/2018 EIR calculations for new runs will be done using liabilities that reflect scaling factors. Besides EIR output items, this also affects other calculations relying on interpolated benefit payment streams (which are relevant for determining "interpolated" future liabilities, calculating interest/service cost under the spot rate interest cost method, and daily roll forward calculations). Previously, these calculations were done without scaling factors.
- 1/29/2018 Fixed decrementing active headcount, age, percent male, benefits inforce, and experience benefit payments in a forecast with overrides or events, scaling factors or plan amendments, and benefits that apply to either funding or accounting results, but not both.

#### ProVal version 3.10

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- 1/17/2018 In rare cases when using a benefit payment roll forward to determine the liability at a measurement date after the valuation date and the average benefit timing factor did not converge for one of a liability and its associated normal cost, an estimated k factor was used for both the liability and its normal cost.
- 1/17/2018 Fixed the ABO expected benefit payment output when using the benefit payment roll forward method. Previously, the amount output was as of the valuation date rather than the measurement date.
- 11/29/2017 Revised U.S. national average wage and social security wage base regulatory data text files for 2018 per revision by the Social Security Administration. Regulatory data with the IRS published values and the social security CPI (which was not revised) were included in our 11/16/2017 patch.
- 11/16/2017 Fixed Gain/Loss calculation if the following criteria are met: aggregate method, employee contributions, participants over 100% retirement age, and employee contributions timing applies beginning or middle of year survivorship.
- 11/16/2017 Fixed calculation of employee contributions when projection assumption for 100% retirement in a core is greater than valuation assumption of 100% retirement.
- 11/14/2017 In Canadian mode calculation of excess contributions, fixed the present value of benefits on a solvency basis when there were no lump sum factor assumptions defined in the funding valuation assumptions. Previously, this caused the solvency present value to use the same assumptions as the ongoing liability.
- 11/13/2017 In US Qualified mode, if PPA, paying the quarterly and final when due, the measurement date is after a quarterly is paid, and the end of first year asset value is overridden in deterministic or stochastic assumptions, fixed the year two asset value to be equal to the override amount. Previously, we added in the quarterly payments that were made between the second valuation date and measurement date.

11/13/2017 Fixed PBGC projected benefit payments and PBGC effective interest rate if the underlying valuations or core projections use PPA attribution.

11/1/2017 Fixed Gain/Loss Analysis for Entry Age Normal methods when the EAN employee contribution methodology is set to "Level contributions for NC with accrued liability" in Valuation Assumptions. Previously, there was a spurious gain for implicit assumption change equal to the EEC AL at the end of the year, with an offsetting loss for unreconciled amounts. The total liability gain/loss was not affected.

10/19/2017 In German mode, in a tax/funding run where no funding eligibility override has been specified, non-Teilwert liabilities are now calculated and displayed for all participants, even those active participants who are not eligible for a Teilwert Liability and/or not vested.

10/19/2017 In German mode, calculate a Teilwert Liability equal to PVVB for participants who are vested but under or at the first funding age. Previously, this was only done for participants who were strictly under first funding age.

10/16/2017 In German accounting runs, fixed the vesting fraction denominator for "technical pensioners" to be vesting service at normal retirement date instead of vesting service at valuation date.

10/13/2017 In German accounting runs, if the last allocation option is full year, set the accrual in the year of decrement to be zero if the participant decremented on the allocation date.

10/4/2017 In German mode, fixed Jubilee Tax liabilities when 100% retirement is set to actuarial retirement age, actuarial retirement age is set to State Pension normal retirement age, and actuarial retirement age (rounded according to German rules) is 1 year less than the rounded age that is nearest the unrounded actuarial retirement age.

9/28/2017 In German mode, fixed results in runs with both Severely Handicapped (Schwerbehinderte) and ordinary members when Actuarial Retirement Age is set to state pension early retirement age.

9/20/2017 In German mode, use unrounded Actuarial Retirement Age for purposes of determining whether a jubilee date occurs after the Actuarial Retirement Date (after which time the member will not receive the jubilee benefit). Previously, the dates at whole Actuarial Retirement Ages were used.

9/20/2017 In German mode Jubilee Valuations, fixed attribution service for ages after the 100% retirement age.

9/20/2017 In German mode, fixed vesting fraction for Terminated Vested members who have passed their Normal Retirement Date.

9/19/2017 In German mode, when an active record is younger than the first funding age (FFA) of 27, 28, or 30, but has a vested right to benefits (currently age 25 with 5 years of service), their Teilwert (or actually the Tax Reserve) will now be set equal to the Present Value of Vested Benefits (PVVB) valued with 100% termination rates, rather than zero.

9/19/2017 In German mode, in-deferment COLA is now applied between termination and 2nd decrement for Terminated Vested and post-termination benefits. For this purpose, the in-deferment COLA is always treated as compound and any COLA dates or limits are ignored.

9/18/2017 In German mode, fixed accrual pattern in the case where service starts at the valuation date and there is no historical service, but there is an existing accrued benefit (for example, someone who transferred in on val date). There should be no accrued benefit for this person before the valuation date.

9/13/2017	In German mode Jubilee Valuations, fixed bug where some ancillary benefits were erroneously deemed to have less than 15 years of eligibility service and were therefore excluded from Teilwert calculations.
9/11/2017	In German mode Jubilee Valuations, fixed PUC attribution service denominator to be in line with the Jubilee eligibility.
9/7/2017	In German mode, fixed Jubilee results when the assumed retirement age and the normal retirement date are in the same year.
9/7/2017	In German mode, assume active participants over the 100% retirement age on the valuation date ("technical pensioners") retire immediately on the valuation date, not on the first birthday after the valuation date.
9/5/2017	In Gain/Loss Analysis, fixed results if there are refund of employee contributions and the employee contribution interest rate used the underlying liability assumptions.
8/31/2017	In German mode, fixed age rounding in eligibility for Jubilee benefits in Tax valuations. Previously, benefits for members hired 0.5 years before a valuation anniversary (July 1 for calendar valuations) might not be valued at the correct age.
8/25/2017	Fixed inactive OPEB valuation results for baseline and +1% sensitivities if all results for the -1% sensitivity are zero. In that case, all results were being set to zero.
8/23/2017	In German mode, in Career Average and Cash Balance components, fixed sporadic error causing accruals to be incorrect at some ages for old age retirement benefits. It occurred for records whose retirement dates were 1 day after allocation dates.
8/18/2017	In German mode, fixed the Jubilee tax reserve to properly reflect the post-1992 Teilwert liability only. This bug was introduced with the 7/13/2017 update for ProVal 3.10.
8/18/2017	Fixed yield curve forecasting of vested PPA funding liabilities in a forecast based on a core projection with the PBGC liability turned off.
8/17/2017	In German Mode, fixed jubilee cash flows to be consistent with liabilities so that there is never both a jubilee and an ancillary cash flow in the same year.
8/16/2017	In a forecast, fixed contribution if additional contributions are entered as target contributions, an end of year additional contribution is valued, the total contribution is limited to a percent of payroll, and the contribution policy is not accounting expense. In that case, the end of year contribution was being limited to the percent of payroll limit plus the target amount instead of just the percent of payroll limit.
8/15/2017	Fixed participants being excluded from processing if they had missing values in database fields used in active payment forms, even if not eligible for benefits that reference those payment forms.
8/15/2017	In German mode, when applying the PSVaG cap to life insurance benefits, use the lump sum cap (30x the general reference value) rather than the annuity cap (3x the general reference value).
8/11/2017	Fixed new entrant asset transfer if combining core projections where some do and some do not have a new entrant asset transfer. In this case, the new entrant asset transfer was set to zero.
8/9/2017	In German mode, fixed BBG for terminated vested participants to always use the value from the calendar year of termination.

8/8/2017	In German mode, fixed SVR calculation for Tax valuations to ignore Teilwert minimum funding rules. Also fixed rounding in calculation of SVR so that sample life tables multiply correctly.
8/3/2017	In German mode, fixed individual results for retirement benefit at normal retirement age and retirement benefit at actuarial retirement age. Previously they would double count benefits if there was either an optional form or a post-termination benefit. Now they will only consider the benefit payable in the normal form.
8/1/2017	Fixed COLA expressions that use #DECYEAR (or #COMMYEAR or #PMTYEAR for actives). These operators could be off by one year for some participants due to rounding. Affects actives whose rounded attained age minus entry age does not equal rounded service, and inactives whose valuation year minus decrement year does not equal rounded attained age minus rounded decrement age.
7/28/2017	In OPEB mode, fixed results of a valuation or core projection with active death benefits using actual spouse data and other active benefits whose payment form is joint life to spouse or reversionary with payments continuing after member death.
7/26/2017	In German mode, fixed risk benefits under the Back-Calculation Method to always be projected to decrement age, even if retirement benefits are projected to Normal Retirement Date in the Vesting Proration Method parameters of the Benefit Promise.
7/25/2017	In German mode, fixed calculation of vesting fraction for valuation date method for vested participants to always use a denominator at actual normal retirement age. Also fixed calculation if denominator ends at retirement decrement. Previously this was always backing off full years of service, even if decrements did not change in full year increments.
7/21/2017	In German mode, fixed valuation of optional forms of payment in the PSVaG liability, when converting using interest and mortality (instead of a table). Previously, the benefits were valued as zero.
7/20/2017	In OPEB mode, fixed bug where scaling factors were not being applied to OPEB funding results in Valuation Output or Valuation Sets. This bug was introduced with the 7/13/2017 patch.
7/18/2017	In German mode, handle negative benefits when allocating the PSVaG cap across multiple benefits (e.g., a negative benefit for a divorce offset). Previously, the PSVaG payment form values for the negative benefits were much too high (and the cap for positive benefits might have been too high also).
7/12/2017	In OPEB mode, fixed average service to retirement and full eligibility if there are both funding and accounting results in the underlying valuations or core projections. In that case, the denominator used was the sum of the denominators calculated on a funding and accounting basis.
7/11/2017	In German mode, fixed the Tax Reserve to be the greater of Teilwert and UC for Deferred Comp Benefit promises. It was previously set to Teilwert before the comparison to UC occurred.
7/05/2017	In German mode, in Jubilee promises, fixed eligibility for ancillary retirement (tolerance) benefits at or near retirement ages.
6/22/2017	In LTD valuations, fixed individual result of expected payouts for life insurance benefits that consider the member's life.
6/22/2017	In German mode, fixed transitional vesting rules for Terminated Vested records so that only post-law-change benefit promise duration is counted for each rule. Previously, all benefit promise duration was counted.

5/31/2017	Fixed effective interest rates in a valuation set that was only trying to override the PBGC results, but was also inadvertently affecting the max tax and PPA Funding EIRs. The same problem existed for at-risk overrides.
5/31/2017	In Canadian mode valuation sets & forecasts, fixed the calculation of amortization payments for purposes of the minimum funding contribution when the option to amortize as a percent of payroll was selected with a nonzero increase rate.
5/24/2017	In German mode, for the Exclude TV's over NRA or SVRA include/exclude mask, specifications have been revised. Duration to exclusion is now defined as the NRA or SVRA plus one year, minus the unrounded participant's age.
5/22/2017	In Core Projections, fixed emerging inactive expected benefit payments for post-decrement death benefit payment forms.
5/15/2017	Fixed OPEB emerging inactive projected headcounts under middle of year decrements in the year following decrement. For the portion of an active that decremented at age x, the emerging inactive headcount at age x+1 was previously computed as $p[x]/2$ instead of $(1+p[x])/2$ . Subsequent years were not affected. For example, the emerging inactive headcount at age x+2 was correctly computed as $p[x+1]*(1+p[x])/2$ . This issue only affected emerging inactive projected headcounts; neither liabilities nor projected benefit payments were affected.
5/10/2017	In German mode, fixed calculation of jubilee benefits: Correctly exclude jubilee from German tax calculations if fewer than 15 years of service; Consider actual jubilee dates when determining attribution service; Exclude jubilee benefits paid before the valuation date or after the 100% retirement date for all liabilities (previously this was only done for teilwert and was based on actuarial retirement date, not 100% retirement date).
5/10/2017	Fixed Annuities Inforce for Vested Valued as Actives for both Core projections and Valuations.
5/10/2017	In German mode, fixed PUC liability and normal cost for Career Average and Cash Balance components in benefits for decrement directly from active service when PUC=UC is selected in Valuation Assumptions.
5/04/2017	In OPEB Valuation & Core output, fixed the accounting average expected remaining service lives. Previously, it was displaying the average service to retirement. This was introduced with the 4/28/17 patch.
5/04/2017	In German mode, changed calculation of Vesting Eligibility for Post-termination benefits when using the Back-calculation Method (Rückrechnungsmethode). Previously, it was calculated on valuation anniversaries; it is now calculated at sharp retirement ages.
5/04/2017	In German mode, fixed decrement dates on and before the current age on the valuation date in the Teilwert when the Back-calculation Method (Rückrechnungsmethode) is used. Previously, these dates were adjusted to valuation anniversaries.
5/03/2017	Reflect any ad hoc COLAs specified in the Asset & Funding Policy when determining interest cost under the spot rate interest method.
4/28/2017	In OPEB mode, fixed projected total and initial inactive headcount. Previously, the projected present value of future benefits was displaying in those slots.
4/27/2017	In German mode, fixed PUC liability and normal cost for Career Average and Cash Balance components in post-termination benefits when PUC equals UC is selected in Valuation Assumptions.
4/27/2017	Fixed gain/loss if initial inactives have a post-decrement death benefit with beneficiary determined at member death.

4/25/2017	In German mode, fixed Unit Credit liabilities and normal costs for post-termination benefits so that vesting eligibility is measured at termination decrement ages. Previously, vesting was measured at the current valuation age.
4/25/2017	In German mode, fixed Teilwert liability for Jubilee promises. Previously, all promises were being valued for all participants because any promise mappings or selection criteria were ignored.
4/24/2017	In German mode, fixed the attained age calculation in optional payment forms and lump sum factors if the Individual Method applies.
4/19/2017	Fixed GASB 67/68 and 74/75 expected remaining service lives. For an active participant, the numerator contains all service until the last decrement age at which a non-zero benefit is assumed to be payable. The denominator is set to 1 if any non-zero benefit is assumed to be payable at any decrement age and zero otherwise.
4/17/2017	When calculating accounting expense under the benefit payment roll forward method and an override is present for the expected benefit payments, the override is adjusted to the beginning of year using the first spot rate. Previously it was using the effective discount rate.
4/17/2017	Under the IAS 19 accounting standard, changed calculation of the output variables interest cost and expected return on assets so that they both reflect the expected benefit payments. Also when using the spot rate interest method under IAS 19, changed the calculation of the implied interest cost rate so that it is the single rate that can be used to replicate the total interest cost derived using spot rates on the PBO offset by expected benefit payments.
4/13/2017	In German mode, fixed Legal Vesting for Actives to use transitional rules. They get the better of the old rule and the new rule (post 2001 or post 2009).
4/4/2017	In German mode core projections, fixed Accrual Rate Proration PUC and UC liability in years after the initial year for Retirement benefits when there is both an Accrual Definition and a Lump Sum Factor in the benefit formula.
4/4/2017	In German mode valuations and core projections, fixed Accrual Rate Proration PUC and UC liability for Post-termination benefits when there is both an Accrual Definition and a Lump Sum Factor in the benefit formula.
4/4/2017	In German mode valuations and core projections, fixed Accrual Rate Proration PUC liability for Post-termination benefits when there is a component type that is not an accrual definition, a subformula, or a lump sum factor (e.g. a table would cause this bug). Previously, the Post-termination liability was zero for a benefit containing this component.
3/29/2017	In Stochastic Forecasts with leveraged asset mixes, force asset and income returns to be greater than negative one and turnover to be between zero and one.
3/29/2017	In German mode, fixed Teilwert results if the Adjusted First Funding Age (in Valuation Assumptions > Additional Liabilities) is entered, even if not relevant.
3/29/2017	In German mode, fixed spouse year of birth for inactives in the Collective Method (i.e. not using actual spouse DOB) when the member was born the day after a valuation anniversary. (For example, if the member was born January 1 for a calendar val as of December 31.).
3/29/2017	Fixed calculation of benefit payments when PPA Attribution applies and a COLA limit or advanced COLA applies to be consistent with the methodology applied to liability calculations (COLA is applied separately to the accrued portion and the excess portion of the benefit).
3/29/2017	In Universal mode, if interpolating to exact age, and using an inactive benefit that commences (or temporary period that begins) at a date defined by a field or at a constant date, fixed rounding of date. Previously the benefit commenced (or

temporary period began) at the same age for both age last birthday and age next birthday, rather than at the same date.

- 3/29/2017 Changed the calculation of accounting expense under IAS 19 when using the spot rate interest cost method. Now the effective interest cost rate, which is used to determine the return on assets, is calculated as the (Interest on PBO – Interest on expected benefit payments) / PBO. Previously, interest on expected benefit payments was ignored when calculating this rate.
- 3/29/2017 Previously, for a plan with a pay as you go contribution policy, ProVal determined the expected contributions used in the calculation of expense based on the funding expected benefit payments when running a Valuation Set and the experience benefit payments when running a Forecast. Now, the determination of expected contributions for expense calculations for a pay as you go plan are set equal to the expected benefit payments (unless a statutory minimum or contribution schedule has overridden the contribution policy amount).
- 3/29/2017 For German tax valuations (specifically those that apply German statutory rules):
- In-Service benefits with an eligibility date that occurs after the actuarial retirement date or before the valuation date are now excluded from the Teilwert.
  - The decrement age for in-service benefits is now set to the valuation date anniversary closest to the in-service eligibility date. Users should now enter eligibility using the exact requirement (e.g., 25 years of service), rather than subtracting 0.5 as a workaround.
- 3/29/2017 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:
- ProVal\_IAS19 (IAS 19: Development of Retirement Benefit Expense), ProVal\_IAS19R (IAS 19: Development of Retirement Benefit Expense), ProVal\_CICA3461 (CICA 3461: Development of Pension Expense), ProVal\_CICA3462 (CICA 3462: Development of Pension Expense), ProVal\_GASB68 (GASB 68: Development of Pension Expense), and ProVal\_FAS87 (ASC 715: Development of Pension Expense) have new tags if there is a new entrant asset transfer.
  - ProVal\_MktVal (Development of Market Assets (Funding Basis), ProVal\_FairVal (Development of Market Assets (Accounting Basis), ProVal\_ActAv (Development of Actuarial Assets), ProVal\_MktRelAV (Development of Market-Related Assets), and ProVal\_SolvAV (Development of Solvency Assets) have new tags if there is a new entrant asset transfer.
  - ProVal\_GASB68 (GASB 68 or 75: Development of Pension Expense), ProVal\_RecGASB6768 (GASB 67/68 or 74/75: Reconciliation of Balance Sheet Liability), ProVal\_DefRes (GASB 67/68 or 74/75: Development of Deferred Outflows & Inflows of Resources) and ProVal\_TrendGASB687475 (GASB 74/75: Development of +/- Trend Sensitivities) have been modified for the revised GASB expense methodology available in ProVal 3.10.
  - ProVal\_FFLMIN (Development of Full Funding Limits – Minimum Contribution Basis) has new tags to show the inactive vested RPA current liability.
  - ProVal\_ErCtrb (Development of Employer Contribution) has new tags if there is an end of year additional contribution to avoid 4010 reporting.

- ProVal\_ReclIAS19 (IAS 19: Reconciliation of Funded Status /Balance Sheet Entries), ProVal\_ReclIAS19 (IAS 19: Reconciliation of Funded Status /Balance Sheet Entries) and RecFAS87\_158 (ASC 715: Reconciliation of Funded Status / Balance Sheet Entries) do not display the liability roll forward section if the accounting methodology roll forward method is Benefit Payments.
  - ProVal\_USPreMAP21MinPPA (Development of Pre-MAP 21 Minimum) and ProVal\_USPreMAP21ShrtflChg (Development of Pre-MAP-21 Shortfall Amortization Charge) are new reports showing the Pre-MAP-21 minimum required contribution.
  - ProVal\_MeasDateBPs (Measurement Date Benefit Payments) is a new report showing the rollforward of PBO benefit payments if the roll forward method is Benefit Payments.
  - ProVal\_USCredBal (Development of Credit Balances) fixed duplicate tag names.
- 3/29/2017 In German mode, corrected the Teilwert liability for Jubilee benefits to not apply the 1992 offset.
- 3/29/2017 Improved Efficient Frontier methodology when numerous linear constraints were applicable. Previously the optimizer had blind spots when adjacent mixes on the frontier different by something other than a 1% shift between asset classes. These blind spots between adjacent mixes occurred when the active constraints (i.e. constraints that actually limit the mix) switched along the frontier.
- 3/29/2017 Fixed accounting asset results if pay as you go contribution policy, the measurement date is after the valuation date, and there are administrative expenses paid. Previously, instead of applying a half year of interest to the administrative expenses, we were adjusting the timing for the difference between the valuation date and the measurement date.
- 3/29/2017 The average benefit timing factors (aka "k-factors") were changed so that they are the k-factors that can be used to discount the benefit payments to match the liabilities. Previously they were the k-factors used to determine the effective interest rate.
- 3/29/2017 Fixed rounding of experience employee contributions.
- 3/29/2017 Updated calculation of GASB expense in accordance with GASB Implementation Guide 2015-1 question 5.142.6 to reflect actual benefit payments and employee contributions and to reflect gains and losses as of the end of the year.
- 3/29/2017 Eliminated separate scaling factors for projected benefit payments and instead automatically apply the scaling factors applied to the corresponding liability.
- 3/29/2017 For runs executed prior to version 3.10, when continuing active and emerging inactive PBPs were aggregated, the emerging inactive scaling factor will no longer be applied.
- 3/29/2017 For a daily rollforward, available through the ProVal PS API, if there is more than one underlying valuation or core projection in the valuation set or forecast, and they have different scaling factors, and the scaling factors also differ within one or more runs between continuing actives and emerging inactives, then the results may change (usually slightly).
- 3/29/2017 When unchecking the "apply scaling factors" checkbox in OPEB valuation view, scaling factors will no longer be applied to the displayed projected benefit payments.
- 3/29/2017 Increased the accuracy of the interpolation in certain forecasts by increasing the benefit timing factor tolerance threshold from the previous range of 0 to 1, to -.01



to 1.01. This tolerance determines if we discount benefit payments or revert to our old interpolation methodology.

- 3/29/2017 In US Qualified mode, we now store separate inactive vested ASC 960, vested ABO, vested RPA, and multiemployer vested liabilities. Previously, they were assumed to be equal to their corresponding total inactive liability.
- 3/29/2017 In US Qualified mode, the inactive benefit definitions "exclude from vested liabilities" checkbox now applies to all vested liabilities. Previously, it only applied to PPA and PBGC liabilities. This impacts vested ASC 960, vested ABO, vested RPA, and multiemployer vested liabilities.
- 3/29/2017 Alternative ABO liabilities are no longer interpolated in a forecast. Previously, the interpolation was based on the change in the PBO discount rate. This only produced reasonable results if a scalar "change in rates" was valued, but not if explicit rates were input.
- 3/29/2017 In a forecast, ASC 960 liabilities will be set equal to ABO liabilities if they both reference the accounting discount rate. Previously, the ASC 960 liability was not interpolated in a forecast.
- 3/29/2017 Fixed rounding on the custom variable "normal cost (before expenses)".
- 3/29/2017 When saving gain/loss analysis to a MS Access database (e.g., for the report writer), the "effect on the normal cost rate" under a spread/gain method is no longer scaled by 100. For example, 2% is now stored as 0.02 rather than 2 in the MS Access database.
- 3/29/2017 Fixed calculation of inactive post-decrement death benefit payments and liabilities in future years of a core when there is more than one post-decrement death benefit and beneficiary is determined at member death.

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ProVal version 3.09

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- 2/2/2017 In non-PPA runs without optional payment forms or dynamic mortality, fixed results if the active spouse age difference is based on actual spouse dates of birth, if available, and a block of data has participants with and without actual spouse dates of birth specified. Instead of using the age difference specified in valuation assumptions, ProVal was using the spouse age difference from the first participant in the data block.
- 1/12/2017 Fixed death benefits not payable to everyone with joint life optional payment forms if joint life optional payment forms are assumed paid to all participants in Valuation Assumptions > Post-Decrement probabilities. Previously, if the benefit was only paid to single participants, the liability was zero and if it was only paid to married participants, the % married was ignored.
- 1/10/2017 In a non-US qualified stochastic forecast, fixed accounting asset results if the measurement date differs from the valuation date, the contribution policy is pay as you go, and actual benefit payments are not interpolated or the underlying interest rate is a yield curve.
- 12/15/2016 Fixed PPA installment acceleration calculation if more than 7 years from the original relief date. ProVal was not limiting the total original payments to 7 years.
- 12/6/2016 In German mode, changed Jubilee liabilities when "Apply German statutory rules" is unchecked in valuation assumptions. Now, when unchecked, the following German rules will not apply:
- Exclusion of members with less than 10 years of Benefit Promise Service
  - Exclusion of benefits with eligibility of less than 15 years
  - Use of rounded, rather than exact, ages

12/6/2016	In German mode, fixed the calculation of post-termination benefits after 100% termination age.
12/5/2016	Fixed the mortality calculation if the spouse age difference is set by a database field (instead of the valuation assumptions) and the beneficiary mortality varies by calendar year and/or coded database field.
12/1/2016	Fixed optional form conversions, lump sum factors, and administrative factors when an age by year of improvement table is used for the post-commencement mortality improvement scale, and either an age table or an age by year of improvement table with a different earliest year is used for the pre-commencement mortality improvement scale.
11/29/2016	In German mode, fixed the disabled mortality calculations if the disabled mortality switches to retiree mortality at actuarial retirement age and the disabled mortality does not vary by coded field but the retiree mortality varies by both coded field and calendar year. Previously, in this case, ProVal used only the retiree mortality after the first calendar year.
11/28/2016	In a core projection, fixed a potential calculation error for the emerging inactive life expectancies. Previously, benefits not payable to the member may have been inadvertently reflected.
11/21/2016	In German mode, changed the rounding of Normal Retirement Age so that age X years and 6 months is rounded down to X years. This only affects people born in 1952 and 1961, and only when NRA is set to SSNRA.
11/7/2016	In Canadian mode, fixed potential issue with excess contributions when there was more than one benefit definition included in the excess contribution calculation for a decrement, a participant was eligible for at least one of the included benefit definitions and not eligible for at least one of the included benefit definitions, and the eligibility requirements differed across the benefit definitions. Previously, ProVal may have determined that the participant was not eligible for the excess contribution.
11/1/2016	Fixed the early retirement and J&S factors in post-decrement death benefits to use the spouse age difference from the data, if the checkbox "For spouse age difference use spouse date of birth" is checked and the spouse benefit commencement age is set "at spouse age". Previously, the age difference from the assumptions was used for this purpose.
10/31/2016	Fixed the application of scaling factors to missing values on Active Decrements, for Core projections run prior to 3.09, in OPEB mode.
10/24/2016	Fixed extraneous accounting and/or Solvency plan change bases in a forecast in years after the plan amendment had already past (in addition to the correct base in the actual year of the plan amendment) if forecasting with a yield curve.
10/24/2016	Fixed Solvency plan change base if one or more underlying core projections contained plan amendments and another underlying core projections which referenced the same benefits did not contain plan amendments and accounting liabilities were not run.
10/19/2016	Fixed the multiemployer vested liability for a vested valued as active participant when run with no termination benefit definition. Previously, it was using the PBGC interest and mortality instead of the funding interest and mortality.
10/14/2016	In Canadian mode, fixed Deferred Annuity Purchase liabilities, if COLA caps or COLA expressions with an annual dollar limit are applied and the Deferred and Immediate Annuity Purchase benefits were different (for example, if using a lump sum component linked to the Solvency interest rates).
10/7/2016	In ProVal PS, fixed zero effective interest rate displayed for OPEB projections with no active participants.

10/3/2016	In German mode, fixed calculation of subformulas in retirement benefits using accrual rate proration for projected unit credit. Previously, they were evaluated as zero.
10/3/2016	In German mode, fixed calculation of Benefit Formula Components other than Accrual Definitions when used in retirement benefits using accrual rate proration for projected unit credit, when not included in a subformula. Previously, they were evaluated as zero.
9/30/2016	Fixed PIA operator salary calculation when assume computation age at decrement is used and salaries are projected backwards from decrement at a level rate.
9/29/2016	In forecasts, fixed accounting market related value of assets if the N-Yr average accounting asset valuation method is used and the option to "exclude administrative expenses from projected assets" is selected.
9/29/2016	In Core Projections, fixed calculation of Inactive Members Average Age when spouse age difference for actives is specified in Census Specifications. Previously, the surviving spouse ages for experience deaths were calculated using the constant spouse age difference from Other Parameters rather than the spouse DOB from the data.
9/28/2016	<p>Revised OPEB active liabilities based on spot rates and middle-of-year decrements. In determining the mid-year payment form value, <math>PV[x+0.5] = (PV[x] + PV[x+1])/2 \times v^{(1/2)}</math>, the half-year interest adjustment <math>v^{(1/2)}</math> was previously based on the spot rate and is now based on the forward rate for annuities and life insurance. For lump sums, the change depends on how (or if) it is deferred:</p> <ul style="list-style-type: none"> <li>• For immediate lump sums, there is no change; <math>v^{(1/2)}</math> still uses the spot rate.</li> <li>• For lump sums deferred for a period, <math>v^{(1/2)}</math> still uses the spot rate but <math>PV[x+1]</math> is based on shifting the spot rate curve.</li> <li>• For lump sums deferred to an age, <math>v^{(1/2)}</math> now uses the forward rate instead of the spot rate.</li> </ul> <p>This methodology makes OPEB consistent with pension modes. Note that this change does not affect the payment form value at 100% retirement age since 100% retirement is always assumed to occur at beginning of year. It also does not affect OPEB inactive liabilities. This change has been observed to lower the active liability by roughly 0.1% - 0.5% for upward sloping spot rate curves and generally moves the average payment timing closer to the value it has under a scalar interest rate assumption.</p>
9/15/2016	Fixed lump sum factors (and optional forms) with underlying form of Post-decrement Death when the Assumed member retirement age is specified by a database field (or, in German mode, by actuarial retirement age). Previously, the constant assumed member retirement age was used.
9/14/2016	In German mode, changed age at which Terminated Vested records will be excluded from liabilities (if elected). They will now be excluded only when their exact age is one full year greater than the exact exclusion age. Previously, they were excluded when their exact age was greater than the exact exclusion age.
9/13/2016	In forecasts where the average payment timing of an active benefit is not between 0 to 1, ensure that these timing factors are not used to determine a forecasted liability under an interest rate assumption which changes shape from the initial valuation year. A timing factor outside this range occurs when there is a mismatch between the projected benefit payments and the liability. This has been observed with PBGC projected benefit payments under certain circumstances in early versions of 3.08 - see changes log entry dated 6/29/2016 – with a significantly negative timing factor (e.g., -13). Other cases have been observed but only

slightly outside the range and led to only small discrepancies in the forecasted liability. Previously, ProVal was attempting to check for and eliminate any unreasonable benefit timing factors, but was not always succeeding, and because ProVal sometimes eliminated the wrong timing factor, a forecasted liability associated with a benefit that was not necessarily incorrect in the core projection could sometimes (depending upon the random order of the benefits) end up using the timing factor from the other benefit.

- 9/8/2016 In German mode, changed Jubilee Teilwert calculation to ignore the 1992 adjustment when "Apply German statutory rules" is unchecked in Teilwert Parameters of Valuation Assumptions.
- 9/8/2016 In German mode, changed Teilwert calculation so that when subtracting Transfer Value from PVBe, the difference is not limited to zero when "Apply German statutory rules" is unchecked in Teilwert Parameters of Valuation Assumptions.
- 9/8/2016 In German mode, changed conditions for calculating the Gap (difference between Teilwert and Tax Reserve). The calculation will now be omitted if "Apply German statutory rules" is unchecked.
- 8/19/2016 Fixed calculation of average expected service lives under GASB 75 to include active participants and inactive members only (i.e. retirees and surviving spouses, but not dependents). Previously inactive dependents were also included.
- 8/19/2016 Fixed covered compensation \$600 rounding methodology to exactly match the winter 2015-2016 Enrolled Actuaries Report. This impacts a participant with a 1981 year of birth. Previously, ProVal calculated \$18,200. The revised value is \$18,500.
- 8/19/2016 Ensure accounting amortization period is not less than one.
- 8/19/2016 Revised the 2016 values for unrounded IRC 415(b) maximum benefit and 401(a)(17) maximum compensation limits in RegMaxBen.txt and RegMaxComp.txt, respectively, to agree with the winter 2015-16 Enrolled Actuaries Report. Previously, they were set equal to the 2015 values. This may change results for future decrement / valuation dates but 2016 rounded limits are unaffected.
- 8/19/2016 In Descriptive Statistics, fixed median and other quartile statistics.
- 8/19/2016 Fixed interpolation of Max Tax and PBGC EIRs when interest rates changed using a parallel shift.
- 8/19/2016 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:
  - ProVal\_Contrib\_Policy (Development of Employer Contribution): new tag for the parameter to multiply the contribution policy defined by participant using valuation data by a percentage.
- 8/19/2016 Fixed a problem whereby the Canadian Solvency liability (or other specialized liability) could vary when run multiple times on the grid, in a case involving lump sum factor benefit formula components used within a death benefit. The valuation COLA was sometimes being ignored in the calculation of the lump sum factor. Parallel processing potentially caused the pattern of ignoring the COLA to vary, leading to different (but still incorrect) results each time the run was executed.
- 8/19/2016 In OPEB mode, fixed accounting PVFS, valuation salary and number if timing is set to something other than beginning of year. This would have impacted Entry Age Normal Accounting results, if applicable.
- 8/19/2016 In core output, fixed expected and experience payouts for inactive certain annuities if valuation COLAs differ from projection assumption COLAs.

- 8/19/2016 Fixed the split by benefit of accounting initial inactive projected benefit payments. Previously, all the benefit payments were included in the first benefit.
- 8/19/2016 Apply rounding of corridor asset method and PPA prefunding and credit balance calculations.
- 8/19/2016 In Canadian mode, fixed the ITA maximum benefit used in solvency liability calculations. Previously, if the option to use the valuation date value for solvency liability was not selected, the ITA maximum benefit calculated for ongoing liability was used.
- 8/19/2016 In Pension modes, fixed calculation of lump sum factors (or optional forms) when spouse mortality is used (death benefits, J&S forms, etc.) and spouse age difference is specified by a table. Previously, the constant spouse age difference was used.
- 8/19/2016 In German mode, changed Jubilee Tax valuations so that payments and eligibility measurements are at rounded ages. Previously, exact ages were used.
- 8/19/2016 In German mode, changed Jubilee Tax valuations so members must have ten full years of Benefit Promise service to be counted in the Teilwert. Previously, rounded ages were used in determining if ten years had elapsed.
- 8/19/2016 For purposes of calculating the maximum benefit for post-decrement death benefits, we now take the unreduced benefit at member commencement age, instead of at the coverage cessation age. The two ages are typically the same, but starting with v3.08, the member commencement age is a required input and may be different from the coverage cessation age (for example, if coverage never ceases).
- 8/19/2016 Updated the last year of actual (experience) benefit payments in a core projection to include the new entrants that enter at the beginning of that last year and are assumed to decrement immediately, thus generating experience benefit payments.

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ProVal version 3.08

- 7/21/2016 Fixed calculation of effective interest rate in Valuation Sets run on a + or – sensitivity where the underlying valuations did not have interest rates selected as a sensitivity and had a yield curve for the interest rate assumption. Previously, the effective interest rate was calculated based on a yield curve that reflected the sensitivity amount.
- 7/20/2016 Fixed validation of 415(b) Plan reduction factors service field if no reduction table is specified. Previously, records may have been excluded that had an invalid service field even though it was not applicable.
- 7/14/2016 Fixed gain/loss source breakdown if running pre-PPA and PPA with a funding not-at-risk liability basis.
- 7/6/2016 Fixed bug in Universal mode interpolating to exact ages and using inactive benefits deferred for a number of years (constant or by field). The commencement age should be the age on next or last birthday plus the rounded number of deferral years. Previously, the commencement age was the rounded exact age plus the deferral years.
- 7/5/2016 Fixed results if a subformula contains a #MAXBEN operator and the operator is not referenced in any formula directly.
- 7/1/2016 In experience studies, correctly set the individual result field zStatEnd for end of year status.
- 7/1/2016 Allow end of year additional contributions to run without funding liabilities in modes without funding requirements, if all parameters are accounting based.

- 6/29/2016 Fixed PPA PBGC projected benefit payments for plans where disability decrements are specified, the mortality table used for disabled members differs from that used for healthy members, and disability benefits are defined but are not included in vested liabilities. For active participants assumed to decrement due to disability, the PBGC projected benefit payments are calculated assuming the disabled member table for post-decrement mortality. Previously, it was applying healthy life post-decrement mortality.
- 6/21/2016 In U.K. mode, fixed the deterministic forecast exhibits to show commuted amounts in the lump sum bucket of the experience benefit payments.
- 6/17/2016 Fixed bug running valuations that include the individual aggregate cost method and benefits that apply to only actives or vested valued through active participants. Previously, these benefits were being applied to both groups.
- 6/16/2016 Improved initial inactive liabilities in forecasts based on multiple core projections with different inactive scaling factors across cores. Affects runs where the shape of the interest rate curve changes ("full yield curve" forecasts) in which projected benefit payments are being discounted to determine forecast liabilities. The improvement is more noticeable when the scaling factors differ significantly across core projections (e.g., 1 and 0.4, 1 and 0, 1 and -1, etc.).
- 6/13/2016 Fixed projected benefit payments when benefits in the final year paid were negative. This value was being used for all future years, rather than zero.
- 5/25/2016 Fixed calculation of vested liabilities when "new rates as of" exist in a benefit formula component, custom attribution applies to that component, and the optional valuation assumption to reflect future accrual rates (available for PPA funding only) does not apply.
- 5/13/2016 In ProVal PS, fixed bug where if the stochastic forecast in a .pvps file had events, the deterministic forecast was run without those events.
- 5/04/2016 Changed PBGC projected benefit payments for vested valued through active participants to be based on the PVB projected benefit payments when there are no termination benefits and vested liability projected benefit payments otherwise.
- 4/28/2016 For gain/loss analysis, revised bucketing of decrement gain/loss for actives at 100% retirement or termination during the period that exit by death or disability. Now, the decrement gain/loss will be allocated solely to death or disability. For a 1-year gain/loss, this is equivalent to setting the expected liability if remain active to the assumed retirement/termination liability. Previously, there was a retirement/termination gain equal to the assumed liability and an offsetting death/disability loss equal to the actual liability.
- 4/26/2016 Changed PBGC projected benefit payments for vested valued through active participants to be based on the PVB projected benefit payments. Previously, these were based on the (vested) accrued liability.
- 4/22/2016 When running a Valuation Set on an assumption sensitivity and interest rate sensitivities were not selected in the underlying valuations, ensure the interest rate assumption is not adjusted by the sensitivity.
- 4/22/2016 If the contribution policy is pay as you go, always include administrative expenses and PBGC premiums (in US Qualified mode, if paid out of plan assets). Previously, we included only administrative expenses and only if they were included in the funding normal cost.
- 4/11/2016 Fixed bug in OPEB mode when the same component is used in both a member and spouse benefit, each of these benefits is referenced by a separate lifetime maximum, and the benefit referenced by the "first" lifetime maximum is the spouse (not member) one. ("First" means the library entry created first by the user.)

3/31/2016	Fixed calculations for inactive certain & life payment forms when there was a lurking temporary period.
3/15/2016	Updated the calculation of gain/loss when valuation salary definition is the sum of multiple salary definitions. Rerunning a gain/loss which used the sum of multiple salaries will change results. However, the previous results may be replicated by returning to the Continuing Active screen and selecting and mapping each salary definition.
3/15/2016	Fixed validation of Inactive Benefit Definition payment forms if lurking temporary stop age inputs were specified. Previously, incorrect records may have been excluded.
3/01/2016	Fixed optional form conversion factors based on a Joint & Survivor payment form and spouse age is determined by database field for (at least some) actives rather than determined by assumption.
2/16/2016	Fixed calculation of Benefits Inforce for Post-decrement Death or J&S payment forms, when the beneficiary is determined at member death. Previously, the probability of member death in the valuation year was generating inforce spouse benefits for that year. The problem existed for inactives and emerging inactives.
2/4/2016	Fixed liability calculation of vested valued as active participants if lurking PPA attribution parameters were specified.
2/4/2016	Fixed the calculation of PBGC liability for vested valued as active participants when there was no termination decrement, optional payment forms were used, and the option to use most valuable optional form at each decrement age was selected.
1/28/2016	If Pre-PPA & PPA, fixed Max Tax deterministic forecast results if interest rates changed from the valuation rate. Previously, we were using the rate as of the valuation date.
1/28/2016	After curtailment, switch from using working lifetime to using total lifetime (active + inactive) for future amortizations.
1/28/2016	In German runs with accrual rate proration selected (via another mode) for Retirement benefits, stopped coercing the methodology to linear proration to decrement.
1/28/2016	When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column: <ul style="list-style-type: none"> <li>• ProVal_Contrb_Policy (Development of Employer Contribution): new tag for the contribution policy defined by participant using valuation data.</li> <li>• ProVal_RecCICA3462 (CICA 3462: Reconciliation of Funded Status / Balance Sheet Entries), ProVal_RecFAS87_158 (ASC 715: Reconciliation of Funded Status / Balance Sheet Entries), ProVal_RecFAS106_158 (ASC 715: Reconciliation of Funded Status), and ProVal_ReclIAS19R (IAS 19: Reconciliation of Funded Status / Balance Sheet Entries) has new tags if the measurement date is after the valuation date to display the liability rollforward.</li> <li>• ProVal_IAS19R (IAS 19: Development of Retirement Benefit Expense), ProVal_FAS87 (ASC 715: Development of Pension Expense), and ProVal_FAS106 (ASC 715: Development of Postretirement Benefit Cost (Expense)) have new tags for the option to calculate expense using the individual spot rate method.</li> <li>• ProVal_FundTgt (Development of Funding Target) has new tags to break down the Vested Not-at-Risk and At-Risk Funding Liabilities by participant type.</li> </ul>

- ProVal\_CanMinBase (Funding Amortization Bases) has new tags if Canadian amortization payments are deferred.
- ProVal\_CanMin (Summary of Minimum Required Contribution), and, if using Federal as the applicable provincial law, ProVal\_SolvDef (Development of Solvency Deficiency) have new tags to display letter of credit information.
- ProVal\_CanLoc (Development of Letter of Credit) is a new table in Canadian mode.
- ProVal\_GASB68 (GASB 74/75: Development of OPEB Expense), ProVal\_RecGASB6768 (GASB 74/75: Reconciliation of Balance Sheet Liability), ProVal\_DefResources (GASB 74/75: Deferred Outflows & Inflows of Resources) and ProVal\_GASB\_DefRes (GASB 74/75: Development of Deferred Outflows & Inflows of Resources) are now available in OPEB mode to support GASB 74/75 accounting.
- ProVal\_TrendGASB687475 (GASB 74/75: Development of +/- Trend Sensitivities) is a new table in OPEB mode to support GASB 74/75 accounting.

1/28/2016	In German runs with "New rates as of" in career average or cash balance components, fixed calculation of accrual rates to allocation dates and resulting benefit formula component values in <at valuation anniversaries> version.
1/28/2016	In German mode, fixed calculation of career average and cash balance accrual definitions with variable accrual rates, when used in retirement benefits. Previously, the benefit service at allocation dates was being measured to sharp retirement dates.
1/28/2016	Fixed calculation of payment form values when the beneficiary is determined at member death and the spouse mortality table is Age by Duration from Decrement type. Previously, the payment form value was zero.
1/28/2016	Modified results in the rare case where core projection liabilities are zero for the baseline scenario, but not zero for the low and/or high scenarios. Previously, these results were zeroed out if there was any non-interest interpolation being performed.
1/28/2016	Fixed the present values of post-decrement death benefits in core projections where experience assumptions for the Section 148 rates may be different from the valuation assumptions.
1/28/2016	Improved pension results when shape of interest rate curve changes (i.e., non-parallel shift) in a forecast.
1/28/2016	Tweaked selection of interest rate for computing duration when doing full yield curve forecasting. This will change forecast results slightly.
1/28/2016	In OPEB mode, automatic trend sensitivity output is no longer calculated when the discount rate is a yield curve.
1/28/2016	In German mode, fixed calculation of career average and cash balance components when the allocation date differs from the valuation date and the accrued benefit (as of the most recent allocation date) is specified by a database field. Previously, the accrued benefit was being treated as being at the second prior allocation date.
1/28/2016	The average wage base custom operator may have had a calculation error when the end of the "Averaging period ends in year before decrement". For this calculation a zero wage base amount was added for the year before entry age and the other table values were shifted. This may have understated the average due to the inclusion of a zero in the average instead of the actual wage base value.



- 1/28/2016 Vested value through actives with a disability contingency will no longer get an inforce benefit or appear on the scatter chart.
- 1/28/2016 In German mode, changed calculation of COLA timing for active retirement benefits when a COLA date is used, whether plan-wide or member-specific. Previously, the fraction of the year to COLA date was measured from valuation date anniversaries for all benefits. Now, for retirement benefits, the fraction will be measured from retirement decrement date (unless the new 3.08 option to override this behavior is used).
- 1/28/2016 Changed rounding in a roll-forward of PBO/APBO when measurement date differs from valuation date in order to display components in an exhibit. Previously, rounding was only done on the total, now it is done on each component separately.
- 1/28/2016 Adjusted projected accrual definitions in German mode to project to retirement ages instead of rounded valuation anniversaries.
- 1/28/2016 Corrected calculation of benefits in force (valuations and cores) and liabilities (cores only) when valuing vested valued through active participants using PPA attribution.
- 1/28/2016 Improved Gain/Loss Analysis methodology for benefits that cover both the member and spouse (e.g., a joint life annuity). Previously, the gain/loss for member mortality reflected spouse mortality experience rather than assumptions for the portion of the liability from benefit payments during the period. This might change the split between member and spouse mortality gain/loss, but the total mortality gain/loss remains unchanged. The new methodology matches the existing sample life report for inactive mortality gain/loss.
- 1/28/2016 Administrative expenses are now included in the employer contribution (when selected in the Asset & Funding Policy) for multiple of expected employee contributions and percentage of payroll contribution policies. This latter change may affect reported contributions for runs without funding liabilities but with expenses included in the funding costs because the contribution policy for these runs is coerced to 0% of payroll.
- 1/28/2016 Revised PPA inactive Not-at-risk and At-risk vested liabilities to only include vested inactive benefits.
- 1/28/2016 Changes were made to the calculation of letter of credit in Canadian mode:
- a. Under federal law, the prior and second prior year solvency ratios are now adjusted for the change in face value of the letter of credit. This was not done previously.
  - b. The old parameter "vary letter of credit in a forecast" does not map into new parameters, unless the total letter of credit was already at the maximum allowed. The old parameter is now mapped into apply a maximum to the letter of credit.
  - c. The old parameter "use LOC to secure solvency deficiencies" does not map into new parameters. Previously, the amount of LOC entered into the AFP was then used to offset the solvency amortizations. The same amount was applied each year and the amount of the LOC was not added to the assets to determine the solvency deficiency. If you have selected "use to secure solvency deficiencies", we will update to assume that you want to increase the LOC each year to cover payments.
- 1/28/2016 In Canadian mode, when calculating solvency liability as the greater of the annuity purchase and transfer value liabilities, determine the maximum across all benefits. Previously the maximum was determined for each benefit separately. Also fixed the calculation of the maximum for emerging inactives in a Core Projection.

- 1/28/2016 In UK mode, the benefit at exit is now required only if the benefit is deferred, regardless of status. This may change which inactives are excluded.
- 1/28/2016 At-risk projected benefit payments, which were displayable in valuation set view, will now be impacted, as appropriate, by liability overrides.
- 1/28/2016 If forecasting to a yield curve, fixed effective interest rate (EIR) if there were vested valued through active participants with lump sum optional forms of payment. Previously, the EIR used the lump sum instead of the annuity benefit payments.
- 1/28/2016 Improved benefit payments for vested valued as active participants with lump sum factors based on the underlying liability if funding and max tax interest rates differed. We now store and use the max tax benefit payments. Previously, we used the funding benefit payments.
- 1/28/2016 For PPA plans with "Reflect new accrual rates during the valuation year in PUC and UC liability" checked, changed to not reflect the new rates in vested liabilities.
- 1/28/2016 Improved switchover from pre- to post-commencement mortality for post-decrement death benefits. Previously, both member and spouse mortality were switched at the spouse commencement age. Member mortality now switches at the member commencement age, which is now a required input. Spouse mortality still switches at spouse commencement age, unless member commencement age is earlier. Results are expected to change UNLESS: pre- and post-commencement mortality are the same, spouse commencement age equals coverage cessation age, or spouse commencement age equals member commencement age (previously only specified in UK Pension mode or if beneficiary determined at earlier of member death or member commencement age).

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ProVal version 3.07

- 1/15/2016 When calculating total active life expectancy in a core projection with plan amendments, correct the check for non-zero benefits after decrement. This change will only impact plans that have a benefit that changes from non-zero to zero as a result of a plan amendment.
- 1/14/2016 Fixed calculation of lump sums and optional forms for death benefits, when mortality is dynamic by decrement date and the spouse's age is greater than the member's age (i.e. usually when the employee is female). Previously, the member's age, rather than the spouse's age, was used in determining mortality rates.
- 1/14/2016 Fixed experience increase assumption applied to custom regulatory tables. Previously, the assumptions may have been set to the increase assumption of another salary/regulatory item.
- 1/8/2016 Change to gain/loss methodology when continuing active sources are run where beginning of period salary definition had a custom regulatory limit applied and end of period salary definition referenced a different custom regulatory limit definition.
- 11/25/2015 In OPEB mode, fixed total projected emerging inactive headcounts for a run with benefits for which no participants are eligible.
- 11/24/2015 Fixed normal cost + supplemental cost contribution policy if PPA law type and the actuarial cost method is an aggregate method. Previously, we were using the normal cost of the underlying cost method (e.g., EAN for Frozen Entry Age (FIL)) to calculate the contribution.
- 11/12/2015 Modified PBGC variable rate premium applicable dollar amount to check that it's not less than the prior year's applicable dollar amount before adding any additional increase required. Previously, we added the additional amount and

then ensured the total premium rate was not less than the prior year's total premium rate. This could impact plans or trials with a negative National Average Wage increase assumption.

- 11/11/2015 Fixed calculation of optional forms and lump sum factors using age by year of birth mortality.
- 10/30/2015 In German mode, fixed calculation of career average and cash balance accrual definitions with variable accrual rates, when used in retirement benefits. Previously, the benefit service was not measured to sharp retirement dates.
- 10/6/2015 Fixed Gain/Loss Analysis when decrement date was required for inactives in some valuations but not all (e.g., because an OPEB inactive benefit formula used #DECAGE). Once ProVal processed a valuation where decrement date was required, it was considered required for all subsequent valuations included in the gain/loss run. This could cause inactive records with a blank in a referenced decrement date field to be excluded from the beginning or end of period valuations in the Gain/Loss Analysis. This bug was introduced in the base release of version 3.07.
- 9/30/2015 In OPEB mode, fixed core projection results of components with pre/post medicare increase rates or stop ages applied that were created in version 3.07. These components were ignoring the post-medicare increase rates and stop ages in years after the initial valuation year.
- 9/25/2015 Per Final 430 regulations, in US Qualified PPA valuation sets and forecasts with a contribution schedule, include interest on cash contributions to determine if quarterly contributions are satisfied.
- 9/25/2015 Per Final 430 regulations, in US Qualified PPA valuation sets and forecasts, if the circular situation arises in which a plan has a funding standard carryover balance and the plan sponsor's election to use a portion of the prefunding balance to offset the minimum required contribution results in a minimum required contribution that is smaller than the funding standard carryover balance, where the minimum is greater than the funding standard carryover balance when the prefunding balance is not subtracted from assets for the shortfall, ProVal will assume the plan sponsor elected to not use the prefunding balance.
- 9/23/2015 For OPEB valuations and core projections that did not have participants in all 4 inactive statuses (retired, vested, disabled, and survivor), projected headcounts by inactive status could be flawed for vested, disabled, and survivor statuses -- typically zero. For example, for a valuation with retired and survivor participants, projected headcounts for retirees were correct but survivors erroneously displayed zero. The total projected headcount was correct; only the inactive status code splits were affected.
- 9/17/2015 Fixed calculation of an automatic refund of employee contributions when the employee contribution formula resulted in 0 and there was a nonzero amount for the employee contributions with interest at the valuation date. In this case, ProVal ignored the accumulated employee contributions and calculated a refund of \$0.
- 9/16/2015 In German mode, fixed vesting Transition Rule for terminated vested participants to allow active service from January 1, 2009 to December 31, 2013 to satisfy the requirement of five years of Benefit Promise duration.
- 8/3/2015 Fixed German #SVR operators to include a full year of service for the year in which participants attain entry age.
- 8/3/2015 Adjusted German Tax valuation option to use "regulatory data as of valuation date for all prior years" to apply to all prior and future years.
- 7/24/2015 Fixed inactive results if participants with joint life payment forms have a COLA applied and a younger spouse. Previously, the COLAs were stopping after the

	member reached the oldest possible age of the mortality table but the spouse still had a number of years to go.
7/1/2015	In Public GASB 67/68 stochastic forecast, fixed output of total pension liability variable. Previously, it was displayed as a negative.
6/29/2015	In Valuation Sets run with low or high interest sensitive liabilities, fixed effective interest rate. This can affect the roll forward of accounting results for a valuation set with a measurement date different than a valuation date and a variable by duration accounting valuation interest (discount) assumption.
6/15/2015	In Core Projection interest sensitivities, fixed lump sum factors that reference valuation COLA assumptions when the COLA sensitivity is used. Previously, the COLA used for the factor was equal to the baseline valuation assumption.
6/4/2015	In Canadian mode, for vested valued as active participants, fixed the determination of eligibility for annuity purchase assumptions. Previously, the eligibility for actives was used.
5/29/2015	When saving to an Access database, fixed certain deterministic forecast variables saved to table ProVal_Detproj_Data.
5/29/2015	For Core Projections with Modified Cash Refund payment forms, fixed experience basis deferral period interest for emerging inactive participants. Previously, interest was continuing to each future valuation date even in cases where commencement preceded it.
5/21/2015	When saving to an access database, fixed inactive values for variables that also had active detail available by benefit. This functionality was inadvertently broken with the introduction of ProVal 3.07.
5/21/2015	In Deterministic Forecast output, fixed detail split of benefit payment variables when there was an automatic refund of employee contributions. Previously, the automatic refund of employee contributions was double counted and displayed as an active and inactive benefit payment.
5/6/2015	For Cooperative and Small Employer Charity (CSEC) plans, no longer calculate the Pre-PPA PBGC premiums or Maximum Tax deductible contribution amounts. PBGC Premiums and Maximum Tax Deduction amounts for CSEC plans are based on PPA law which is not available from a Pre-PPA run.
4/27/2015	In OPEB mode, ensure that the individual results match the val output projected benefit payments. Previously, they were matching for a few years and then remaining constant.
4/24/2015	In Canadian mode, fixed calculation of solvency liability for participants eligible to retire on the valuation date when the option to compare to the transfer value of termination benefits was selected.
4/24/2015	Fixed deterministic forecast output by active benefit when the underlying core projection has plan amendments.
4/22/2015	In Canadian mode, fixed application of surplus to minimum required contribution under provincial law selections of Alberta, British Columbia, New Brunswick, Newfoundland, and Nova Scotia so that the surplus is applied only if there is no solvency deficiency. Previously, the surplus was applied if there was no new solvency deficiency.
4/16/2015	In stochastic forecasts, fixed results if overriding yield curves and the option to "shift simulated values and prepend overrides" was selected. The simulated yield curves were only shifted if an asset benchmark override was also applied. The bug was introduced with the release of ProVal 3.07.
4/8/2015	In UK mode core projections with plan amendments, fixed the calculations for decrementing actives when the pension increases parameters differed between the original and replacement benefits.

4/8/2015	In U.S. Public mode, fixed stochastic forecast results if the contribution policy applies a lag period.
4/3/2015	In Canadian mode, fixed valuation set and forecast output variable "actuarial (gain)/loss" when there was an actuarial loss and either a plan change or assumption change gain.
3/30/2015	In a Canadian stochastic forecast, fixed solvency liability override to always use the entered rates. Previously, the entered rates were adjusted in accordance with Section 3800.
3/30/2015	For GASB 67/68, include the interest on service cost in the interest cost component. Previously, it was included in the service cost component. This change is consistent with Paragraph's 73 and 74 of the implementation guide.
3/30/2015	In Canadian mode, when using the Asset & Funding Policy update and roll forward buttons and the accounting standard selected is either IAS 19 or CICA 3462, fixed the roll forward of minimum funding amortization bases. Previously they were not rolled forward. This change also affects ProVal's Disclosure and Budgeting tool.
3/30/2015	When pre-decrement, pre-commencement and post-commencement interest rates are specified (and differ), and the EIR converged outside of but within tolerance (generally .001) of the range of rates specified, the highest or lowest rate will now be displayed. Previously, a slightly different rate (by as much as the tolerance may have been displayed).
3/30/2015	In German mode Termination benefits that are payable in the form of a life-contingent lump sum, changed post-termination mortality from active to post-retirement mortality.
3/30/2015	In Canadian mode Valuation Sets, fixed the solvency amortization rate when a solvency liability override was present, either the solvency override or baseline (but not both) valuation had a separate annuity purchase interest rate defined, and the solvency amortization rate was determined as a blend of the transfer value and annuity purchase interest rates.
3/30/2015	In UK Mode, fixed temporary benefit if the temporary period has already ended. Previously, we were valuing the benefit as if it never expired.
3/30/2015	If PPA and overriding shortfall amortization rates, always limit rates to zero. Previously, negative rates were inadvertently allowed in certain situations such as when the first seven spot rates were identical.
3/30/2015	In Universal mode, if interpolating results to exact age, make the spouse ages move consistently with the member ages for inactives.
3/30/2015	Fixed optional payment forms if converting to a lump sum and valuation COLA assumptions are variable by calendar year. Previously, we were not properly reflecting the calendar year aspect of the table.
3/30/2015	In U.S. Qualified non-PPA and Canadian modes, if running an Aggregate or Frozen Initial Liability cost method, fixed Normal Cost and Normal Cost + Supplemental Cost contribution policies to use the statutory Normal Cost.
3/30/2015	In cases where the cloud is off, a core projection with active spouse date of birth specified by field in census specifications, optional forms involving joint payment forms that utilized dynamic mortality assumption for the optional conversion factor, and which have new entrants, could produce incorrect new entrant optional form conversion factors.
3/30/2015	Fixed record exclusions when participants had missing data values in database fields used for COLAs variable by coded database field. Records were previously being run with no COLA but are now being correctly excluded.

- 3/30/2015 In Canadian mode, fixed application of surplus to minimum required contribution under provincial law selections of Alberta and British Columbia to no longer apply surplus if there is a solvency deficiency. For provincial law selections of New Brunswick, Nova Scotia, and Newfoundland, change the check for a solvency deficiency when applying surplus to use the solvency assets including the present value of special payments over the next 5 years.
- 3/30/2015 In German mode, fixed emerging inactive headcounts (and average age and sex) in core projections for post-termination death and disability benefits when valuation assumptions specify that eligibility is applied after averaging death/disability benefits. Benefit eligibility was not being applied, so headcounts were incorrectly non-zero for ineligible decrement ages.
- 3/30/2015 In Gain/Loss analysis, fixed results if a participant was not processed in the underlying valuations because of a missing decrement age for a basis not selected. For example, if a participant ran through funding, but was not processed for accounting because decrement age was required and missing, they were previously not being run through the gain/loss analysis for a funding basis.
- 3/30/2015 Fixed 415 factors applied to Post-Decrement Death Benefits with no cessation age.
- 3/30/2015 In U.K. mode, fixed the application of the 'ERF table on Notional GMP' parameter in the case of retirement prior to GMP age.
- 3/30/2015 Fixed accounting effective interest rate calculation in a deterministic forecast with active accounting projected benefit payments of zero and forecasting to a yield curve. Now the accounting normal cost projected benefit payments will be used for the effective interest rate calculation.
- 3/30/2015 Fixed projected benefit payments for low and high lump sum sensitivities in a core projection. Previously, these projected benefit payments were being overwritten with the values from the baseline sensitivity. This will change results if lump sum sensitivities affect benefits under any payment form other than an immediate lump sum (technically any benefit payable beyond the year of decrement).
- 3/30/2015 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:
- ProVal\_Contrb\_Policy (Development of Employer Contribution): new tag for the threshold option available in the end of year contribution.
  - ProVal\_Contrb\_Policy (Development of Employer Contribution) and ProVal\_ARC\_Policy (Development of ARC): new tags for the lagged contribution policy available in U.S. Public Mode.
  - ProVal\_AggNC and ProVal\_AggNCCan (Development of Normal Cost) and ProVal\_AggNCQual (Development of Minimum-basis Normal Cost): new tags as necessary to always display the employer and employee normal cost as a percent of valuation and total payroll.
  - ProVal\_ValSet\_Acctg\_ERACtrb (Development of Expected Return on Contributions): New Report to display the Accounting expected return on contributions if there is a contribution schedule.
- 3/30/2015 In core projections, changed calculation of liabilities for emerging inactives when there are non-zero COLA rates and there are COLA limits in the benefit definition.
- 3/30/2015 Allowed COLA cap parameters to apply to benefits using a lump sum with installments payment form.
- 3/30/2015 Revised projected benefit payments for active benefits. These changes apply to continuing actives, emerging inactives, and vested valued through active

participants unless noted below. None of these changes affect liabilities. Also, expected benefit payments (for the year starting on the valuation date) and actual benefit payments were not changed, except where noted:

1. Modified calculation of projected benefit payments under middle-of-year decrements to better match the liability calculation, summing exactly to the liability under a 0% interest assumption. The new middle-of-year decrement methodology notably fixes understated projected benefit payments for active payment forms that are temporary for a period (not to an age) or certain only. Previously, the final half-year payment was included in the liability but not the benefit payments (so a 2 year temporary annuity would have 1.5 years of projected benefit payments). When this last half-year was a significant portion of the total projected benefit (as might be true in a severance plan that pays 1 or 2 year benefits), this could lead to an inaccurate EIR or an "effective interest rate does not converge" error.
2. In cases where the projected (PVB) benefit at decrement is zero but the unit credit or projected unit credit accrued benefit is not, the projected benefits on a unit credit or projected unit credit basis will now reflect the non-zero amounts rather than zero. This will also result in a more accurate EIR calculation under those circumstances, potentially preventing an EIR does not converge error.
3. In a PPA run where PPA mortality differs from actuarial mortality, fixed PPA projected benefit payments for post-decrement death benefit payment forms to use PPA mortality instead of actuarial mortality.
4. Fixed projected benefit payments when PPA attributed benefits or linear prorate options were present. ProVal was setting the projected benefit payments for the PPA-basis UCAL continuing actives prior to prorating the benefits.
5. In a PPA run, fixed PVB benefit payments for actives (which are always on a PPA basis regardless of what basis the PVB liability is on) when an alternative actuarial interest rate was specified for lump sum factors or optional form conversions (under Lump Sum and Optional Payment Forms). Previously, the PVB benefit payments used the actuarial liability basis for the lump sum factors and optional form conversions.
6. In a PPA run, fixed projected benefit payments on a unit credit not-at-risk basis for modified cash refund annuities. Previously, the projected refund payments were overstated by the ratio of the projected benefit at decrement / accrued benefit on the valuation date.
7. In German mode, fixed expected and projected benefit payments for Jubilee in-service lump sum benefits so as to discount the fraction of the year from expected payment to beginning of the year using survival only, not interest.
8. Corrected projected benefit payments for term-costed benefits on an actuarial liability basis. Now they will be zeroed out consistent with the actuarial liabilities.
9. Fixed bug whereby expected benefit payments and projected benefit payments may have sometimes been calculated incorrectly for a deferred certain annuity.

3/30/2015

In U.K. mode, fixed GMP projected benefit payments for active benefits when GMPs apply to benefits with payment form of:

1. Lump sum payable in installments. Previously, the applicable GMPs were not being prorated into installments, but rather the full GMP amount was

	<p>assumed to be paid each year for the multiple years to which the installment applied.</p> <ol style="list-style-type: none"> <li>2. Post-decrement death benefit with beneficiary determined at member death and benefit at decrement of 0. The GMP projected benefit payments will now be 0, consistent with other forms of payment.</li> <li>3. Life insurance with adjustment factor at member death. The adjustment factors were being applied twice (double counted) when calculating the GMP projected benefit payments.</li> </ol>
3/30/2015	<p>In U.S. Qualified mode, fixed calculation of PPA EIR benefit payments for optional lump sums whose conversion used the underlying interest rates (triggering EIR benefit payments to be calculated under the normal payment form but with the conversion mortality, typically 417(e)). These changes affect the calculation of the effective interest rate as well. No liabilities were affected. Previously, PPA EIR benefit payments for optional lump sums:</p> <ol style="list-style-type: none"> <li>1. Used 0 beneficiary mortality where the contingency of the benefit was death or the normal form was a joint life annuity unless the "first" benefit with an optional form had a normal form of joint life annuity.</li> <li>2. Based the accrued lump sum on the excess amount of the normal form where separate attribution was assumed on the accrued/excess portions (typically death and disability benefits based on projected service).</li> <li>3. Used the valuation percent married assumption where the normal form was a joint life annuity, even if valuation assumptions specified that optional form conversions should assume a joint life for all participants.</li> </ol>
3/30/2015	<p>In U.S. Qualified PPA runs, removed application of first funding age from Max Tax PUC liabilities (if specified in Valuation Assumptions &gt; Actuarial Liabilities). This change does not affect Funding liabilities or Max Tax UC liabilities.</p>
3/30/2015	<p>Fixed projected emerging inactive headcounts (headcounts shown alongside projected benefit payments):</p> <ol style="list-style-type: none"> <li>1. Revised projected emerging inactive headcounts under middle of year decrements. The half-year survival in the year decrement is now estimated by averaging inactive headcounts from successive decrement ages rather than using <math>px^{0.5}</math>.</li> <li>2. In U.S. Qualified PPA runs, fixed projected emerging inactive headcounts so that they are always on a PPA not-at-risk basis even when special PPA EIR projected benefit payments differ from regular PPA projected benefit payments.</li> </ol>
3/30/2015	<p>Liabilities for decrementing actives will now be calculated in such a way that if the participant is alive on the future valuation date according to the experience mortality assumption, the liability will at least reflect the benefit payable on that future valuation date, even if the participant is beyond the valuation mortality table omega on that date. This is consistent with how projected benefit payments are calculated and will avoid a mismatch between the liabilities and projected benefit payments that was potentially leading to a LIMIT ERROR.</p>
3/30/2015	<p>In certain deterministic forecast exhibits, changed the emerging inactive liability split between in-receipt and deferred benefits so that the liabilities associated with termination benefits are now considered deferred benefits.</p>
3/30/2015	<p>In valuations and core projections where a benefit definition has a COLA limit that includes "No increases once benefit exceeds (a constant) <math>\times</math> benefit at decrement", and the benefit at decrement is negative at some ages, changed</p>



calculation of limit. Previously, for a benefit at decrement of -100, a constant of 1.5, and zero COLA the limited benefit was calculated as -150, i.e. the minimum of -100 and -150. Now, the absolute value of the benefit will be limited to 1.5 times the benefit at decrement, and the sign will be retained. Essentially all results will be affected.

- 3/30/2015 In core projections in all modes other than UK mode, changed Benefits Inforce for emerging inactives when there are any benefits that decrease from one payment age to the next (such as with negative COLAs).
- 3/30/2015 In a core projection, apply the 415 payment form adjustment for new entrants. Previously, the payment form adjustment factor was ignored for new entrants.
- 3/30/2015 Fixed gain/loss calculations on projected unit credit liabilities when the projected unit credit method was based on the unit credit liability for career average and cash balance components and the unit credit liability was not turned on in the valuation assumptions.
- 3/30/2015 In UK mode core projections, changed calculations for actives in projected valuation dates to use benefits at decrement from those dates. Prior to 3.07, benefits at decrement were taken from the initial valuation date.
- 3/30/2015 In core projections in German mode, changed calculation of emerging inactive liabilities for post-termination benefits in valuation years after the 100% assumed experience retirement age.
- 3/30/2015 In core projections in German mode, changed calculation of emerging inactive projected benefit payments for post-termination benefits in valuation years after the 100% assumed experience retirement age.
- 3/30/2015 In individual results, the fields for current benefit for employee contributions (including the field zCurrBft\_eec) will output the expected contributions for the next year. Previously the accumulated value of employee contributions was saved to the output.
- 3/30/2015 In German valuations and core projections with a 12/31/yyyy valuation date, return yyyy instead of yyyy+1 for the #ENTRYYEAR benefit formula operator.
- 3/30/2015 In stochastic forecasts, fixed calculations when a plan amendment was coded in Projection Assumptions, and the new benefit was different for funding and accounting.
- 3/30/2015 In UK mode stochastic forecasts, fixed calculations when a plan amendment was coded in Projection Assumptions, and either there were multiple tranches or the new benefit and initial benefit differed in whether commutation was applied.
- 3/30/2015 Refine forecast methodology for MAP-21 25 year average for val dates between 10/1 and 12/31.
- 3/30/2015 In Canadian Pension mode core projections, refine the calculation of inactive Solvency liabilities in future valuation years in cases where Ongoing and Solvency COLA rates differ and benefits have COLA caps applied.

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ProVal version 3.06

- 1/22/2015 In Canadian mode Valuation Sets and Forecasts using an applicable provincial law selection of Quebec, fixed the calculation of the minimum required contribution when a special amortization was required due to amendment.
- 1/22/2015 In Canadian mode Valuation Sets and Forecasts using an applicable provincial law selection of Federal (PBSA), fixed the calculation of the solvency ratio for the

second prior year. Previously the wrong interest rate was used to determine the asset adjustment for special payments.

- 1/21/2015 Fixed at-risk liabilities for active benefits with attribution that "uses accrual rate proration on the accrued benefit and linear proration on the excess" when Valuation Assumptions specify that at-risk liabilities should "use most valuable optional form at each decrement age" and at least one Benefit in the Plan Definition includes an optional form. Previously, there were two offsetting errors in the at-risk liability for these benefits, netting out to an overstatement. 1. ProVal treated the accrued and excess pieces as if they were separate optional forms, only reflecting the piece with the greater liability in the at-risk liability. 2. ProVal double-counted the at-risk probability of benefit receipt for these benefits. In one test case, the error was about 2% of the total active at-risk liability and about 1.3% of the total at-risk liability. This bug has existed since the "use most valuable optional form..." option feature was released in version 3.04.
- 1/8/2015 In a Valuation Set, fixed projected benefits when overriding a specific basis (such as ABO or PPA Max Tax). Previously, projected benefit payments corresponding to active benefits in the baseline valuation but not in the override valuation were being zeroed out for all liability bases, not just the one being overwritten. This could have caused, for example, an ABO override to impact EBO projected benefit payments.
- 1/5/2015 In PPA forecasts, fixed the interest on contributions in years after the valuation year if using contribute normal cost contribution policy, and paying quarterlies and final when due.
- 1/5/2015 For multiemployer forecasts with valuation dates before 2014, fixed 2014 PBGC premium reflecting MAP-21 if the assumed NAW increase from 2013 to 2014 was greater than approximately 4%.
- 12/15/2014 Fixed calculation of lump sum factors for new entrants when there are COLAs that vary by calendar year and they reference age-based COLA rate tables.
- 11/26/2014 Fixed the excess pension calculation for initial actives if GMPs apply.
- 11/25/2014 Fixed calculation of life insurance payment forms that were deferred for a fixed number of years such that the deferral period was measured from each calculation age rather than from the first calculation age. This potentially impacts administration factors, ProAdmin annuity and payment form factors, ProVal lump sum benefit formula components, and the "calculate annuity factors" option in benefit component tables.
- 11/7/2014 Fixed the U.K. cash flow split by pension increase set for initial inactives if GMPs or commutation applies.
- 11/4/2014 In U.K. Pension mode, apply benefit eligibility to commuted lump sum benefits. Previously, commuted lump sums were potentially valued at every decrement age, regardless of eligibility.
- 9/24/2014 Fixed the calculation of post-decrement death payment form values when all the following conditions are met: 1) The spouse's benefit commences immediately at member death 2) There is a latent entry in the member's deferral age field 3) Early retirement factors or joint & survivor factors are applied in the payment form. If these conditions were met, the ERF and JS factors from the specified member's age were applied to all earlier ages.
- 9/24/2014 Fixed the calculation of the average benefit timing parameter in OPEB valuation output. When a variable valuation interest rate assumption (yield curve) was used, this could have also cause the effective interest rate to be off or to not converge.

8/7/2014	Fixed bug in calculation of PV of future service, salary and employee contributions when reflecting interest timing and using a spot interest rate assumption (segment rates or full yield curve) so that at the bend points it uses the spot rate for the intra-year adjustment rather than the forward rate. This also impacts the Entry Age Normal liability calculation.
8/7/2014	In UK mode, fixed the excess revaluation timing for decrement ages prior to the valuation age for immediate benefits. This change only affects the Entry Age Normal results.
7/23/2014	In a core projection, fixed the inflation sensitivity applied to the projection of custom regulatory tables. Previously, the low inflation was applied even when running the baseline and high inflation sensitivities.
7/09/2014	Fixed calculation of lump sum factors that use mortality with two-dimensional improvement scales of the "cumulative" type.
7/01/2014	In US Qualified mode, if forecasting to a full yield curve, and for two projection years there is no liability, the effective interest rate will be based on the normal cost (if there is one). Previously, the effective interest rate was set to 0.
6/13/2014	Fixed results using active spouse date of birth for the age setback with dynamic mortality for participants missing spouse date of birth. In that case, the spouse mortality was not reflecting the assumed spouse setback.
6/05/2014	In OPEB mode, fixed the pre/post Medicare split headcounts for inactives with a "Joint Life Annuity to Member" payment form.
6/02/2014	In OPEB mode, fixed emerging inactive headcount when displayed by subtotal in valuation view. Previously, they were displayed as zeros which also caused the corresponding projected benefit payments by subtotal to display incorrectly.
5/30/2014	In OPEB mode individual results, changed the inactive age and sex output fields to be blank instead of 0 for participants with 0 liability.
5/29/2014	In OPEB mode, fixed the pre/post Medicare splits for inactive benefits using the "Joint Life Annuity to Member" payment form. Previously, the pre/post Medicare splits were based on the spouse's age rather than the member's age. Total inactive member results were correct, only the split was affected.
5/20/2014	In payment forms, changed temporary stop age and commencement age validation limit back to age 120, consistent with version 3.05. Version 3.06 inadvertently changed it to 119 which may have excluded records with those parameters set to 120.
5/15/2014	In US Qualified mode, fixed AFTAP if the not-at-risk funded ratio is greater than 100% and credit balances are maintained but there are no selections in the underlying Asset & Funding policy to waive balances. In that case, the credit balances were erroneously being subtracted from the assets when calculating the AFTAP.
5/13/2014	Fixed results if using spouse date of birth for actives. Previously, the lookup for the spouse may have been using an incorrect setback. Also, if the payment form has a temporary period that stops at spouse age or the benefit commencement is based on spouse age, fixed the determination of the stop date and/or commencement date.
5/13/2014	In Canadian mode, fixed calculation of the solvency deferred annuity purchase liability when a linear proration option is selected. Previously, the proration fraction was only applied to the immediate annuity purchase and transfer value liabilities. The proration fraction is now also applied to the deferred annuity purchase liability.

- 5/5/2014 In OPEB mode, fixed calculation of an active joint life annuity to spouse payment form with a temporary period that stops at spouse age if the spouse age difference is calculated from a database field.
- 4/29/2014 Fixed inactive spouse liability related to a COLA when the member would have been older than 124 years.
- 4/25/2014 In a Netherlands funding-only forecast, use the funding interest rate to project assets for the minimum contribution calculation instead of the not-applicable FASB rate of return.
- 4/22/2014 In valuations, fixed validation of linear attribution service field. Previously, if a linear attribution service field was defined in valuation assumptions, it would be validated in a core, but not a valuation. This led to active participants with missing fields to be excluded from cores but not valuations. They will now be excluded from both.
- 4/22/2014 In U.S. Qualified mode, fixed end of year additional contribution to avoid at-risk status if the at-risk liability is less than the not-at-risk liability. Previously, we did not set the at-risk liability equal to the not-at-risk liability to calculate the additional contribution.
- 4/22/2014 In U.S. Qualified mode, fixed the option to "exclude this inactive benefit from PBGC vested liabilities." The checkbox was erroneously ignored beginning in ProVal 3.05.
- 4/2/2014 When running a deterministic forecast or valuation set based on multiple cores with different employee contribution benefits, the initial update to ProVal version 3.06 will allocate the entire PV of employee contributions (which in previous versions was only stored in total) to the first employee contribution benefit. Rerunning in version 3.06 or later will calculate PV of employee contributions individually for each EEC benefit. While this will not change the PVEEC results in total, it will change the allocation by benefit.
- 4/2/2014 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:
- ProVal\_CICA3462 (CICA 3462: Development of Pension or Postretirement Benefit Expense), ProVal\_RecCICA3462 (CICA 3462: Reconciliation of Funded Status/Balance Sheet Entries), ProVal\_TrendCICA3462 (CICA 3462: Development of +1%/-1% Trend Sensitivities) are new tables for the CICA 3462 accounting standard.
  - ProVal\_FundTgt ((Development of Funding Target) and ProVal\_MaxFundTgt (Development of Max Tax UC Funding Target): new tags for the development of FTAPs.
  - ProVal\_USCredBal (Development of Credit Balances): new tag 'PFB\_Increase' for option to Add excess contributions to Prefunding Balance.
  - ProVal\_ErCtrb (Development of Employer Contribution): Valuation Sets will display the Schedule of plan year cash contributions (previously only displayed in forecasts).
  - ProVal\_FAS87 (Development of Pension Expense), ProVal\_FAS106 (Development of Postretirement Benefit Cost (Expense)), ProVal\_RecFAS87\_158 (ASC 715: Reconciliation of Funded Status / Balance Sheet Entries), and ProVal\_RecFAS106\_158 (ASC 715: Reconciliation of Funded Status): New tags for settlement and curtailment accounting.

- ProVal\_RecGASB6768 (GASB 67/68: Reconciliation of Balance Sheet Liability): Removed Net\_Position, NPL\_py and NPL2 tags and included BSL, BSL\_py and BSL2 tags.
- Exhibits are now available in UK and German modes.

4/2/2014	In GASB 67/68, removed net deferred outflows of resources from net pension liability so the net pension liability is always the total pension liability minus fair value of assets. A new metric, balance sheet liability, is the net pension liability minus net deferred outflows. Balance sheet liability is now the requested input in the Asset & Funding Policy and is output as well.
4/2/2014	Fixed effective interest rate when the scalar input for pre-decrement, pre-commencement, and post-commencement rates differ.
4/2/2014	Fixed funding eligibility being incorrectly applied to emerging inactive in OPEB projected benefit payments when the funding assumption parameter "Participants are included in liabilities at later of" parameter is filled in. This caused a potential mismatch between liabilities and projected benefit payments.
4/2/2014	When assumed spouse age for inactive is negative adjusted the decimal attained age to more nearly match the rounded age, and also changed the floor to 0.5, in order to ensure that the spouse age offset always matches the "year" offset (e.g. in case of year of birth tables).
4/2/2014	Fixed benefit payment stream for forecast years in a core projection with PPA Attribution. Previously, projected benefit payments were not correctly capturing expected benefit payments for participants who experienced retirement.
4/2/2014	Fixed Canadian Present Value of Future Benefits (PVB) if running Solvency but all actuarial liability methods are turned off. Previously, we were showing the PVB calculated on a solvency basis. Now, we will calculate the PVB using the ongoing assumptions.
4/2/2014	For Multiemployer plans, set the Max Contrib interest rate to the RPA rate. Previously, it was always being set to use the valuation assumption rate.
4/2/2014	In Nondiscrimination Accrual Rates tool, coerce future custom regulatory increases to 0 for consistency with salary and existing regulatory data.
4/2/2014	Fixed bug in German mode whereby active participants were being incorrectly valued as GTVs when the actives and the GTVs shared exactly the same benefits and the actives were in the same data block as GTVs. This could result in the results being different when these participants were run by themselves versus run in a full run with other participants.
4/2/2014	In the explicit capital market simulator, cap the corporate bond spread over treasuries at 10 standard deviations above the mean.
4/2/2014	In US Qualified mode, in a forecast where the PBGC liability is calculated but the liability is 0 in the initial year because there are no vested participants, but greater than 0 in future years, ProVal will now calculate a PBGC Premium. Previously, it was set to 0 for all years.
4/2/2014	In ProVal PS, fixed experience benefit payments if impacted by lump sum yield. In a scenario, the lump sum yield was shifted so year 1 was used as year 0, etc.
4/2/2014	Changed methodology for estimation of valuation allowance under CICA 3461. Previously the maximum balance sheet asset was the sum of the present value of future accruals less the percent of surplus potentially withdrawable times the entire surplus. It is now the present value of future accruals less the percent of surplus potentially withdrawable times the portion of surplus in excess of present

value of future accruals. Additionally, the present value of future service accruals has been limited to be not less than zero.

- 4/2/2014 Fixed Canadian stochastic forecast bug that may have caused trial results to be incorrect for some trials depending on the funded status of other trials.
- 4/2/2014 In Canadian mode, fixed bug in forecasting solvency when the transfer value rate is a scalar (i.e., the same rate at each duration). If user had specified a solvency interest rate and then forecasted using a specified change in rates, the solvency rate was forecasted incorrectly.
- 4/2/2014 In OPEB mode, fixed +/- trend sensitivities in IAS 19 for plans with an asset ceiling. Previously, the interest on effect of asset ceiling was not added to the sensitivities.
- 4/2/2014 In PIA calculations, if assume computation age attained at decrement is selected, this may result in an assumed age of less than 15. In this case, the salary merit scale will be zero for ages less than 15. Previously, it used the age 15 value.
- 4/2/2014 Set inactive mortality to zero for ages less than 15. Previously, inactive participants exact age 14 or less were excluded, and those over 14 but under 14.5 were valued at rounded age 15.
- 4/2/2014 Changed results for participants with a spouse under the age of 15 (due to age difference assumption). Previously, mortality at age 15 was used for earlier ages, now zero mortality is assumed. This also changed results when using blended non-integer sex (e.g. grouped data) for actives, when a member is hired at an age where an assumed spouse could be under age 15.
- 4/2/2014 Fixed a bug, where in rare cases, employee contributions were calculated to be a very small number (e.g.  $1E^{-11}$ ) rather than zero. In entry age normal calculations, with a funding span that ends at the last age with a future benefit this caused an incorrect last age with a future benefit to be used.
- 4/2/2014 In German mode, changed calculation of SVR for members hired at age 15.
- 4/2/2014 In a stochastic forecast with investment return overrides, if asset classes have stochastic income returns (generally asset classes derived from simulated yields), for the override years, they will be replaced by the asset class's average income return. With this change, smoothed assets based on income return will not be stochastic in the override years.
- 4/2/2014 In Canadian mode, fixed lump sum factors that use underlying interest rates for the ongoing liability and the underlying rates differed pre and post-commencement. Previously, only using the post-commencement interest rate was used. Now, the in-deferment rate will be used as the pre-commencement rate when calculating the lump sum factor.
- 4/2/2014 In OPEB mode, changed inactive average age and sex calculation to use decimal age rather than rounded integer age. Also, fixed inactive average age and/or sex output in individual results if a record included less than a 100% covered spouse.
- 4/2/2014 When there are separate accounting returns, the fixed income yield now reflects returns on an accounting basis. Previously, the same values were used for both funding and accounting.
- 4/2/2014 Made a slight modification to MAP-21 stochastic interest rate averaging which has a minor impact on the 25-year average PPA funding interest rates in the early years of a U.S. Qualified PPA stochastic forecast.
- 4/2/2014 Fixed bug in Valuation Sets with events in non-U.S. Qualified modes where the funding method is changed from an individual method to an aggregate method.

The initial unfunded liability for the aggregate method may have been double-counted in ProVal version 3.06.

- 4/2/2014 Modified calculation of the present value of employee contributions in a forecast with active plan amendments if the rounding parameter in the Asset & Funding Policy is set to something other than <none>. Previously, the present value of employee contributions was rounded, then had the active plan amendment applied, then rounded again. Now the present value of employee contributions has the active plan amendment applied and then gets rounded.
- 4/2/2014 In OPEB mode, fixed the initial inactive average age and sex for joint life to member payment forms. Previously, this payment form averaged in the spouse age/sex rather than the member. Now spouse age/sex is used for payment forms payable to spouse and member age/sex for payment forms payable to member.
- 4/2/2014 Modified OPEB headcount to exclude participants for whom there is no corresponding liability (for example if their temporary period expired or the participant contribution equals the gross benefit formula).
- 4/2/2014 In German mode, changed #DATEPLUS and #DATEMINUS expression operators so that they add dates in the same way as other modes.
- 4/2/2014 When viewing OPEB mode inactive and emerging inactive headcounts, the output will now display the total number of participants rather than the sum of the number of participants eligible for each benefit (which was for example double counting a participant eligible for two benefits). Average age and average sex will be based on the new headcounts rather than be weighted by benefit.
- 4/2/2014 In Canadian mode Valuation Sets and Forecasts, slightly changed the rounding of solvency liability to be the sum of the rounded transfer value liability plus the rounded annuity purchase liability. Previously, the solvency liability was determined as the sum of the transfer value and annuity purchase liabilities and then the sum was rounded.
- 4/2/2014 COLAs now apply to life insurance benefits. Previously, COLAs assigned to these benefits were ignored. To remove the COLA and replicate the prior results, either uncheck the "apply valuation COLAs" box in the benefit or apply a COLA override of 0 to the benefit in valuation assumptions.
- 4/2/2014 Fixed OPEB core projection and gain/loss results for "reversionary annuity to spouse" and "joint life annuity to spouse" payment forms that include a grace period, where payments continue to the spouse for n years after the member's death. The initial valuation year results are not affected.
- 4/2/2014 In US Qualified mode, when calculating the PBGC premium during a forecast, if the "eligible for small plan cap on variable rate premium" is checked, the small plan cap will be applied to all years in the forecast with under 25 active participants. Previously, ProVal made a determination for each forecast year based on member headcount if the checkbox "this is employer's only DB plan" was selected on the Prior Year Values topic of the Asset & Funding Policy. However, this was not an accurate test since eligibility for the cap should be based on employee count, not participant count.

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ProVal version 3.05

- 3/20/2014 In US Qualified mode, for PPA runs, fixed Max Tax loads if the plan is At-Risk for Max Tax but not for Funding.

12/5/2013	In US Qualified mode, for PPA runs, fixed Max Tax calculation if segment rates are used and the plan's consecutive years at risk on a Max-Tax basis differs from the Funding basis.
11/26/2013	Fixed core projection results that contain a plan amendment that replaced a post-decrement death benefit with another post-decrement death benefit. Previously, any changes to the payment form parameters (ERF, J&S factors, etc.) were ignored.
11/18/2013	In UK mode, adjusted the U.K. cash flow split exhibit to treat benefits with lump sum installment payment forms as annuities.
11/14/2013	In UK mode, fixed the cash flow split by pension increase for inactive benefits with multiple payment forms, particularly when the first payment form is 'N/A'.
11/11/2013	Fixed forecast of PBGC premium in ProVal PS if the premium is not paid out of plan assets.
11/06/2013	Fixed death benefit lump sum factors that use spouse's age/sex/mortality for male participants, when the mortality table applies a fully generational improvement scale. (Previously, the scale rates looked up for the female spouse were being doubly offset.)
11/04/2013	Fixed plan amendment calculations if combining a funding only core with an accounting only core if the same Benefit Definition was overridden by different Benefit Definitions in each core.
10/31/2013	Fixed lump sum benefit formula components used in a death benefit coded to base the primary mortality on the spouse's age/sex when used in a death benefit, and used a mortality table dynamically generated as the table expected to be in effect as of the decrement date (rather than the valuation date), to use the spouse age rather than the member age. This will also impact optional payment forms on death benefits where the actuarial equivalence is based on a dynamic mortality table.
10/30/2013	Fixed issue where an active is assumed to decrement at an age when the post-decrement probability of death is one. Previously, the liability for all but the last benefit was zero even though some benefit payments were due in the first year. ProVal will now calculate a small liability and life expectancy in this situation.
10/30/2013	In German mode, possible impact on valuation basis expected benefit payments for active participants who first terminate and then experience a secondary decrement in the same year.
10/24/2013	Fixed a bug causing ProVal to stop processing participant database records after it encountered a very large (in one case 5,000 record) consecutive set of records all of which were excluded from processing, even if there were some additional records to process at the end that should not have been excluded.
10/21/2013	Modified EIR calculation, in the case where liability is 0 and normal cost cashflows are used instead, to disregard the normal cost offset due to employee contributions.
9/25/2013	Fixed bug causing exclusion of inactive records having a benefit with payment form of Post-decrement death benefit with beneficiary determined by data as of valuation date, when another inactive benefit has a payment form of Joint Life Annuity (or Certain & Joint Life Annuity), and the assignment of payment forms to records does not preclude the participant from receiving both benefits.
9/23/2013	In experience studies, fixed bug where if using salary merit scales by calendar year and selected salaries 'end on dates above', then the salary merit scale table



was off by one year. Current year salary was being adjusted by the current year salary scale table, even though the salary was actually from the previous year.

- 9/16/2013 In Universal mode, fixed calculation of the Capital formula or Premium formula of an Insurance Reserve if it contains a subformula component and not all members are eligible for all benefits.
- 8/27/13 Ensured that post decrement death projected benefit payments use non-disabled mortality for the post decrement death weights in cases where the benefit contingency is not disability and the disability mortality assumption differs from the healthy mortality assumption.
- 8/23/13 In Canadian mode Valuation Sets and Deterministic & Stochastic Forecasts, fixed the treatment of actuarial gains so that gains are only used to reduce existing loss bases. Previously, actuarial gains may have been established as a new negative amortization base.
- 8/23/13 In Canadian mode, fixed the calculation of amortization payments when calendar year interest rates are specified for the ongoing liability and amortization payments are made at the end of period.
- 8/16/13 In Public, Universal and OPEB modes, fixed stochastic forecasts which forecasted the funding interest rate to a yield curve. Previously, funding/GASB amortizations may have been incorrectly based on the duration 1 interest rate rather than the full initial valuation yield curve, possibly causing the contributions/expense to be incorrect.
- 8/13/13 In Deterministic & Stochastic Forecasts, fixed rounding of Expected Return on Assets if the return is over 4 decimal places when calculating the expected assets using one of the following asset methods: 1) N-Yr Average with Excess over Expected Return and expected return based on Valuation Rate, 2) Weighting of Market and Expected Actuarial Values with Expected Assets based on Expected Return, 3) Corridor Method.
- 8/12/13 Fixed projected unit credit normal cost projected benefit payments in a U.K. pension mode run that had no post-decrement death benefits and linear attribution to a fixed age is used.
- 8/7/13 Fixed bug whereby COLA definitions that vary by coded database field and were created in version 3.05 or later, were evaluated as table entry type "constant" instead of table entry type "table".
- 7/26/13 For IAS 19 forecasts, if a plan is in surplus and less than 100% of the surplus is potentially withdrawable, fixed calculation of current period gain/loss in other comprehensive income. Previously it was offset by the interest on effect of asset ceiling.
- 7/25/13 In U.S. Qualified mode under PPA, if elected to waive credit balances to meet a specified AFTAP and chose the use x% min AFTAP for pre-10/1/2010 plan years, fixed the minimum percentage used if the user did not also choose PRA amortization relief. In that case we were assuming the percentage entered was a decimal amount instead of a percentage.
- 7/15/13 Fixed first year expected benefit payment overrides in Public Mode. Previously, they were being ignored.
- 7/11/13 Fixed calculation bug when COLA rates use a table, but do not otherwise vary by calendar year or coded database field.
- 7/9/13 In Canadian mode, fixed calculation of ongoing and solvency amortizations when the contribution frequency was annual and there was less than 1 year remaining in the amortization period.

7/1/13	Allow the 2012 Pension Stabilization Event to apply for plan years after 2012. This was allowed in 3.04 on 3/7/13 and was accidentally reversed when 3.05 was released.
6/24/13	The total and deferred benefits in force for vested valued as active participants are now adjusted for the count field.
6/21/13	Changed stochastic forecast interpolation methodology if a trial triggers use of linear interpolation instead of three point interpolation. Now, linear interpolation will be used only for that particular trial, not for all trials corresponding to that output item.
6/13/13	Fixed emerging inactive count, average age, percent male and life expectancy during a core projection for vested as active participants with plan amendments.
6/13/13	In U.K. mode, fixed headcount if there are benefits with commutation. Previously, the headcount was double counted in the year of decrement if a commutation lump sum benefit was paid.
6/13/13	In U.K. mode, fixed the emerging inactive headcount and benefits in force for deferred benefits.
6/13/13	Prevented "negative" mortality improvement (i.e. mortality worsening) from generating mortality rates greater than 1. (This is rare.)
6/13/13	Fixed U.K. gain/loss analysis for decrementing actives with corresponding decrement assumption of 0 (e.g., an active who terminates but whose termination probability is 0). Previously, the expected end-of-period liability for these records was artificially being set to 0.
6/13/13	Revised headcounts for emerging inactives with post-decrement death benefits to avoid counting the spouse during the coverage period when the member is still alive. When a member annuity is also being valued (typical), this avoids double counting both the member and spouse during the coverage period. The headcount after the coverage period remains unchanged.
6/13/13	In UK mode, fixed Section 148 increases if variable by calendar year for valuation dates on or after 6 April. Fixed CPI/RPI increases if variable by calendar year for valuation dates on or after 1 September.
6/13/13	In German mode, in runs with only Jubilee promises, fixed calculation of retirement decrement probabilities (and any probabilities dependent on them) when termination rates are 100% at some age. This changes most results in these circumstances.
6/13/13	When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column: <ul style="list-style-type: none"> <li>• ProVal_GASB68 (GASB 68: Development of Pension Expense), ProVal_RecGASB6768 (GASB 67/68: Reconciliation of Net Pension Liability), ProVal_DefResources (GASB 67/68 Deferred Outflows &amp; Inflows of Resources), and ProVal_GASB_DefRes (GASB 67/68: Development of Deferred Outflows &amp; Inflows of Resources) are new tables for the GASB 67/68 accounting standard.</li> <li>• ProVal_MaxFundTgt (Development of Max Tax UC Funding Target) is a new table for the MAP-21 enhancements.</li> <li>• ProVal_WeightedRetAge (Weighted Average Retirement Age) is a new table to display the Weighted Average Retirement Age.</li> <li>• ProVal_AcctgBase (Accounting Amortization Bases): The 'Trans_Oblig_#' and 'Tot_Trans_Oblig' tags will only be displayed if there is a transition obligation.</li> </ul>

- ProVal\_USMaxPPA (Summary of Maximum Tax Deductible Contribution): The 'Fund\_Tgt' tag has been renamed 'UCMax\_Fund\_Tgt' and the 'Tgt\_NC' tag has been renamed 'UCMax\_Tgt\_NC'.
- ProVal\_ActAV (Development of Actuarial Assets), ProVal\_MktRelAV (Development of Market-Related Assets), ProVal\_SolvAv (Development of Solvency Assets): the 'PBGC\_Prem', '420\_Transf', 'Ret\_on\_PBGC\_Prem', and 'Ret\_on\_420\_Transf' tags will only display in U.S. Qualified mode.

6/13/13	Fixed valuations and core projections with 100% termination and middle of year decrement timing assumption. <ul style="list-style-type: none"> <li>• Fixed subsequent retirement ages (which are forced to 100%) to use beginning of year decrement timing consistent with other 100% retirement ages. Thus actives beyond 100% termination age on the valuation date (or future valuation date in a core) and hence are at 100% retirement will not have a normal cost but might have previously.</li> <li>• Fixed linear attribution fractions to reflect middle of year decrement timing at 100% termination. Thus, actives who are at 100% termination at the valuation date (or future valuation date in a core) might have a normal cost where they didn't previously.</li> </ul>
6/13/13	In a core projection with dynamic mortality, fixed expected and projected benefit payments when any payment forms depend on beneficiary mortality. The beneficiary px for the first year of the core projection was erroneously being calculated using dynamic mortality from the last year of the core projection.
6/13/13	Fixed German Jubilee benefits payable at 100% retirement age or the age prior. Previously, no payment was being made at 100% retirement and the probability at the previous decrement age was invalid.
6/13/13	Fixed expected and projected benefit payments when running a core projection with a plan amendment on a "post-decrement death" or "joint life annuity" benefit with beneficiary determined at member death (or earlier of member death and member commencement), and the plan amendment is in the last year of the core projection.
6/13/13	In German and UK modes, do not evaluate alternative entry age normal normal cost formulas. This was possible by using a benefit definition in German or UK modes that was created with an alternative formula in another mode.
6/13/13	In German mode, changed algorithm for age and service calculations. The new algorithm generally differs from the prior one by no more than 3 days, except in the case of whole rounded ages.
6/13/13	In German valuations and core projections, changed the treatment of the valuation date so that ProVal will now assume that the first opportunity to decrement is the day after the valuation date. This facilitates December 31 valuation dates, in which the initial valuation year is the year following (but not including) the valuation date.
6/13/13	In German mode, changed calculation of career average and cash balance components in retirement benefits so that accumulations are measured to valuation anniversaries (when allocation dates are not used), and partial years' accruals to retirement dates are added to the benefit at prior valuation anniversaries.
6/13/13	In German mode, changed "Crediting Frequency" to annual for Cash Balance Benefit Formula Components.
6/13/13	In Canadian mode, fixed Valuation Sets and Forecasts with a solvency liability override to determine whether transfer value and/or annuity purchase liability was present based on the override Valuation or Core Projection. Previously, part of the

	solvency liability may have been excluded if the baseline Valuation or Core Projection had different solvency liability types present.
6/13/13	In Canadian mode, changed Valuation Sets and Forecasts with a valuation date prior to 1/1/1998 and an Applicable Provincial Law selection of British Columbia or Ontario to always amortize new solvency deficiencies over 5 years.
6/13/13	For U.K. post-decrement death benefits with beneficiary determined at member death, switch from in-deferment to post-commencement interest rate and from pre- to post-commencement member mortality at the earlier of member death and member commencement age (as defined in the payment form). Previously, we always used the post-commencement interest and member mortality in this payment form.
6/13/13	In U.S. Qualified PPA law type valuation sets, the PPA max tax override, that previously affected actives only, now also overrides the PPA max tax inactive liability.
6/13/13	Mortality projected to a static fixed end year is now always rounded to six decimal places. Previously, more precision would be retained if the format of the mortality table had specified so. (This is rare.)
6/13/13	Fixed use of mortality improvement scales AA, D, or H when the end age of the mortality table was reduced below age 100, 97, or 99, respectively, thus extending a nonzero rate for future ages. (This is rare.)
6/13/13	Active mortality rates projected to a fixed end year used in conjunction with fractional sexes now have mortality rates and improvement scales blended separately (rather than the projected rates themselves being blended).
6/13/13	Fixed 1971 Group Annuity Mortality table rate at age 64 for females (from 0.008606 to 0.008608).
6/13/13	When calculating an effective interest rate (EIR), ProVal will now use a tolerance of $1E^{-10}$ rather than the previous tolerance of $1E^{-3}$ . For certain runs, this will allow the discounting of the projected benefit payments using the EIR to more closely match the liability, especially when COLAs are present.
6/13/13	In a Valuation Set with an accounting plan change event, fixed bug calculating the liability change if the interest rates change by event and the valuation date does not equal the measurement date.
6/13/13	In German Pension mode, accrual basis tables and the #SERVICE operator are now calculated based on service at retirement dates for retirement accrual definition retirement date calculations.
6/13/13	Fixed optional form conversion factors for deferred lump sum optional forms that are of the "lump sum, no life contingencies" type and use an interest and mortality conversion basis. Previously, the conversion factors were not disregarding mortality during the deferral period.

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#### ProVal version 3.04

4/12/13	Fixed Most Valuable At-Risk calculation if the total liability normal cost is zero or negative.
3/6/13	Fixed the calculation of PBO benefit payments when an alternative ABO interest rate was used and benefit payments were dependent on interest (e.g. lump sum benefits). The liability calculation was correct and was not changed.
2/28/13	Fixed benefits inforce for vested as active participants with deferred benefits in the first year of a core projection.

2/20/13	Fixed the calculation of benefit payments and headcounts for benefits which applied PPA attribution. Previously the benefits were being double counted for the projected benefit stream. The liability calculation was correct and was not changed.
1/25/13	Fixed the calculation of life expectancy in a core projection for participants with a status of vested valued as active. Previously once a vested as active participant retired, they were excluded from the life expectancy calculation.
1/25/13	Fixed subtotals for life expectancy for vested valued as active participants when grouped data is present. Previously, the count field was not reflected.
1/10/13	In OPEB mode, when running IAS19, fixed calculation of expected return on assets to exclude benefit payments (they are excluded from interest cost for IAS19 and should be excluded from both since they are offsetting).
1/8/13	Fixed projection of #SVR operators and General Reversion Value in German core projections when there are increase rates of zero for German Average Income.
1/7/13	For US Qualified forecasts with current year contributions made before the measurement date, fixed administrative expenses used in accounting expense if administrative expenses are defined with both a dollar amount and a fraction of assets and the dollar amount is overridden for accounting expense. Previously, the asset value used to calculate the fraction of assets portion of the accounting administrative expense did not reflect the pre-measurement date contributions.
1/4/13	In German core projections, fixed benefit cap for PSVaG liability in future valuation years with nonzero experience increase rates for German Average Income.
1/3/13	For multi-employer, pre-PPA, and public plans, refined the calculation of present value factors over a fractional period when using constant interest rates in valuation sets and the first year of forecasts. In this case, ProVal now uses the standard present value formula of $(1-v^n)/i$ for an annuity immediate and $(1-v^n)/d$ for an annuity due. Previously, ProVal took the present value of each payment which gave a slightly different result when the fractional period was not consistent with the payment frequency.
12/17/12	Fixed an EIR not converging issue in a case where a participant retired at an age where the post-decrement probability of mortality was one. Previously, the liability was calculated as zero even though there were some benefit payments being made in the first year. ProVal will now calculate a small liability and life expectancy in this situation.
12/14/12	Fixed cash balance Accrual Definitions that used attribution with custom rates for projected or pure unit credit with a Service Definition. Previously, the Service Definition was ignored and the date of hire (or hire age) defined in Census Specifications was used instead.
12/10/12	Fixed calculation of the expected return on assets in expense to always reflect employee contributions. Previously employee contributions were ignored in accounting only runs.
12/5/12	In report writer, fixed the Asset Data: Reconciliation exhibit so that the Net Increase/(Decrease) item is calculated as Total Income - Benefit Payments + Plan Transfers. The signs on the benefit payments and plan transfers were inadvertently changed with the 11/2/2012 report writer change.
12/4/12	In UK mode, fixed the excess benefit when the GMP is larger than or equal to the total benefit before applying the spouse fractions, but smaller after applying the spouse fractions. Previously, the excess benefit was set to zero in this case. Also, ensured the scheme's spouse fraction is applied to the greater than the member GMP and the member total benefit at the time of member death. This supersedes and partially reverses a related temporary fix on 11/7/12.

- 12/4/12 Refined the calculation of present value factors over a fractional period when using constant interest rates in valuation sets and the first year of forecasts. In this case, ProVal now uses the standard present value formula of  $(1-v^n)/i$  for an annuity immediate and  $(1-v^n)/d$  for an annuity due. Previously, ProVal took the present value of each payment which gave a slightly different result when the fractional period was not consistent with the payment frequency.
- 12/4/12 In Canadian mode, when applying solvency gains by reducing the amortization period, ProVal was looking at the parameter for ongoing bases to determine if the solvency base amortization periods could be reduced to 0 years. This has been corrected so that ProVal checks the parameter applicable to solvency bases. Also, previously, when a solvency base was reduced to 0 years remaining, the amortization payment was erroneously retained for 1 more year.
- 11/29/12 Fixed post-decrement death benefits with beneficiary determined at earlier of member death and member commencement age so that spouse mortality does not start before decrement age.
- 11/29/12 Fixed post-decrement death benefits with beneficiary determined at earlier of member death and member commencement age so the spouse age difference, if defined with an age-related table, is looked up at the earlier of member death and member commencement age but not before the decrement age.
- 11/19/12 In UK mode, fixed in-deferment increases if the minimum is unchecked (previously the minimum was set equal to the benefit at termination with 0% increases, in that case).
- 11/16/12 Corrected decrementing active liabilities and expected benefit payments in future valuation years in a core projection which had a benefit with a modified cash refund payment form.
- 11/16/12 Corrected PBGC and solvency liabilities with a modified cash refund payment form. Previously, ProVal was always using the ongoing/funding COLA rates to determine the cumulative annuity payments and therefore the remaining cash refund amounts.
- 11/14/12 In UK mode, apply excess revaluation and nominal GMP calculation to current vested participants at or above the deferral age on the valuation date.
- 11/12/12 In administration factors, fixed bug when zero mortality during deferral period was selected. Previously, ProVal was zeroing out the mortality for the period beginning on the first decrement age rather than the decrement age corresponding to each annuity factor. Also, fixed a similar problem with respect to age by pre/post-commencement spouse mortality when the spouse mortality table differs from the member mortality table. The latter fix may affect valuations or core projections which contain lump sum factor or optional forms.
- 11/9/12 In UK mode, fixed inactive headcount and benefits in force to include participants with no benefits payable immediately but with a non-zero future benefit.
- 11/8/12 Applied the scaling factor for benefits and liabilities for emerging inactives when viewing projected benefit payments in a core projection.
- 11/7/12 In UK mode, fixed GMPs for active death in service benefits. Previously, the full GMPs were being used rather than 50% (where applicable).
- 11/7/12 In UK mode, fixed post-decrement death benefits to apply the GMP floor after (not before) spouse fractions have been applied in runs that assume in-payment increases apply to the total pension (not to the excess).
- 11/6/12 Corrected the payment timing adjustment factor for life insurance payment forms in Administration Factors and ProAdmin which is supposed to be always end-of-period. It had inadvertently been changed to beginning of period. This also affects the death coverage premium for insurance contracts in Universal mode.

11/2/12	In UK mode, fixed the normal cost arising from decrement in the valuation year if using middle of year decrements and the benefit on the valuation date is zero.
11/2/12	In Report Writer's Asset Data, Statement of Assets, fixed the calculation of market value of assets for valuation.
10/23/12	In UK mode, changed the number of monthly payments before the first pension increase from 0 to 12 if the pension increase date is in the same month as the valuation date, but on a prior day. For example, if the valuation date is 31 March and the increase date is 30 March, we now assume 12 monthly payments prior to the first increase (previously, the first increase was applied immediately). Also fixed an unintended one-month delay if the valuation date was at the end of a shorter month and the pension increase date was at the end of a longer month. For example, if the valuation date is 30 April and increase date is 31 May, we now assume that only 1 payment will be made prior to the first increase (previously, 2 payments were assumed).
10/22/12	In UK mode, fixed lookup of historical CPI/RPI for active benefits with minimum pension increase during payment period. Previously, the CPI/RPI increase for the future was aligned with entry age rather than attained, so that historical indices were not used (under the EAN method) and future CPI/RPI assumptions that vary by calendar year were not properly used (under all other methods).
10/22/12	In UK mode, fixed double-counting of continuation fraction for active benefits with "Post-decrement Death Benefit" payment forms. Previously, this resulted in the liability and benefit payments being too low if the continuation fraction was < 1.
10/3/12	When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column: <ul style="list-style-type: none"> <li>• ProVal_IAS19R (IAS 19: Development of Retirement Benefit Expense), ProVal_RecIAS19R (IAS 19: Balance Sheet Disclosure) and ProVal_TrendIAS19R (IAS 19: Development of +1%/-1% Trend Sensitivities) are new tables for the revised IAS19 methodology.</li> <li>• ProVal_PBGCPremPPA table (U.S. PBGC Premium (PPA)) and ProVal_PBGCPrem (U.S. PBGC Premium): 'PY_Rate' was retired from the Name column and new values were added for MAP-21.</li> <li>• ProVal_ErCtrb (Development of Employer Contribution): In Canadian mode, new values were added for triennial valuations.</li> </ul>
10/3/12	In German mode, fixed Projected Benefit Payments and Expected Benefit Payments in core projections in years after the initial valuation date for post-termination retirement benefits when a member has more than one retirement benefit and the eligibilities are different between them and there are non-zero retirement rates earlier than the last retirement eligibility condition.
10/3/12	In German mode, changed vesting calculations for Terminated Vested records so that they are always eligible for a vested benefit (i.e. the "vesting mask" does not apply), except in the PSVaG liability in which legal vesting, but not contractual vesting, will be calculated and applied.
10/3/12	In German mode, changed legal vesting calculations for Terminated Vested records so that the transitional vesting rule is applied. That is, if the Benefit Promise date is on or before 31 Dec 2000, and the termination date is on or after 1 Jan 2001, the member gets the better of the 2000 rule and the 2001 rule.
10/3/12	In German mode, fixed calculation of PSVaG liability for non-vested records in benefits whose formula does not depend entirely on Accrual Definitions. This bug was introduced with the 8/7/2012 patch to 3.03.

- 10/3/12 Fixed spurious inactive record exclusions in OPEB mode in certain cases when attained age was specified with a (numeric) age field but decrement age was specified with a date field.
- 10/3/12 Fixed #DECYEAR operator in OPEB mode for members with decrement dates on 1/1, 12/31, and sometimes 1/2 in conjunction with certain valuation dates (but not 1/1, 4/1, 5/31, 6/1, 8/1, 10/1, 11/1, or 12/1). Now, ProVal will either use the date of decrement provided on the data directly, or if a numeric decrement age was provided, back into a year assuming that age was computed using #YEARDIF.
- 10/3/12 Fixed #PIA operators with certain rare combinations of decrement and computation age parameters, in conjunction with members having birthdays on 1/1, 12/31, and sometimes 1/2 as well as certain valuation dates (but not 1/1, 4/1, 5/31, 6/1, 8/1, 10/1, 11/1, or 12/1).
- 10/3/12 In Canadian mode, fixed the applicable percentage of participants to be valued using deferred annuity purchase interest rates when running solvency liability for participants with a status of vested valued as active. Previously the active percentage was used and this was corrected to use the inactive percentage.
- 10/3/12 When running a stochastic forecast with a custom simulator and reserved asset classes, ensure that the income return is the same as the investment return and the turnover is one. Previously, that may not have been true if revised returns had been imported and/or if the import contained more years than the cloned simulator.
- 10/3/12 Fixed results in a run which had lump sum factors that referenced valuation assumption COLAs when the valuation assumption COLAs were variable by calendar year.
- 10/3/12 For the calculation of PPA quarterly contributions, limit the final installment acceleration to the shortfall amortization charge to ensure that the acceleration amount subtracted for the quarterly calculation is not greater than the amount contributed to the minimum required contribution.
- 10/3/12 In German mode, fixed average expected future service if normal retirement age is not on the first of the month coincident with or next following birthday and there are non-zero retirement rates at any age before normal retirement age (previously the mid-year adjustment was using the fraction of service at the later of 100% retirement age or normal retirement age for all years) or post-termination benefits are payable and normal retirement age is greater than or equal to 100% retirement age (previously those years were excluded).
- 10/3/12 In German mode, fixed #PIA operator to correctly use the salary at termination for Terminated Vested members.
- 10/3/12 Changed lump sum (experience) interest rate sensitivity interpolation of emerging inactive liabilities in a forecast to base the interpolation on the year of decrement rather than the valuation year. Emerging inactive liabilities and experience benefit payments in a deterministic or stochastic forecast will change for any benefits with an annuity, deferred lump sum or deferred life insurance payment form that contains a lump sum factor benefit formula component in the benefit's formula or has an optional payment form that varies with the lump sum benchmark yield.
- 10/3/12 In Canadian mode, fixed the handling of ongoing amortization bases with less than 1 year remaining in the amortization period.
- 10/3/12 In Canadian mode, fixed fractional amortization periods entered for ongoing amortizations in the Asset & Funding Policy and two rare rounding bugs. Ongoing bases entered with a fractional amortization period are handled with a more exact methodology. The first rounding bug occurred when writing down ongoing bases due to application of a gain and the base should have been



completely eliminated but instead was left with a very small amount remaining. The other bug occurred after a solvency base was eliminated due to solvency gains when a very small ongoing base was created when there was no ongoing unfunded.

- 10/3/12 Fixed potential incorrect stochastic trial detail results if running IAS19 and end of year additional contribution and more than one contribution and expense custom stochastic variables are used in the same custom stochastic variable expression.
- 10/3/12 Changed treatment of effective interest rate calculation when the interest rate assumption in any of the valuation assumptions is a constant that varies pre and post-decrement. ProVal will no longer try to calculate the average benefit timing factor which cannot be reliably calculated, but rather will use an estimate of 11/24. This produces a more accurate effective interest rate.
- 10/3/12 Fixed effective interest rate running with a yield curve or pre/post-commencement interest rates which had the projected unit credit method turned off in a mode or law type where PUC is not automatically on. ProVal was not switching over to the PVB basis for the effective interest rate calculation as it should have.
- 10/3/12 Fixed projected benefits for initial inactive participants in a core projection whereby life contingencies were being applied for the experience period for an inactive benefit which had a lump sum without life contingencies payment form. This was causing a mismatch between the liability and the projected benefit payments resulting in the effective interest rate not converging.
- 10/3/12 Corrected projected benefit payments for decrementing actives in a core projection with post-decrement death benefits where beneficiary is determined at member death. Previously, if experience and valuation assumptions differed for post-decrement member mortality, post-decrement beneficiary mortality, or percent married then projected benefit payments in projected valuation years used valuation assumptions for experience. Similar issues were also corrected for valuation expected benefit payments (which equal the first year of projected benefit payments) and experience benefit payments in a core projection.
- 10/3/12 Corrected rare issue with liabilities for decrementing actives in a core projection with post-decrement death benefits where beneficiary is determined at member death. Previously, if experience post-decrement member mortality was 100% during the projection period, ProVal acted as if it was 0% instead.
- 10/3/12 Corrected liabilities for decrement actives in a core projection with post-decrement death benefits where beneficiary is determined at the earlier of member death and a specified member (commencement) age. Previously, decrementing actives ignored the specified age, determining the beneficiary at member death only.
- 10/3/12 Fixed error in active pension liabilities pertaining to payment forms that specified that the beneficiary is to be determined at decrement age and the marital age difference in the "other valuation parameters" topic of valuation assumptions was specified by table. In this situation, the mortality of the beneficiary for purposes of determining the annuity payment frequency adjustment should have varied by both payment age and decrement age but was only varying by payment age (ProVal assumed the youngest possible decrement age).
- 10/3/12 Revised active and emerging inactive liabilities when percent male is specified (other than 1 or 0) for actives or new entrants and a sex distinct mortality table is used. Previously, the annuity payment frequency adjustment (e.g.,  $13/24 + 11/24 v px$ ) used  $px$  based on  $lx$  normalized to 1 at entry; now the  $px$  is based on  $lx$  normalized to 1 at decrement. The more time that has elapsed since decrement, the less proportion of survivors the sex with the greater mortality has and

therefore the greater the weight toward the px of the sex with the lesser mortality. These differences are generally minor.

- 10/3/12 Corrected active and emerging inactive liabilities when using pre/post-commencement mortality for annuities that commence "after number of years specified by table" such that commencement age at entry (x) is greater than the commencement age at a later decrement age (y). In this case, the payment frequency adjustment (e.g.,  $13/24 + 11/24 \text{ v } px$ ) used pre-commencement mortality from ages x up to y. These differences are usually minor.
- 10/3/12 Corrected emerging inactive liabilities for death benefits from active service in a core projection in which the spouse age difference in the "other valuation parameters" topic of valuation assumptions was specified by table. Previously, the annuity payment frequency adjustment (e.g.,  $13/24 + 11/24 \text{ v } py$ ) was based on the spouse age that applied at entry age (or current age for terminated participants in German mode). These differences are usually minor.
- 10/3/12 In OPEB mode, if applying increase rates to a lifetime maximum with increase rates that were specified by a table that varied pre/post Medicare age, fixed bug so that the post Medicare age rates were applied appropriately. Previously, the pre-Medicare rates were used for all ages and the post-Medicare rates were ignored.
- 10/3/12 In OPEB mode, changed calculation of decrement age for inactives when a numeric field is provided for "date of birth (or attained age)" and a date field is provided for "date of decrement (or decrement age)" in the Inactive Data topic of Census Specifications. The revised calculation can differ by one day (1/366) for some combinations of ages/dates. This can affect the rounded decrement age as used with payment forms indicating deferral for a specified number of years or indicating a temporary period that stops after a specified number of years. It can also affect the unrounded decrement age used in the Benefit Formula Operators #DECAGE, #DECPTS, and #DECYEAR.
- 10/3/12 Fixed core projection benefits in force for the ProVal status "vested valued through active" to reflect post-decrement probabilities and to only consider retirement benefits for those not yet retired (previously termination benefits were included).

#### ProVal version 3.03

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- 7/30/12 If running a benefit with a modified cash refund payment form, fixed erroneous cash refund amounts when any benefits used selection expressions.
- 7/17/12 In a U.S. Qualified mode stochastic forecast, fixed PPA PBGC segment rates if not set equal to funding rates. They were incorrectly being averaged over 24 months.
- 7/5/12 Fixed error in ProVal PS financial sensitivities whereby changing the funding interest rate curve in year 1 for a U.S. Qualified PPA run was not changing the effective interest rate (which can be viewed under details on the "Summary of Minimum Required Contribution" exhibit).
- 7/5/12 In German mode, changed the calculation of valuation and projection results for Terminated Vested when a benefit definition is included in more than one benefit promise. Previously, the benefit was only counted once, rather than once for each benefit promise that contained it. The results affected are the following items for inactives: Liabilities (other than PSVaG, which was already correct), Projected benefit payments, Expected benefit payments, Actual benefit payments, Headcount, Average age, and Percent male.

6/20/12	In German mode, fixed linear proration for PUC and UC methods for post-termination retirement benefits so that the denominator is at mid-year termination dates. Previously, retirement sharp age calculations were used for the denominator.
6/18/12	Fixed Attained Age liability for runs that have linear proration to decrement/eligibility for at least some benefits and did not have Projected Unit Credit liability calculated.
6/13/12	In German mode, changed the Payment Form Value for In-Service benefits with lump sum payment forms in Pension promises.
5/15/12	In German mode core projections with non-zero termination rates, fixed emerging inactive headcounts when projected benefit payments are turned off. Previously, the counts for members who had terminated through experience but not yet hit second decrement through experience were excluded.
5/14/12	In German mode, changed the way the COLA rate during deferral period is applied to Post-Termination benefits. It will now only apply to the deferral period specified in the payment form, i.e. from second decrement to commencement. Previously, it was also applied to the period between termination and second decrement.
5/11/12	In German mode, changed the Teilwert liability, PSVaG liability, and tax Reserve calculations so that they are never less than zero at the benefit promise level.
5/9/12	In ProVal PS, changed the treatment of an underlying deterministic forecast that had one of the future valuation assumption interest rates specified as "rate changes specified below" but then left the column below blank to indicate "use valuation assumptions", thus creating a conflict. ProVal PS will now mirror ProVal's treatment of ignoring the "rate changes" selection and interpret this set up as "use valuation assumptions". Any rate changes that were previously saved within ProVal PS in the past will now be treated as absolute interest rates.
5/4/12	Fixed bug where funding eligibility was not applied to the expected benefit payments for active participants decrementing in the valuation year.
5/4/12	Abort valuation sets and forecasts with multiple valuations or cores projections that are combined with inconsistent employee contribution timing parameters. Previously they would run but with an incorrect employee contribution timing parameter.
3/19/12	Fixed deferred lump sum factor using a pre/post-commencement mortality table. Previously, ProVal was applying the post-commencement mortality table during the pre-commencement years.
3/2/12	In a PPA core projection with optional forms that override actuarial liability interest rates, fixed high/low interest rate sensitivity results if sensitivity fractions for those optional forms are not equal to 1. Previously, we did not apply the sensitivity fraction.
2/24/12	In a deterministic forecast, fixed effective interest rate if forecasting to a full yield curve and the full yield curve is identical to the valuation assumptions. Previously, the results were slightly different because we recalculated the effective interest rate instead of just using the core baseline results.
2/24/12	In a forecast, fixed effective interest rate calculation to use the EIR projected benefit payments, if available, instead of the not at risk projected benefit payments.
2/14/12	Prevent freeze ages from applying to basis only accrual definitions.
2/13/12	Fixed the calculation of effective interest rates for interest rate sensitivities in a core projection when the valuation assumption is a yield curve of forward rates

	(as opposed to spot rates). ProVal was converting to spot rates before adding/subtracting the interest rate sensitivity rather than after.
2/13/12	In German mode, fixed expected future service to reflect retirement decrement timing.
2/10/12	In German mode, in Valuations with termination rates, fixed numerator of vesting fraction for post-termination retirement benefits so that it is beginning-of-year vesting service at termination. Previously, vesting service at actual retirement age was used.
1/25/12	Fixed error in active Solvency liability when linear proration was used for unit credit attribution for certain benefits and annuity purchase liabilities were not calculated. Previously zeros were used for the transfer value liability for the benefits with the linear proration.
1/20/12	Fixed incorrect ProVal PS results that occurred when the Canadian deterministic forecast and/or stochastic forecast used to populate ProVal PS had inconsistent Solvency interest rate types between the baseline cores and the Solvency liability override cores.
1/18/12	Revised methodology for PPA valuation assumption to “reflect new accrual rates during the valuation year PUC and UC liabilities.” The change affects the normal cost associated with decrement in the valuation year (except those at 100% retirement) when decrements are assumed to occur in the middle of the year and the benefit formula referenced a component which is considered fully accrued (e.g., an early retirement factor table). Previously, this slice of normal cost included an additional half-year accrual of service (through averaging) but not an additional half-year for fully accrued components. Now both are reflected.
12/22/11	<p>When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:</p> <ul style="list-style-type: none"> <li>• ProVal_CanMin table (Canadian Summary of Minimum Required Contribution Limits): ‘Req_Amort’ was retired from the Name column if not Bill 30 and not a municipal or university, new values were added for Letters of Credit.</li> <li>• ProVal_FFLCan table (Canadian Surplus Threshold): ‘Normal_Cost’ ‘EE_Contrb’ ‘Total_CX_Contrb’ ‘20pct_Act_Liab’ ‘2_times_NC’ ‘10pct_Act_Liab’ ‘Greater’ were retired from the Name column for valuation dates prior to 2010.</li> <li>• ProVal_PBGCPremPPA table (U.S. PBGC Premium (PPA)): new values were added to display the method and interest rates used in the calculation.</li> </ul>
12/22/11	In Canadian mode, fixed treatment of plan and assumption change gains when an actuarial loss exists and can be completely offset by the gain. Now the excess gain is applied towards writing down previously established bases. (In prior versions, the excess gain was not used).
12/22/11	In Universal mode with Brazilian funding rules, prevent assets from becoming negative. Previously, this was possible with a very large negative additional contribution.
12/22/11	In German mode, fixed treatment of benefit promise date for new entrants. Now, the benefit promise date will be set to the new entrant date of hire (which may proceed date of entry if new entrants have past service).
12/22/11	In German mode, fixed Retirement benefits with subformula components to reflect retirement decrement timing.

- 12/22/11 In German mode, fixed liabilities for death and disability benefits when the payment form value depends on the initial benefit amount (such as with a simple COLA assumption). Previously, the projected benefits underlying the payment form value were based on the benefit at beginning of year of decrement before averaging the benefits to the middle of the year.
- 12/22/11 In German mode, changed the treatment of retirement probabilities in decrement competition. Previously, they were treated as independent rates, and now they are treated as dependent probabilities. This only affects valuations and core projections in which the retirement rates are entered as a table (not 100% at a specified age) and the table contains values other than 100% and 0%. There is also a new screen option in the Decrements tab of Valuation Assumptions and Projection Assumptions which allows the user to switch to the prior treatment.
- 12/22/11 In German mode, fixed calculation of the minimum funding age to be 27 if the benefit promise date is 1/1/2009 or later, 28 if the benefit promise date is between 1/1/2001 and 12/31/2008, and 30 for benefit promise dates before 1/1/2001. Previously, ProVal used 1/1/2010 as the change from 28 to 27.
- 12/22/11 If single period gain/loss with different pre- and post-decrement interest rates, PIA with salary override based on valuation date; or PPA option to reflect mid-year changes in accrual rates as if effective on valuation date, formerly there would be a value in the retirement bucket which represented the discrepancy between individual roll-forward and total roll-forward methods. Now this amount will be included in the "implicit assumption change - other" bucket.
- 12/22/11 If multi-period gain/loss with differing pre/post interest rates, for inactives and retirement eligible actives, individual roll-forward was done using post-decrement rate but aggregate roll-forward was done using pre-decrement. To force consistency, the gain/loss is now always using pre-decrement rate now.
- 12/22/11 In OPEB mode, when computing average expected future service (both to full eligibility and retirement), we no longer reflect service to decrement ages that have a zero benefit associated with them. This change is expected to impact benefits that stop at a specified age (such as 65) but the 100% retirement age is after the benefit stop age.
- 12/22/11 In Canadian mode, updated the calculation of surplus available to be applied to the minimum contribution for British Columbia, Manitoba, New Brunswick, Newfoundland, and Nova Scotia.
- 12/22/11 In Canadian mode, updated the calculation of the surplus threshold for purposes of the maximum tax deductible contributions in years after 2009.
- 12/22/11 Changed Experience Study treatment that excluded records with negative service values for decrements. These records will now be included using the value at zero service, consistent with their treatment in valuations and core projections.
- 12/22/11 Fixed Experience Study eligibility service for benefits using a service definition that included the "transform data to service" feature when the valuation assumptions also assumed midyear decrements.
- 12/22/11 Changed lump sum factors with variable by duration from valuation date spot interest rates that use the "annuity substitution rule" to calculate the annuity factor for decrement dates prior to the valuation date in two steps: first discounting each payment from the payment age to the valuation age and then further discounting from the valuation age to the decrement age. For this purpose, all interest rates corresponding to durations prior to the valuation date (durations less than zero) are assumed to equal the duration 0 rate. Previously, ProVal was going straight back to decrement in one step using the interest rate at the duration corresponding to the payment age. This only affects liabilities for a participant who has a lump sum factor calculated using an oldest recognized age that is prior

to the participant's age on the valuation date, which would be a very unusual case.

ProVal version 3.02

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11/30/11	If PPA and pay quarterlies and final when due, fixed credit balance available at beginning of year to apply to 1 <sup>st</sup> and 2 <sup>nd</sup> quarterly contributions for years after the initial valuation year. Previously we assumed that the entire contribution above the minimum made 8.5 months after the end of the plan year was not available to pay the first two quarterlies. Now, only excess contributions will not be available until 8.5 months after the end of the plan year.
11/15/11	Fixed liabilities and projected benefit payments for inactive modified cash refund payment forms. Previously a mismatch may have existed (not shown in sample lives) between the database guaranteed amount and the guaranteed amount valued.
11/09/11	Fixed small error in the forecasted PPA effective interest rate (EIR) in a deterministic or stochastic forecast that had alternative PPA EIR projected benefit payments due to a lump sum optional form and a "use underlying valuation assumption" interest assumption in the core projection. The effective interest rate computed for the sensitivities sometimes used the not at risk projected benefit payments in the calculation rather than the PPA EIR projected benefit payments.
11/07/11	In U.S. Qualified mode PPA law type core projection view, under the funding not-at-risk target liability heading, we now display the funding not-at-risk target liability projected benefit payments all of the time. Previously the PPA EIR basis projected benefit payments would display when the effective interest rate was being displayed and the funding not-at-risk target liability projected benefit payments would display otherwise.
11/04/11	Fixed Entry Age Normal normal cost bug when a benefit definition has a comment on the last line of the main benefit formula and an alternative formula for Entry Age Normal normal cost. In this case, benefit formula components that appear on the first line of the normal cost formula but are not used in the benefit formula are set to 0. This bug did not affect sample lives; it only occurred when running the valuation or core projection.
11/02/11	In ProVal PS, fixed bug setting up an assumption or plan change in the 1st year when there are plan amendments. ProVal was adding up the saved liabilities of all benefits, not just the correct pre or post amendment benefits.
10/31/11	Changed expected benefit payments for modified cash refund annuities that had a \$0 annuity payable at all payment ages and a non-zero guaranteed amount. While the resulting liability was zero, the expected benefit payments reflected the non-zero guaranteed amount. The guaranteed amounts are now changed to \$0 in this case.
10/31/11	In Canadian mode solvency liability calculations, fixed the attribution when linear proration was selected for unit credit liabilities. Previously the proration fraction was only applied when calculating the annuity purchase liability, now it is applied to both annuity purchase and transfer value.
10/31/11	Fixed calculations for linear proration to eligibility when both of the following were true: (a) used an unrounded service definition with a database field for service accruals, and (b) the database field was 0 for some records and nonzero for others
10/28/11	Fixed OPEB mode APBO projected benefit payments for formulas using accrual rate proration by component that had no components.

10/21/11	In ProVal PS, if pay as you go contribution policy, fixed first year expense in Disclosure & Budgeting and first year assets in Financial Sensitivities to use experience benefit payments. Previously, we were using accounting expense benefit payments.
10/21/11	In a US Qualified mode forecast with a PPA PBGC liability override specified, the PBGC liability may change because the type of interest rate forecast performed was based on the interest rate structure specified in the base core projection(s) instead of the override core projection(s).
10/12/11	For multiemployer plans, fixed creation of 431(b)(8)(B) amortization bases. Now, a base will be created the first year asset relief is elected (for each of the corridor and smoothing elections) and the year following the last year corridor relief was elected. Also, fixed the period over which the initial 431(b)(8)(A) base is amortized.
10/12/11	Fixed OPEB APBO projected benefit payments when using accrual rate proration and the initial benefit or participant contribution at decrement is 0.
09/30/11	In OPEB mode active & emerging inactive life expectancy, benefit eligibility was not getting properly set when a death benefit was present.
09/30/11	Corrected emerging inactive life expectancy calculation (in all modes) when eligibility requirements differ among benefits for a given contingency (e.g., retirement). Previously, eligibility was pulled from the first benefit for each contingency; now all benefits for the contingency are considered.
09/29/11	In valuations and core projections, fixed calculation of Experience Benefit Payments, Benefits Inforce in pay status, and Expected Benefit Payments for active benefits with a payment form of Joint Annuity or Post-decrement death benefit with beneficiary determined at member death.
09/29/11	Fixed bug importing Projection Assumptions from another client using Import from Client or Client Merge. In the Lump Sum & Optional Payment Forms topic of imported Projection Assumptions, optional form conversions that utilized a Benefit Component Table would generally reference the wrong table or no table at all. Where the wrong table was referenced, re-running existing Core Projections could lead to different results. In addition, ProVal's audit trail allowed tables to be deleted that should be protected and protected tables that could be safely deleted.
09/12/11	Fixed bug in solvency liability when a benefit formula component lump sum factor applied valuation assumption COLAs and a participant who was not eligible for any benefits containing the lump sum factor benefit formula component was valued along with a participant who was eligible and had the same demographic characteristics.
08/04/11	Fixed the reversionary annuity in OPEB mode so that if combined lifetime maximums are used and mortality is adjusted for claim timing then ProVal accurately calculates the covered amount for death in the decrement year.
08/01/11	Changed the split of benefits inforce for inactive participants in pension modes between "in receipt" and "deferred" so that benefits with a REA payment form work similar to how life insurance and lump sums work, which is that they are considered deferred unless there is another benefit with an annuity payment form that is immediate.
08/01/11	Modified ProVal and ProVal PS such that if the target interest rate assumption in a forecast is a yield curve that is identical to the valuation interest rate assumption (or one of the sensitivities), then the system will pick up the results from the core projection anchor point rather than try to interpolate.
07/25/11	Fixed pension mode core projections with plan amendments coded in projection assumptions to reflect the correct benefits (either initial or amended benefit) when

- checking for nonzero benefits in each forecast year when determining life expectancy for current actives and emerging inactive. Previously, all benefits (both initial and amended) were reflected in each forecast year.
- 07/25/11 Changed OPEB average inactive life expectancy in valuation sets & forecasts to display as 0, instead of 1, when there were no inactive participants receiving benefits. Similarly, changed OPEB average total (inactive & active) life expectancy to display as 0, instead of 1, where there were no active participants and no inactive participant were receiving benefits.
- 07/20/11 Fixed OPEB "accrual rate proration" attribution in cases where a benefit of 0 in some payment years causes the attribution fraction in those years to erroneously be 0.
- 07/18/11 Fixed effective interest rate calculation in US Qualified mode under a PPA law type when combining several valuations (in a valuation set or by aggregating valuation output) or core projections when some of the runs had lump sum payment forms as an optional form where ProVal was substituting an annuity payment stream for the lump sum payments to determine the effective interest rate and other runs did not require substitution. ProVal was using the "unsubstituted" projected benefit payments in the effective interest rate calculation for all of the runs instead of just the runs that did not require substitution.
- 07/12/11 Fixed Canadian valuation sets and forecasts under Quebec provincial law that apply the Supplemental Pension Plan Act and did not select to write down technical deficiencies first. Previously ongoing bases were maintained instead of eliminating them and re-determining a new amortization as if no prior bases existed.
- 07/12/11 Fixed rare bug in Canadian stochastic forecasts for plans with a Quebec or Federal (PBSA) provincial law selection. In rare cases, trials that had no gain may have had existing ongoing amortization bases eliminated.
- 07/08/11 Fixed several obscure plan amendment bugs, one of which evidenced itself through an "effective interest rate calculation not converging" message. In other cases, the reported plan amendments were clearly incorrect (e.g., equal to the total liability for each year of the forecast even though an amendment was only supposed to occur in a single year). The bugs primarily involved a single Benefit Definition being amended to different Benefit Definitions for different purposes, such as funding and accounting or baseline and override. There was also an issue if some amendments applied to both funding and accounting, but then there were accounting only amendments for an override liability.
- 06/16/11 Fixed bug in US Qualified mode experience studies with a PPA law type that caused disabled mortality to be applied to survivors and non-disabled mortality to be applied to disabled members.
- 06/15/11 Fixed application of pre/post-commencement mortality in inactive post-decrement death benefits with beneficiary determined at member death so that pre-commencement rates will be used during the deferral period, if any. In the initial release of 3.02, post-commencement mortality was used for the spouse in all years after member death, which differed from 3.01, in which pre-commencement rates were used in the deferral period.
- 06/14/11 Fixed incorrect calculation of gain/loss due to regulatory increases in a gain/loss run based on multiple valuations, with some valuations having some regulatory data applicable (such as maximum compensation) but the last valuation not having that regulatory data applicable (which is permissible if there are no active participants in that valuation).
- 06/06/11 Fixed bug introduced with ProVal version 3.02 where a PPA target liability gain/loss analysis produced inaccurate gain/loss by source when it was based on valuations where at least one actuarial liability was being calculated and the



actuarial liability interest and/or mortality differed from the PPA target liability interest and/or mortality.

- 06/06/11 Corrected exclusion of some valid records when multiple service definitions were used and some service definitions used the “transform data to service” feature and others did not.
- 05/31/11 Cost of living adjustments on benefits with a post-decrement death benefit payment form used to be disregarded in all cases but now will be applied with the exception of COLAs with caps or simple COLAs (which will cause the run to abort).
- 05/26/11 Corrected the inactive life expectancy when using grouped data for the ProVal status “vested valued through active.” Previously the count field was not reflected in the calculations.
- 05/23/11 Fixed a bug evaluating plan amendments during a forecast when a Benefit Definition with optional payment forms is in the Plan Definition (without amendment) of one core projection and is the “after amendment benefit” in another core projection.
- 05/11/11 In valuations and core projections, fixed bug causing inactive Benefits Inforce for Post-decrement death benefits to display as Deferred rather than In Receipt for up to 14 years after the commencement age.
- 05/11/11 When saving Valuation Set Exhibits or Deterministic Forecast Exhibits to a Microsoft Access database, the following tables had changes in the Name column:
- ProVal\_CanMin table (Canadian Summary of Minimum Required Contribution Limits): ‘transfer’ was retired from the Name column.
  - ProVal\_SolvDef table (Canadian Solvency Deficiency): ‘New\_Unf\_Solv\_Liab’, ‘Ann\_Amort’, and ‘Amort’ were retired from the Name column.
  - Numerous tables: new values in the Name column, primarily for U.S. Multiemployer 431(b)(8)(A) and (B) relief and Canadian Quebec Bill 30.
- In addition, new tables were added, primarily for U.S. Multiemployer 431(b)(8)(A) and (B) relief and Canadian Quebec Bill 30.
- 05/11/11 Fixed PIA Tool group calculation bug: group and individual PIAs use different parameters to reduce (increase) the PIA for early (late) commencement. Previously, the calculation of the group PIA used the individual assumption rather than the group assumption, even though the long worksheet showed the group parameter value in the “Dates” section.
- 05/11/11 Fixed Valuation Sets and Forecasts calculating the denominator of average future working lifetimes using the “average headcount during the year” option to reflect the scaling factor for the denominator if one was present. The scaling factor stopped being applied to this denominator option when the option to use “headcount expected to receive benefits” was added in version 3.01.
- 05/11/11 Fixed results in ProVal PS with an underlying deterministic forecast which had a yield curve in the initial valuation year but a scalar interest rate in future valuation years. The duration 0 interest rate was being used as the effective interest rate in the first year rather than computing an effective interest rate from the yield curve.
- 05/11/11 Changed continuous annuity calculation to be slightly more accurate. Previously, an approximation of 1E6 (1 million) payments per year was used; now ProVal will use 1E14. This generally causes a difference in the sixth decimal place.
- 05/11/11 Fixed projected benefit payments in a core projection with plan amendments.

05/11/11	Fixed OPEB results aggregated by subtotal in a valuation or core projection where scaling factors are being applied to one or more of the runs. If the total active headcounts across runs for a particular subtotal code were being artificially zeroed out, for example by combining two runs having the same active headcounts but equal but opposite sign scaling factors, then the active results (aggregated by subtotals), or the active result component of the total result, may have displayed incorrectly as zero.
05/11/11	The PPA effective interest rate is now limited to zero.
05/11/11	Do not allow Benefit Definitions with optional payment forms to reference payment forms that vary by benefit component table. Previously, these were valued as payable immediately.
05/11/11	Fixed calculation of Projected Benefit Payments for Post-decrement death benefits with beneficiary determined at member death when the valuation includes multiple mortality assumptions (e.g. includes RPA or Solvency liabilities). Previously, the results reflected the secondary mortality basis.
05/11/11	Fixed calculation of Expected Benefit Payments for Post-decrement death benefits with beneficiary determined at member death for actives and emerging inactive when there is more than one actuarial assumptions basis in a Funding valuation or core projection (e.g. there are RPA or Solvency liabilities).
05/11/11	Fixed interpolation to an exact age for an inactive participant whose temporary period or certain-only period has expired on an age nearest basis if it has not expired on an age last birthday basis. Previously, this participant was excluded. Now the age last birthday results will be averaged with zero age next birthday results.
05/11/11	In ProVal PS, fixed results if the deterministic assumptions used to populated ProVal PS, specified "rate changes specified below" for an interest rate but failed to specify the rate changes below and then tried to change the "next year" interest rate in Disclosure & Budgeting or Financial Sensitivities.
05/11/11	Fixed end of year additional contributions being applied to quarterly contributions if it is made after the quarterly due date. This is possible if the valuation date is different than the measurement date and the liability target is an accounting type.
05/11/11	Fixed Canadian forecasts that were calculating an additional end of year contribution and the checkbox to maintain prior year credit balance was not checked.
05/11/11	Fixed Canadian calculations for plans that maintain a credit balance. Previously, when ongoing bases were adjusted for changes in solvency bases, the credit balance was not properly reflected.
05/11/11	Fixed PPA stochastic forecast that did not vary PPA liabilities with the benchmark yield when the capital market simulation does not include benchmark yields.
05/11/11	Fixed bug for points-based accruals when using rounded service definitions with service accruals which are not a multiple of the rounding amount. (Interpolation in the year where accrual rate changed was slightly off in very limited cases.).
05/11/11	Fixed bug with middle of year decrements where an eligibility requirement of $\leq 0.5$ years of service was assumed to always be met, even during a period of time when service is negative.
05/11/11	Fixed year of birth for actives with birthdays on 1/1, 12/31, and sometimes 1/2 in conjunction with certain valuation dates (but not 1/1, 4/1, 5/31, 6/1, 8/1, 10/1, 11/1, or 12/1). This change affects covered compensation, PIA, and age x year of birth active mortality table lookups (but not age x year of birth mortality table lookups after decrement). Now, ProVal will either use the date of birth provided

on the data directly, or if a numeric age was provided, back into a year of birth assuming that age was computed using #YEARDIF.

- 05/11/11 Changed calculation of projected headcounts for inactive post-decrement death benefits when the beneficiary is determined at member death.
- Changed the calculation method for present values of post-decrement death benefits when the beneficiary is determined at member death. Previously, at member death ages, the beneficiary was assumed to survive to the beginning of the next year and begin payments at that time. Now, the beneficiary is assumed to begin payments in the middle of the year of member death. See Help for a description of the methodology. The change in liability due to this change in methodology for a 55 year-old with monthly payments is expected to be an increase of around 3% of the post-decrement death benefit liability. Other valuation results, such as expected and projected benefit payments, will also be affected.
- 05/11/11 Fixed inactive liabilities in core projections in years after the initial valuation year, when the 100% death age in valuation assumptions for one or more participants is before the end of the projection period and before the 100% death age in projection assumptions. Previously, the liabilities for these participants was zero in projection years after the 100% death age (from valuation assumptions)..
- 05/11/11 In Canadian mode, updated the contribution calculations in Valuation Sets and forecasts when the applicable provincial law selection is Quebec and either the Supplemental Pension Plan Act or the regulation respecting funding of the municipal and university sectors is applied.
- 05/11/11 Fixed bugs calculating the value of plan changes attributable to COLAs and benefit increase for actives amounts included in the Deterministic and/or Stochastic assumptions:
- a. Previously the funding, Canadian solvency and accounting plan change liabilities were not correct (typically either zero or negative) when COLAs were valued as a plan change, there was also an assumption change, and plan changes were valued before assumption changes.
  - b. Previously the active plan change liability for the transfer value portion of the Canadian solvency liability was always zero for a "benefit increase for actives" forecast amendment.
  - c. Previously the assumption change liability was not correct when there was a COLA and an assumption change and the COLA was valued as a gain/loss. The assumption change liability was overstated by the value of all prior year forecast COLAs.
  - d. Improved the plan change liability calculation for ad hoc COLAs on emerging inactive when the COLA only applies to benefits in pay status. Previously it was significantly (possibly over 100%) overstated.
  - e. Fixed bug calculating the solvency plan change liabilities when there is also an assumption change in the ongoing or accounting liability and the assumption change is valued before any plan changes.
- 05/11/11 Fixed projected benefit payments stream for max tax PUC liability on a PPA basis. Previously was referencing benefit payments on a UC basis.
- 05/11/11 In the case of annuities being converted to lump sum optional forms, calculate special projected benefit payments to be used in the calculation of the PPA effective interest rate that reflect the annuity substitution rule: substitute annuity equivalent for lump sums and use lump sum mortality.
- 05/11/11 Fixed Death Benefit payable to Married only or Single only with Optional Payment Forms if the option for joint life optional payment forms, assume joint life for all

participants is selected. Previously, the optional form assumed the death benefit was payable to everybody.

05/11/11 Changed calculation of expected employee contributions for one-year Gain/Loss Analysis when a spread-gain method is used. Previously, expected employee contributions were estimated (using normal cost from the Entry Age Normal method) to determine the expected liability by rollforward. This could result in a mismatch between gain/loss output and individual results, which computed the expected liability by projection rather than by rollforward. Now, expected employee contributions are computed directly. In order to see this change in Gain/Loss Analysis, the underlying valuations must be rerun.

#### ProVal version 3.01

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03/18/11 Fixed calculation of average expected future service in certain rare cases. When the benefit definition has an offset that should have resulted in a \$0 benefit, ProVal was sometimes calculating a very small benefit amount. Since ProVal detected a nonzero benefit, even though very small, the participant was included in the average expected future service calculation. Now participants with immaterial benefits (smaller than  $e^{-10}$ ) are excluded.

02/23/11 Fixed bug in a lump sum factor used within a death benefit which was parameterized under the advanced button to be based on spouses age and sex rather than the member's. When dynamic or fully generational mortality was used for the lump sum factor mortality, ProVal was using member age instead of spouse age.

02/22/11 Corrected fiscal year contribution custom stochastic variable when valuation date does not equal measurement date and end of year additional contributions are zero. The variable was excluding contributions made for the current fiscal year but following plan year.

02/11/11 Corrected interpolation of the PPA PBGC liability in a deterministic forecast in a case where PPA PBGC was set equal to the target interest rate in the valuation assumptions but the PBGC interest rate column in deterministic assumptions future valuation interest rates was left blank.

01/21/11 Fixed PBGC flat rate premium calculation to ensure that the flat rate does not decline from the previous year.

01/18/11 Fixed calculation of emerging inactive liabilities for Post-decrement death payment forms, when the coverage cessation age is beyond the 100% death age for the member. The change in liability due to this fix can generally be expected to be less than 1/100th of 1% of the Post-decrement death liability.

01/13/11 For PPA valuations and forecasts that reflect the Pension Relief Act 2010 shortfall amortization relief, fixed and enhanced the handling of accelerations per Notice 2011-3. Also, do not apply relief when there are negative installments.

01/06/11 Fixed Execute > Core Projection > View active liability results when benefits with optional payment forms have plan amendments valued.

12/23/10 Fixed bug whereby ProVal was always using the low sensitivity increase rates when overriding experience salary increases using a variable entry in a core projection or in a gain/loss analysis. Constant rates and variable by library entries were okay, as were experience increase rates without overrides. Valuations and valuation assumption salary scale overrides were also okay.

12/10/10 Fixed calculation of present value of Post-Decrement Death benefit for inactives when the beneficiary is determined by data at the valuation date and the coverage cessation age is after the 100% death age for the participant.

12/02/10	The U.S. social security PIA calculation has been modified to properly handle a decreasing national average wage.
11/19/10	In pension modes, fixed payment frequency adjustment for active benefits with life insurance payment forms when annuity payment timing is set to end of period. Previously, the end of period timing not only caused annuities to be valued as immediate (rather than due), but also caused active life insurance benefits to be valued as payable at the beginning of the period of death. Now, active life insurance benefits are always valued as payable at the end of the period in which death occurs, regardless of annuity payment timing. Thus, present values for active life insurance benefits are now lower by a factor of $v^{1/m}$ when annuity payment timing is set to end of period. For typical assumptions, this represents a difference of 0.3% to 0.6% where $m=12$ (i.e., insurance payable monthly) and interest is between 4% and 8%.
11/15/10	Fixed calculation of average expected future service and average expected future lifetime for actives in Valuations and Core Projections when there are participants older than the 100% assumed retirement age who are expected to receive no benefits from the plan. Previously these participants were included in the denominator when calculating the average. Now they are properly excluded from the denominator.
11/11/10	Fixed stochastic forecast results when a scalar valuation interest was being forecast using a change in benchmark yield. Previously, the year 1 interest rate was erroneously being set to zero.
11/11/10	Fixed amount of credit balance to waive if waiving credit balance to avoid at-risk and the at-risk funding target, without loads, is less than the not-at-risk funding liability.
10/27/10	In ProVal PS Disclosure & Budgeting, fixed the valuation year pension expense if the valuation date does not equal the measurement date and quarterlies due for the second plan year are payable during the first measurement period. Previously, an additional expense equal to the negative expected return on assets for these contributions was generated.
10/26/10	In a Deterministic Forecast, when the liability, normal cost and benefit payments are all zero, continue setting the effective interest rate to missing but check each future forecast year to see if some of these values become non-zero in future forecast years and calculate an effective interest rate when possible for each year.
10/19/10	Fixed the calculation of inactive life expectancy in OPEB mode when there were inactive records that were not eligible for any benefits.
10/14/10	Fixed PPA Minimum Required Contribution and Prefunding Balance applied in the valuation year if the minimum remaining after the Funding Standard Carryover Balance is applied is less than the difference between the final payment discounted to the beginning of the year and the Preliminary Minimum minus the required quarterlies discounted to the beginning of the year.
10/06/10	In Core Projections, fixed post-decrement mortality for new entrants when mortality is specified by an Age by Year of Birth table.
10/06/10	Fixed bug that occurred when updating to ProVal 3.01 and affected inactive life expectancy in OPEB valuations where the valuations were run with more than one ProVal inactive status. Note that OPEB core projections, pension valuations, and pension core projections did not have this problem nor did the calculations of expected future service, active inactive life expectancy, or emerging inactive life expectancy.
09/30/10	Fixed calculations for aggregate cost methods (e.g., FIL) such that additional contributions do not affect the frozen initial liability.

09/29/10	Fixed active mortality decrement rates when rates vary by coded field and one or more tables are Age by Year of Birth Tables.
09/28/10	Fixed fraction married tables when used for inactives at decrement. If the table's upper limit was not 120, rates of 0 were used for all ages after the latest of 100 and the table's upper limit.
09/23/10	Fixed bug in Deterministic Forecasts where negative normal costs were not varying when forecasting to a full yield curve.
09/16/10	Fixed accounting only valuation sets and forecasts to use accounting assets when calculating any additional contribution amount required to prevent assets from becoming negative.
08/26/10	Fixed potential bug processing plan amendments in a forecast.
08/25/10	Fixed PBGC premium in a forecast when the core projection's underlying National Average Wage assumptions were incomplete.
08/24/10	Adjusted the PPA projected benefit payments such that the accrued benefit will be set to zero whenever the projected benefit (before proration) is zero. This makes the present value of the PPA target liability projected benefit payments more closely approximate the PPA target liability where accrual rate proration was not used and the accrued benefit exceeded the projected benefit for one or more active benefits.
08/20/10	Fixed determination of mortality rates for survivors of active members when mortality is specified by an Age by Year of Birth Table. Previously, the survivor's year of birth was set equal to the member's (though the survivor's age was set correctly according to assumptions).
08/09/10	In a PPA forecast, fix year 2 quarterly calculation if there is an installment acceleration in the first year.
08/05/10	Corrected a divergence between statutory interest rate curve and the funding interest rate curve in a post-PPA deterministic forecast which had no separate actuarial liability interest rate specified in valuation assumptions, had a blank funding interest rate column in deterministic assumptions and used a normal cost plus supplemental cost contribution policy based on the actuarial liability. This could result in the amortization being based on an interest rate curve that was equal to the valuation assumption rather than the forecasted PPA target yield curve.
07/29/10	In a PPA deterministic forecast where the valuation assumptions set PBGC interest rates to be target assumptions, fixed the forecasting results to always have the PBGC interest rates follow the target rates.
07/26/10	In Core Projections, fixed calculation of experience benefit payments for inactives with payment form of Post-decrement Death Benefit with beneficiary determined at death.
07/19/10	Fixed determination of whether the prefunding balance should be subtracted to determine the exemption from a new shortfall amortization base.
07/19/10	In Gain/Loss Analysis, eliminated spurious "system change" amount under spread-gain methods when the underlying valuations included both "Active" and "Vested valued through active" participants below 100% retirement age. Previously, ProVal included "Vested value through active" participants in the present value of future salaries (or present value of future service) and valuation salary (or valuation number) under spread-gain level % (or level \$) methods for computing the liability gain/(loss) by source.
07/19/10	Gain/Loss runs that reference dynamic mortality tables or have lump sum factors with interest rates that are variable from the valuation date will now have part of the gain/loss that may have previously been included in the unreconciled

continuing active, active decrements retired, salary growth & regulatory increases, or new entrants amounts categorized as an implicit assumption change instead.

- 07/19/10 Fixed multiple year gain/loss analyses for runs that reference dynamic mortality tables or have lump sum factors with interest rates that are variable by duration from the valuation date. Now, the assumed normal costs for the period will be backed into using assumptions consistent with the beginning of period assumptions which changes the total liability gain/loss.
- 07/19/10 Fixed individual results for a one year gain/loss analysis with lump sum factors with dynamic mortality.
- 07/19/10 Fixed core projection plan amendment bug if pre/post commencement mortality is used in the underlying valuation assumptions and the payment form of the initial and replacement benefits have different deferral ages.
- 07/19/10 In Universal Pension mode, fixed Insurance Reserve calculation in current Employer and Employee contracts with participation when dividends from prior contracts are credited (passed up) to the current contract and there is a dividend offset from the Delta Capital or Delta Premium method in the current contract. Previously, the offset was not being applied to the dividend passed up from prior contracts.
- 07/19/10 In Universal Pension mode, fixed Insurance Reserve calculations so that Employer Capital is never less than zero.
- 07/19/10 In pension mode core projections, inactive life expectancy now includes emerging inactives. Previously, emerging inactives were excluded from these calculations.
- 07/19/10 In pension mode valuations and core projections, life expectancy is now calculated for participants valued using the ProVal status "Vested Valued as Active". Previously these participants were excluded from the calculations.
- 07/19/10 In OPEB mode, the accounting average total service to retirement and to full eligibility was not saved for new entrants for subtotal calculations. Also in OPEB mode, fix double counting of the inactive portion of the active life expectancy calculation in a core projection when the projection decrements keep a participant active past the 100% retirement age in valuation assumptions. Lastly in OPEB mode, fix issue if a participant terminated prior to becoming eligible for a benefit to ensure that the inactive portion of his life expectancy was also excluded.
- 07/19/10 Fixed Canadian Solvency Liability for emerging inactive participants in a core projection. Previously, emerging inactives could have an annuity purchase liability even if they weren't eligible for any benefits that should be valued using annuity purchase assumptions. This resulted in an annuity purchase liability that was too high and a transfer value liability that was too low. The effect on the total solvency liability depends on the relative value of annuity purchase vs. transfer value.
- 07/19/10 Changed interpolation trigger from 3 to 3.5. This will make it less likely to trigger two-point non-logarithmic interpolation in the case where, while the slope of the liability interest rate sensitivity was below threshold, the rate of change of the slope was high enough in combination with a relatively large slope, to be of concern. We found a case of a normal cost with a large effective duration which had been over the threshold whose interpolation was better without hitting the trigger. Raising the threshold slightly improves the interpolation in these types of situations.
- 07/19/10 Changed the denominator of the average future working lifetime to use the number of participants eligible for a benefit at decrement instead of the number of participants who survived to the end of the valuation year. Also changed the denominator for the average inactive life expectancy calculation to be based on

the number alive on the valuation date rather than the number alive at the end of the year. Lastly, in OPEB mode, changed the total active life expectancy for the pre-decrement period to only reflect periods during which a benefit is earned. Previously, a pure life expectancy calculation was performed and benefit eligibility was disregarded. The denominator used to determine the average active life expectancy is now the same as the denominator used in the average future working lifetime calculation.

- 07/19/10 Changed rounding of the contribution amount calculated to prevent assets from becoming negative to always round up instead of to nearest.
- 07/19/10 Changed stochastic pension expense results for IAS 19 when valuation date does not equal measurement date to properly reflect benefit payment adjustments in calculating the proportion vested.
- 07/19/10 Changed stochastic pension expense results when valuation date does not equal measurement date and end of year additional contributions apply to properly reflect contributions in the calculation of the following year's assets.
- 07/19/10 When the valuation date does not equal the measurement date, fixed potential bug in the annuity benefit payments used to roll forward liabilities when the plan also contains lump sum or life insurance payment forms.
- 07/19/10 In Canadian mode, changed the calculation of required contribution if solvency deficiency for Ontario and Quebec when a negative normal cost exists. Now the negative normal cost is used directly. Previously, a \$0 was used instead of the negative amount.
- 07/19/10 No longer apply the maximum compensation limit to Valuation Salary and Present Value of Future Salary for accounting runs. Previously, it was applied if selected in the funding run. These numbers are only displayed if funding results are not available.
- 07/19/10 ProVal will now validate a table service field or service definition for active payment forms if the user picked the "after number of years specified by table" radio button.

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- 05/11/10 In core projections, fixed emerging inactive experience benefit payments and liability when the underlying run contained lump sum factors that used dynamic mortality in the projection assumptions. If the underlying valuation lump sum factor calculated mortality at the valuation date, the mortality for experience was calculated at the valuation date instead of at the decrement date.
- 05/07/10 Round end of year additional contribution up to the next amount if the target liability is the PPA Not at Risk or PPA At Risk liability.
- 04/26/10 Corrected gain/loss status reconciliation when multiple end of period valuations are specified with non-participating records. Previously, the "Remove non-participating statuses, end of year" line only reflected the last end of period valuation, potentially leading to a flawed bottom line number of "Participants, end of year."
- 04/20/10 Under PPA, round all funding percentages down per the Schedule SB instructions. Also, changed rounding of the credit balances waiver amounts up to the next amount (e.g., \$1) so that the actual funded ratios are greater than or equal to the target ratios before rounding.
- 03/23/10 Fixed rare problem in n-year (where n is greater than 1) gain/loss identifying those attaining 100% retirement age during the n-year period but before the end of the period. Previously, in such rare instances, their entire gain/loss was not getting allocated to retirement.



03/22/10	Fixed problem whereby the Solvency liability for a termination benefit containing a table-type benefit formula component with increase rates when the advanced parameters were freezing service (but not age) for vested liabilities was incorrectly coming out zero.
03/12/10	Fixed calculation of the highest 3 year average salary limitation used in the 415 limitation so that each salary used in the average is limited by the 401(a)(17) limit.
03/12/10	Fixed bug causing spouse ages for inactives to be determined by valuation assumptions rather than by data when the inactive record included a benefit with a Joint or REA payment form with the beneficiary determined by data, and another benefit with a Joint or REA payment form with the beneficiary determined by assumptions, and the benefit amount was zero for the latter benefit.
02/16/10	Fixed bug in a core projection with new entrants where payment form parameters varied by table, the table varied by service, and a service field was specified in the payment form parameters for the table lookup. The presence of the new entrants was causing the table lookup to be inaccurate for the ongoing active participants, causing a miscalculation of the liabilities and other results.
02/08/10	Fixed bug in core projections when the percent married assumption differed between valuation assumptions and projection assumptions and was specified by a constant in valuation assumptions, and the Plan Definition included a joint & survivor or REA payment form with beneficiary determined at commencement (at death in the case of REA).
01/13/10	Fixed Canadian Solvency Liability for emerging inactive participants in a core projection. Previously, emerging inactives could have an annuity purchase liability even if they weren't eligible for any benefits that should be valued using annuity purchase assumptions. This resulted in an annuity purchase liability that was too high and a transfer value liability that was too low. The effect on the total solvency liability depends on the relative value of annuity purchase vs. transfer value.
01/12/10	Changed rounding of asset corridor to round up to the next higher dollar for the lower percentage and to round down to the next lower dollar for the higher percentage.
01/05/10	Fixed service proration for unit credit when mid year decrements are used if linear proration is selected for unit credit and accrual rate proration is selected for projected unit credit.
12/09/09	In ProVal PS Disclosure & Budgeting, fixed expected return on assets in year 2 if there are quarterlies due in year 2. Also, corrected cash flow and return on assets in year 2 if there are quarterlies due in year 2 and credit balance created from year 1 contributions.
12/09/09	When opening Disclosure & Budgeting in ProVal PS if fixed income assets are valued at market, fixed calculation of smoothed assets in year 2. Previously, the fixed income allocation was initially set to zero, but reset properly if a parameter changed.
12/09/09	In ProVal PS Disclosure & Budgeting, fixed effective interest rate if it was recalculated because parameters were changed.
11/25/09	Fixed the effective interest rate for a population of vested valued as active participants only. Previously we were using the PUC at-risk projected benefit payments for these participants. Now we are using PVB at-risk projected benefit payments for them.
11/25/09	Fixed core projection if there is an alternative salary definition without a salary override and the salary merit assumptions differs in the valuation and projection assumptions. Previously, ProVal used the valuation merit assumption for

- experience instead of the projection merit assumption. This was introduced in version 2.30.
- 11/24/09 Fixed gain/loss results if the beginning of year salary assumptions differed from the end of year assumptions. Previously, the beginning of year salary assumptions were used in place of the end of year assumptions. This was introduced with Version 2.30.
- 11/18/09 Changed Social Security Wage Base (SSWB) in the valuation year to be drawn directly from RegWageBase.txt rather than calculated as  $SSWB[VALYEAR] = 60,600 * NAW[VALYEAR-2] / NAW[1992]$ , rounded to nearest \$300. This can change results when an override is entered for  $NAW[VALYEAR-2]$  or  $NAW[1992]$ , but no override is entered for  $SSWB[VALYEAR]$ . Applies to Valuations, Core Projections, and the PIA Calculations tool.
- 10/30/09 Fixed accounting projected benefit payments in a valuation to include emerging inactive projected benefit payments.
- 10/28/09 Corrected the vested, vested PBGC, funding and max tax at risk active liabilities reported for Valuation Sets, Deterministic Forecasts and Stochastic Forecasts (via custom stochastic output variables) when there are Vested Valued as Active participants with an at-risk liability that differs from their not-at-risk liability.
- 10/26/09 Changed calculation of the Solvency liability in a Canadian valuation set or forecast, so that it will include Annuity Purchase liabilities if any of the underlying valuations or cores have annuity purchase liabilities. Previously, ProVal only considered the first referenced valuation or core projection in determining whether to include Annuity Purchase liabilities.
- 10/19/09 Fixed bug whereby accrual rates that varied by service with new rates that changed before the valuation date, zero constant accruals, and a service definition that did not round service, may have resulted in any "new" rates between the "as of" date and the valuation date being ignored.
- 10/19/09 Under PPA, changed the calculation of excess contributions added to the prefunding balance per the final regulations.
- 10/19/09 In Canadian mode, fixed treatment of new ongoing gains so that if there is more than one source of new bases, the new gain is first offset by any new losses.
- 10/19/09 In Canadian mode, when determining the new amortization payment period after applying a gain, do not round the resulting period. Also, fixed potential bug when adjusting ongoing liability bases for an ongoing gain when a solvency deficiency existed.
- 10/19/09 Fixed calculation of emerging inactive projected benefit payments for REA benefits.
- 10/19/09 Fixed calculation of REA benefits in force for Vested Valued as Active participants in Core Projections if Post-Decrement Probabilities are specified and vary by table.
- 10/19/09 Corrected treatment of Canadian solvency payments with less than one year remaining as of the initial valuation date. Previously the payment was correct, but not the present value.
- 10/19/09 In Canadian mode, fixed potential bug in the Ontario Province when the ongoing liability bases are adjusted to reflect solvency gains/losses.
- 10/19/09 Under PPA, fixed the discounting of the additional contribution to the beginning of the plan year. Previously, it was discounting to the last day of the prior plan year.
- 10/19/09 If there is an end of year additional contribution and the valuation date is not equal to the measurement date, we will assume the contribution is made on the last day of the plan year if the liability target is a funding variable and the last day of the fiscal year if the liability target is an accounting variable. In addition, this

contribution will now receive interest as applicable based on the assumed date paid.

- 10/19/09 If there is a contribution schedule with contributions made after the end of the plan year, we now respect the timing of those contributions in the second year. This impacts expected return on assets and present value of employer contribution results. Previously, for forecasting purposes, we assumed these contributions were made before the end of the plan year. Now, we respect the actual timing of the contributions. This also impacts additional contributions when there is a contribution schedule. The additional contribution is assumed made on the date of the final contribution, which is often after the end of the plan year.
- 10/19/09 Fixed bug that double counted any additional contribution in the Present Value of Employer Contributions and Ultimate Cost results if there is a contribution schedule.
- 10/19/09 Fixed roll forward of PPA credit balances if there was an end of year additional contribution.
- 10/19/09 Changed Valuation Assumption Sensitivities for lump sum factors in Core Projections to consistently use a sensitivity fraction of 100% when lump sum interest is determined from the underlying liabilities (and consistently apply the user's sensitivity fraction otherwise). This represents a change in U.S. Qualified mode when the user's sensitivity fraction was other than 100% in the following situations:
- For the "pre-PPA and PPA" law type, when a lump sum factor was coded to use the underlying liability interest rate for "Target, PBGC, and Current liabilities", then the user's Valuation Assumption Sensitivity fraction was applied for the Target and PPA PBGC liabilities, but now a sensitivity fraction of 100% is used.
  - For the "PPA" law type:
    - When a lump sum factor was coded to use the underlying liability interest rate for Target and PBGC Liabilities, then the Valuation Assumption Sensitivity fraction was being applied for the Target and PPA PBGC liabilities, but now a sensitivity fraction of 100% is used instead.
    - When a lump sum factor was coded to explicitly specify the interest rate for Target and PBGC Liabilities and the "use alternative interest rates" for Actuarial Liabilities checkbox was not checked, then a Valuation Assumption Sensitivity fraction of 100% was being applied for the Target and PPA PBGC liabilities, but now the user's fraction is used.
    - When the "use alternative interest rates" for Actuarial Liabilities checkbox was checked and lump sum factor interest rates for the alternative actuarial liability were specified explicitly, then a Valuation Assumption Sensitivity fraction of 100% was being applied for the Actuarial Liability, but now the user's fraction is used.
- 10/19/09 The present value of shortfall amortization bases is now calculated in pieces by base rather than by installment date. This may impact the rounding of the result.
- 10/19/09 Changed experience basis COLAs in a core projection so that the ongoing liability basis is always used even for liabilities such as Solvency that have COLAs which differ from the ongoing basis. Also, we will use the Solvency basis COLAs for Solvency liabilities of emerging inactive in a core projection.

10/19/09	Fixed an incorrect effective interest rate calculation caused by a unit credit accrued benefit that exceeded the entire projected benefit.
10/19/09	Changed ProVal such that an inactive participant whose benefit ceases at the same time that it commences is not excluded from the valuation but, rather, is included but produces a zero liability for that benefit. This allows a user to value other benefits that the participant may have.
10/19/09	Changed ProVal to use projection assumption % married and % electing J&S rather than valuation assumptions in experience lump sum factors.
10/19/09	Changed ProVal to use projection assumption % married rather than valuation assumption in active REA expected benefit payments.
10/19/09	The PPA at-risk liability calculated for participants evaluated using the "Vested valued through active" status code will now be saved in the output, so these inactive participants will potentially generate an at-risk liability that differs from their not-at-risk liability.
10/19/09	When running funding and accounting together, the expected employee contribution used for the expected return on assets in expense will be dependent on the accounting assumptions. Previously this was overridden by a funding expected employee contribution.
10/19/09	In Canadian mode, when applying gains to bases in the order first established, "grandfathered" bases (i.e., bases that could have more than 5 years of amortization payments recognized in solvency assets) may not have been properly written down for the solvency asset calculation. Also in Canadian mode, small rounding differences may occur in the calculation of Net Solvency Assets due to a slight restructuring of this calculation necessary to accommodate other enhancements. Finally, fix a small rounding error that could occur when solvency bases existed and an ongoing gain was created. When the gain was applied and bases were allowed to be written down to 5 years, contribution frequency was not properly accounted for.

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#### ProVal version 2.29

9/22/09	ProVal will now exclude participants missing an inactive benefit COLA cap field
9/16/09	Under PPA, limit the shortfall amortization charge to zero.
8/21/09	Fixed gain/loss analysis when individual results were turned on for gain/loss and additional fields were specified for individual results in the beginning-of-period valuations (regardless of whether individual results were turned on in the valuations) in certain circumstances. If both data corrections and continuing active sources were evaluated and the status field (from census specifications) was listed as an additional field in the beginning-of-period valuation, ProVal was ignoring the "end of period status for cause of decrement" specified in the Non-Participating Statuses topic. The default guess was used instead (i.e., termination or retirement for actives; death for inactives). Similarly, if data corrections were evaluated and the actual benefit payment field (from gain/loss analysis) was listed as an additional field in the beginning-of-period valuation, and continuing active sources were not evaluated (or if evaluated, the end-of-period valuation did not list the actual benefit payment field as an additional field), ProVal pulled the actual benefit payments from the corrected beginning-of-period database, not the end-of-period database.
8/17/09	Fixed stochastic forecast bug if there are inactive COLA plan amendments and negative prior service costs. Previously, the amortization of the negative prior service costs was incorrectly being set to zero.

8/11/09	Corrected service lookups for certain table-type benefit formula components under vested liabilities as well as Canadian solvency liabilities when participants are not eligible for grow-in. Previously, if the table component varied by coded field, referred to tables that vary by service, and the advanced lookup option was set to "freeze service for vested liabilities", any service field/service definition was disregarded and <rounded attained age – rounded hire age> was used instead.
8/05/09	In Canadian mode, fixed Joint & Survivor (J&S) inactive participant annuity factor produced under the transfer value basis when the transfer value basis mortality assumption differed from the annuity purchase mortality assumption. The J&S annuity factor was correctly using the mortality specified for the transfer value basis for the primary annuitant but incorrectly using the mortality specified in the annuity purchase basis for the joint annuitant.
7/07/09	Inactive expected benefit payment individual results now contain a non-zero value for participants with the "vested valued through active" status code.
6/26/09	Fixed the employee contribution offset to the normal cost for actuarial liabilities under PPA law type to use actuarial assumptions for the interest and mortality adjustments.
6/24/09	Pad projected benefit payments for each individual beyond their last payment age with zeros rather than the last value when the last benefit payment is negative.
6/23/09	Fixed a stochastic forecast, ProVal PS forecast, or stochastic trial forecast that had multiple core projections based on different projection assumptions that, when combined, generated combined plan amendments that replaced a single initial benefit more than once with different replacement benefits.
6/17/09	Fixed problem whereby vested liabilities such as the PBGC vested liability or the FAS35 vested liability were incorrectly coming out as zero when increase rates were applied to a benefit formula component which freezes service for vested liabilities.
6/12/09	Changed the employee contribution offset to normal cost in a PPA law type run to use the PPA interest and mortality. Previously, if an actuarial liability was run, the actuarial liability interest and mortality was used.
6/11/09	In ProVal PS, fixed the Net Amount Recognized (or Accrued/Prepaid) amount used for disclosure if the user made contribution changes.
6/09/09	In PPA forecast with a contribution schedule and quarterly contributions due, fixed bug that was applying the Funding Standard Carryover Balance to the minimum required contribution in the valuation year, even if the user elected not to apply it. This impacted the second year Funding Standard Carryover Balance.
6/04/09	Corrected overstatement of projected benefit payments for REA benefits for actives who decremented during the experience period in a core projection.
6/03/09	Fix Canadian mode amortizations. Previously, a rounding error may have caused an ongoing base to be created. Also fix Stochastic Forecasts when increasing ongoing bases due to a reduction in solvency bases. Incorrect amortization periods for each trial may have been adjusted.
5/28/09	In Gain / Loss Analysis tool, assume the beneficiary lives for inactives with a beneficiary at the beginning of the period (i.e., status of "retired", "vested", "disabled", or "survivor" and a Joint Life or REA payment form) and a status of "Vested valued through active" at the end of the period. Previously, ProVal assumed the beneficiary died in this situation. (ProVal doesn't actually know if the beneficiary lived or died, but seems more intuitive if we assume the beneficiary lived.) This affects the calculation of the inactive mortality gain/(loss) for survivor beneficiaries and unreconciled gain/(loss) for continuing inactives from "... to Vested" status.

5/28/09	In Gain / Loss Analysis tool's status reconciliation, split participants with status change of "Active" to "Vested Valued through Active" between "Active to Vested" and "Active to Vested (but ret. elig.)" categories. Previously, they were always assigned to the "Active to Vested" category.
5/27/09	In OPEB mode, if in the inactive census specifications topic the fraction covered is specified by a coded field, apply data defaults to any participants with a missing value for that coded field. Previously, they were assumed to be not covered.
5/21/09	Made various Canadian mode amortization fixes with respect to negative bases.
5/12/09	Correct inactive overrides when status codes are inconsistent. Previously, if inactive participant liabilities were overridden and one or more status codes in the baseline set of liabilities were not included in the override set of liabilities, only the liabilities for annuities in pay status were zero'd out in the original liabilities, so the final liabilities after the override would include values for annuities, lump sums and insurances not currently in pay status for the original status code. This was particularly noticeable if one tried to do an override that changed the treatment of vested terminated participants from the "vested" status code to the "vested valued through active" status code.
5/12/09	Correct Gain/Loss Analysis involving participants with a "vested valued through active" status. Previously, those with "vested valued through active" status at the beginning of the period and a change in status during the period had a spurious gain in the retirement decrement and a corresponding spurious loss in unreconciled for "vested to...". Also, those with a "vested valued through active" status at the end of the period had results that were categorized as though active at the end of the period and faulty status reconciliation changes.
5/11/09	Fix Gain/Loss Analysis for inactive participants with a pre-commencement mortality rate applied to one benefit (e.g., deferred to 62) and a post-commencement mortality rate applied to another benefit (e.g., temporary to 62). Previously, the difference between projecting the liabilities to the end of the period using the post-commencement rate vs. using the respective rates created a spurious gain/loss amount that appeared under "data corrections" or "retirement" gain/loss. In addition, individual gain/loss results were inconsistent with the summary results.
5/06/09	Fix valuation benefits inforce output for the "vested valued through active" status when there are post-decrement probabilities. Previously the "in receipt" inforce was adjusted for post-decrement probabilities, including the percent married for death benefits, but the total and, by extension, deferred inforce was not.
5/06/09	In a post 2008 PPA Valuation Set with a contribution schedule, when calculating the credit balance available for use to satisfy quarterly contributions, only adjust the prefunding balance for prior year contributions.
5/05/09	In Gain/Loss Analysis, don't limit "experience" increase rates during the period to 0 if the increase rates in Valuation Assumptions were less than 0.
4/29/09	Fix Canadian mode amortizations. Previously, when checking if in both ongoing surplus and solvency surplus, the solvency assets included the present value of special payments.
4/27/09	Fixed COLA overrides if there were duplicate inactive benefit IDs in the census specification. Duplicate inactive benefit IDs could be created by saving an inactive benefit as new in Version 2.29.
4/27/09	Fix core projection output for the "vested valued through active" status code when there are plan amendments. Previously the liabilities included values for both the pre- and post-amendment benefits. Now the correct liabilities are output, but a warning is issued because ProVal will value the change as a gain/loss rather than a plan amendment during a forecast.

4/27/09	Fix Canadian mode Stochastic Forecasts when the option to apply gains to bases in the order first scheduled was selected. Previously, trials with a solvency deficiency but an ongoing gain may have had ongoing amortization payments eliminated instead of maintaining them for at least 5 years. Also, after solvency bases were eliminated and additional ongoing surplus was used to write down ongoing bases, the Solvency Assets may previously have been adjusted for trials which had no change in ongoing bases.
4/20/09	In Gain/Loss Analysis, fix spurious "system changes" gain/loss that occurred when 1 or more lump sum components were based on a dynamic mortality table in effect as of decrement date (as opposed to valuation date). A mostly offsetting spurious amount also appeared under the "Unreconciled amounts - continuing actives" source. Small spurious amounts might also be seen in the sources "Data corrections", "Active Decrements", "Unreconciled amounts - decrementing actives", and "Benefit payments".
4/16/09	Under IAS 19, fixed the calculation of the effect of asset ceiling when there is a plan amendment. Also, no longer recognize prior service cost and gains and losses of opposite signs when there is no paragraph 58A recognition.
4/09/09	In Canadian Mode, when the Asset & Funding Policy contains no going concern bases and at least one solvency base, and a solvency gain is created that triggers a new going concern base, ProVal now adds the going concern base in such a way as to not change the value of the Solvency Assets. Specifically, a 30 year base is created as before, but with an offsetting 5 year negative base of the same payment amount.
4/01/09	Fix deterministic and stochastic forecasts where the underlying core projection(s) contain plan amendments in which the replacement benefits contain lump sum factors but the initial benefits do not. In this case, the deterministic or stochastic forecast results were invariant with changes in the lump sum benchmark yield (i.e., only the baseline lump sum experience assumption was reflected).
3/26/09	Under PPA, fixed the AFTAP for well funded plans where the AFTAP is calculated without reducing the assets for the credit balances. Previously, ProVal did not add the annuity purchases into the numerator and denominator.
3/25/09	Fixed calculation of the Canadian Solvency liability for an active benefit definition whose formula references #MAXBEN (the U.S. 415 benefit limit). ProVal was using 0 for the component value.
3/20/09	Fixed calculation of core projection projected benefit payments that previously included amounts for original plan amendment benefits in addition to the replacement benefits. This could potentially impact the PPA effective interest rates in projection years after the initial valuation year.
3/18/09	In Canadian mode, age and service table lookups for the solvency liability calculation will now mimic pure unit credit liabilities when a participant is eligible for grow-in and vested liabilities otherwise. This could change results if table type benefit formula components selected "freeze age & service for pure unit credit & vested liabilities" under the Advanced button and no grow-in applies, or "no exceptions" was selected under the Advanced button and either grow-in does not apply or grow-in applies but some participants are not eligible for grow-in.
03/16/09	Fixed problem if more than one inactive benefit in a census specification was created since ProVal 2.29 and at least one was referenced as a COLA benefit override in valuation assumptions.
02/11/09	Fixed 2+ year Gain/Loss Analysis for continuing actives who were assumed to reach 100% assumed retirement age after the beginning of the period but before the end of the period. Previously, if continuing active sources were analyzed, a

- spurious loss appeared under "unreconciled" for these participants, offset by a gain in the first source under "salary growth & regulatory increases".
- 02/11/09 Changed PPA funding calculations to limit the adjusted assets in the shortfall amortization calculation to 0, disallowing negative values.
- 02/11/09 Changed rounding of Prior Service Cost amortizations in accounting calculations.
- 02/11/09 In Canadian Mode, fixed CICA expense in a forecast if there is a change in valuation allowance in the prior year. The unrecognized gain/loss did not reflect this change so the amortization of gain/loss in expense was not correct.
- 02/11/09 Fixed the Average Entry Age Normal results for the last cohort of new entrants for sensitivities other than baseline (in SERP mode when the average entry age normal method is being used) to use the NC% applicable to the sensitivity being valued rather than the baseline sensitivity NC%.
- 02/11/09 Apply interest rate sensitivities to the time 0 interest rate when a duration-based interest rate assumption is employed in a core projection that has high and/or low interest rate sensitivities being calculated. When spot interest rates are specified, as in the case of PPA liabilities, this only impacts the payment frequency adjustment in the year beginning at duration 0 and generally will have a minimal impact on results.
- 02/11/09 In Gain/Loss Analysis, when projecting liabilities from the beginning of the period to the end of the period, don't reflect implied assumption changes in the form of "Decrements: Dynamic mortality", "Lump Sum Interest & Mortality: Dynamic mortality", or "Lump Sum Interest & Mortality: Spot rates that vary by duration from valuation date". With this fix, the change in liability due to the implied assumption change will appear under "unreconciled". Exceptions: 1. the entire assumption change will be allocated to "Active Decrements: Retirement" for continuing actives who attained 100% retirement age before the end of the period and 2. a small portion of the assumption change will be allocated to "Salary growth & regulatory increases" for other continuing actives. Previously, this amount appeared as a spurious amount under Active Decrements and Inactive Mortality, primarily in the "Active Decrement: Retirement" category.
- 02/11/09 Under PPA, if the target liability is zero, ProVal will now use the target normal cost projected benefit payments to calculate the effective interest rate. If the target liability and target normal cost are both zero, ProVal will set the effective interest rate to zero.
- 02/11/09 In OPEB Mode, use the total (initial + emerging inactives) inactive life expectancy if life expectancy is used for accounting amortization in a forecast. Previously, the initial inactive life expectancy was used.
- 02/11/09 The methodology for calculating average age for initial and emerging inactives has been changed to be based on decimal age rather than integral age at the valuation date, consistent with the methodology that was always used to calculate the active average age.
- 02/11/09 In a forecast with the IAS 19 accounting methodology, the expense now includes the paragraph 58A recognition.
- 02/11/09 The IAS 19 asset ceiling (previously named Maximum Balance Sheet Asset) calculation no longer limits the unrecognized prior service cost to positive amounts.
- 02/11/09 In a forecast with the IAS 19 accounting methodology and a new prior service cost, fixed the final amortization payment if rounding is turned on.
- 02/11/09 Fix gain/loss for inactive participants who are at or reach 100% assumed death (e.g., age 120) before the end of the period. Previously, the expected benefit payments with interest for these participants was assumed to be zero, creating a



	spurious gain/loss amount that appeared under "data corrections" or "retirement" gain/loss.
02/11/09	Fix 2+ year gain/loss for participants who are not included in active liabilities at the beginning of the period, but become eligible to include in active liabilities by the end of the period, or become eligible for benefits during the period. These participants will now be treated as active at the beginning of the period so that any emerging liabilities and benefit payments will be reflected.
02/11/09	Changed active participant benefit formula component table look-ups for the Solvency Liability calculation such that, while age may continue to grow until decrement as before, service is now frozen on the valuation date unless full age and service grow-in applies, in which case service, for purposes of table look-ups, is projected to decrement for participants who are eligible for grow-in on the valuation date. Previously, age and service were always projected to decrement.
02/11/09	The benefit used for purposes of determining COLA caps will now be the Solvency benefits when determining COLAs for the Solvency liabilities and the Ongoing benefit when determining COLAs for the Ongoing liabilities. Previously, the ongoing benefit was always used.
02/11/09	Fixed the calculation of the employer's final payment date when reflecting a contribution schedule. Previously, valuation dates that were not January 1 may have produced final payment dates that were off by a couple of days.
02/11/09	When specifying that cost of living adjustments cease after reaching a benefit at decrement amount in accordance with a specified formula and middle-of-year decrements are being assumed, ProVal was capping the COLA after the middle-of-year benefit was reached rather than the boy benefit.

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ProVal version 2.28

01/23/09	Fixed calculation of lump sum factors with an underlying annuity type of Joint & Survivor when using mortality that is dynamic by decrement date and the spouse age setback is not zero.
01/07/09	Fixed calculation of changes in unfunded liability by event type in Canadian mode Valuation Sets when there was an initial ongoing liability base that was eliminated by a gain, after which there was a liability loss and then an offsetting liability gain.
12/23/08	<p>Several changes were made to implement the PPA changes under the Worker, Retiree, and Employer Recovery Act of 2008:</p> <ol style="list-style-type: none"> <li>1) The calculation of the funding shortfall now multiplies the applicable percentage by the funding target for purposes of calculating the shortfall amortization base. Also, in a forecast, the transition rule is no longer based on whether or not there was a shortfall amortization base established in prior years.</li> <li>2) In a PPA forecast, the AFTAP for forecast years beginning between 10/1/08 and 9/30/09 will use the prior year AFTAP, if greater, to determine if benefit restrictions apply.</li> <li>3) The at-risk target normal cost has been modified if the normal cost is adjusted for plan expenses or employee contributions and loads apply. Loads are now based on the not-at-risk normal cost before adjustments for expenses or expected employee contributions.</li> </ol>
12/18/08	In U.S. Qualified mode, fixed the calculation of lump sum factors in a PPA core projections if there is a non-zero interest rate sensitivity fraction and the interest rate used is not the underlying interest rate. ProVal now correctly reflects that sensitivity fraction. This bug was introduced with ProVal Version 2.28.
12/15/08	<p>Modified the Canadian maximum tax deductible contribution such that:</p> <ol style="list-style-type: none"> <li>1) The reduction in the normal cost cannot be more than the solvency surplus, and</li> </ol>

- 2) Expenses are reflected in solvency assets for purposes of calculating the unfunded or surplus solvency liability.
- 12/11/08 Modified AFTAP calculation to be equal to the funded ratio if the funded ratio test applies.
- 12/04/08 In a stochastic forecast, under an accounting standard other than IAS19, fixed the prior service cost and expense results if there is a negative plan amendment in one of the trials.
- 12/02/08 Fixed calculation of changes in unfunded liability by event type in Canadian mode Valuation Sets. Previously, if an event causing a gain was followed by an event causing a loss, the calculation of unfunded liability by type (Plan Change, Assumption Change, and Actuarial Gain/loss) may not have been correct.
- 11/19/08 Fixed problem valuing a plan with a benefit definition containing a lump sum factor when the regular formula ended with a lump sum factor benefit formula component name (not followed by a blank) and the EAN alternative benefit formula was checked, not blank and not beginning with a blank.
- 11/11/08 In a PPA or Pre-PPA and PPA core projection with lump sum factors that use the underlying liability interest rates for PPA Target liabilities and valuation interest rate sensitivities are turned on, fixed the lump sum calculation for the low and high sensitivity scenarios. Previously, ProVal always used the baseline interest rate assumption instead of the low and high interest rate assumptions when evaluating the lump sum factors.
- 11/11/08 In a Pre-PPA and PPA valuation or core projection with lump sum factors that use the underlying liability mortality table for PPA Target liabilities and it is a dynamic table, fixed ProVal to always generate the dynamic mortality as of the valuation date. Previously, it used the user selection of valuation date or decrement date in the lump sum factor.
- 11/06/08 Fix issue where faux-dates were being interpreted incorrectly in version 2.28. In particular, 12/31/2006, 12-31-2006, 12\*31\*2006, and 12+31+2006 (all without spaces) were interpreted as dates because the 3 digits could form a valid date. Only the first one with slashes (/) should be. We expect these additional cases to be rare, but it is possible that they could run without error and instead produce bad results. You'll be able to tell if this is the case if you edit your expression and see a / where a +, -, or \* should be.
- 10/22/08 If a 0% valuation interest rate is used and it is necessary to determine a fractional amortization period for an amortization base (as happens often in Canadian mode), calculate a more reasonable result. Previously the amortization period used was always 1.
- 10/15/08 In Canadian mode, corrected situation during a forecast where new negative amortization bases may not have been recognized, causing the net positive new bases to be too high.
- 10/15/08 Fixed potential rounding issue running a forecast under PPA when calculating the prior year funded ratio (with assets reduced by the prefunding balance) to determine if credit balances can be used to offset the minimum required contribution.
- 10/08/08 In Nondiscrimination Accrual Rates, fixed calculation of most valuable accrual rates in certain circumstances. Standard mortality for spouses was being overridden with standard mortality for members if Valuation Assumptions had (1) Applicable Law set to "PPA" and (2) either "Use alternative mortality" was not checked in the Actuarial Liability topic or the "Projected" method was used to calculate accrual rates.

09/29/08	Fixed bug whereby annuities with a certain period were always being calculated with beginning of period payments even when the user specified end of period payments.
09/11/08	Under PPA, subtract any contribution carryover from the assets when calculating the maximum deductible contribution.
09/03/08	<p>Canadian Registered Plan mode solvency amortization fixes:</p> <p>1) If a solvency amortization base has a fractional amortization period, partition the payment between two consecutive integral amortization periods based on the current solvency amortization rate. Previously the payment was partitioned linearly.</p> <p>2) Per Ontario Pension Benefits Act Regulation 909, Section 5(17)(2), when there is a solvency gain and there are existing solvency bases, ProVal now reduces the solvency amortization period but leaves the payments unchanged (unless there is less than one year to go).</p> <p>3) Modify rounding adjustments to improve precision.</p> <p>4) Improve methodology when ongoing liability bases are adjusted upward beyond 15 years to account for a solvency gain.</p>
08/29/08	In a deterministic forecast with a PPA override, ProVal will now override the inactive PPA projected benefit payments in addition to the PPA liabilities.
08/28/08	Fixed bug where a lump sum factor used in the EAN formula of a death benefit that wasn't also used in the regular benefit formula was evaluated as a non-death lump sum factor.
08/28/08	When creating a file to Populate ProVal PS, changed the approach to calculating the expected return for each asset class for the efficient frontier. Previously the geometric average of the simulated nominal returns was always used. Now we will look to the "calculate expected return based on" parameter in the referenced Efficient Frontier to choose either an arithmetic or the default geometric approach.
08/28/08	Fixed bug that the wrong current year interest rate was used during a stochastic forecast for the U.S. Qualified N-Year Average ERISA Asset Valuation Method smoothing the excess return over the expected return when the expected return uses a market-based rate.
08/28/08	Fixed bug where fully eligible headcount and salaries were not displaying for an OPEB valuation with both funding and accounting when the PUC liability method was turned off in the funding assumptions.
08/28/08	Fixed bug in nondiscrimination testing accrual rates if using the annual method, end of year data, and there are career average or cash balance components with projection whose beginning of year accrued benefit references a database field. Previously, ProVal was ignoring the projection when taking the beginning of year database field.
08/28/08	Fixed experience lump sums in a 1 year stochastic forecast that had a first year override for the 30 year Treasury yield. Previously the override was ignored when calculating the experience lump sums.
08/28/08	Fixed exhibits detailing the individual aggregate cost method under a PPA law type. Previously, \$0 was shown as the allocated assets and the individuals' normal cost. Also eliminated the detail of the normal cost under a minimum and maximum basis as the concept of individual aggregate normal cost does not exist under PPA law.
08/28/08	Correct treatment of solvency amortization bases during a stochastic forecast for trials that have an initial solvency surplus, an ongoing liability surplus, existing ongoing liability bases and existing solvency amortization bases, but the solvency surplus can be reduced to exactly 0 by a reduction in the ongoing liability bases.

When there were other trials not in this situation, the solvency amortization bases for these trials may have been inappropriately eliminated during a stochastic forecast.

- 08/28/08 Correct incremental COLAs for emerging inactive during a stochastic forecast when there is a first year COLA override. Previously the COLA override was ignored for emerging inactive.
- 08/28/08 Correct Canadian mode amortization under the Normal Cost + Supplement Cost contribution policy when a non-zero amortization increase rate was specified, but no increase rate was used for the minimum contribution amortization basis.
- 08/28/08 In a PPA forecast, if there is a contribution schedule reflected, a discounted contribution receivable inputted on the Initial Asset Values screen in Version 2.27 and the forecast parameter to reflect contribution timing to calculate interest on funding assets is selected, if the inputted value of the discounted contribution receivable in Version 2.27 does not match the value of the contributions receivable from the contribution schedule discounted at the newly provided prior year effective interest rate, the return on assets will change.
- 08/28/08 Fixed emerging inactive liabilities in OPEB core projections for salary-related benefits (i.e., those utilizing #FAS, #SALARY, etc.). If current salary was "<imputed from prior year>" for at least one salary definition (or, alternatively, Soc. Sec. PIA was used in the plan's benefits), then the emerging inactive liabilities for valuation years beyond 100% retirement age (experience basis) were inflated by salary scale for each year from 100% retirement age to the valuation year, up to age 70. Participants with 100% retirement age at or beyond age 70 were not affected.
- 08/28/08 With respect to increase rates with a stop-age feature in OPEB mode, ProVal was changed to:
- Properly reflect a specified stop age in an increase rate table in projection assumptions when such stop age was prior to the future valuation date for a participant in a core projection and prior to the valuation assumptions stop age.
  - Properly reflect a stop age in an increase rate table in a valuation run for actives over the stop age as of the valuation date. The increases were reflected in accordance with  $(1 + \text{trend})^{\text{(stop age - age at valdate)}}$ , but (stop age - age at valdate) should not have been permitted to go below 0.
  - For new entrants in a core projection, to apply the valuation assumption stop age to participant ages prior to the initial valuation date and to apply no stop age assumption for the period from the initial valuation date to the entry date.
- 08/28/08 For a period, ProVal was inadvertently accepting a fully generational mortality table for lump sum factor experience mortality in projection assumptions even though it was not supported. Now that it is supported, any old core projections that utilized such an assumption, were they to be rerun, would produce results with the actual benefit payments and the projected benefit display for emerging inactive changed to the correct values.
- 08/28/08 Fixed individual results earliest retirement age so that it is never less than the participant's (rounded) attained age. (Important for new 4010 workaround.)
- 08/28/08 In U.S. Qualified mode, the PPA target and PPA PBGC liabilities are now included as "specialized liabilities" for lump sum factor interest and mortality under the "pre-PPA and PPA" law type. Therefore, if substitution of the underlying liability interest rate and/or mortality for the lump sum factor interest rate and/or mortality for certain specialized liabilities was selected by the user in "pre-PPA and PPA" funding valuation assumptions in an earlier version of ProVal, re-running in version 2.28 or later will result in this substitution applying to all PPA

liabilities in addition to RPA current liabilities and pre-PPA PBGC liabilities to which it previously applied.

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08/15/08	Fixed bug in the 2 #CANMAX operator that pre-reform service was increasing after the reform date. This bug was introduced with ProVal version 2.27
08/14/08	<p>Fixed calculation of expected return on assets and total expense in two situations.</p> <p>1) If there were no funding results and an actuarial cost method was selected in the Asset &amp; Funding Policy, the expected return on assets &amp; total expense were not calculated and would be displayed as blanks.</p> <p>2) If PPA law type was selected, no actuarial cost method was selected, and there were employee contributions, the expected employee contributions were set to \$0 for purposes of determining the expected return on assets. ProVal now reflects the expected employee contributions in the expected return on assets calculation.</p>
08/11/08	In a PPA forecast, changed the number of participants used in determining if the plan is at-risk. Previously, we checked against the number of participants in all DB plans maintained by employer input on the prior year values screen of the Asset & Funding Policy. Now, we will check against the greater of that number or the number of employees in the prior year valuation.
08/08/08	Fixed PPA penalty interest calculation. Previously, ProVal was discounting the contribution from the date made to the beginning of the plan year at the effective interest rate. Then subtracting a 5% interest penalty on the contribution from the date made to the date due. Now ProVal will discount from the date paid to the date due at the effective interest rate + 5% and then discount at the effective interest rate from the date due to the beginning of the plan year.
06/25/08	Corrected projected benefits being exported to Access in a valuation set with a funding only valuation, an accounting only valuation, and events with benefits which were not in the original valuations. Small amounts were being added to the benefit payments.
06/09/08	<p>Fixed penalty interest calculations:</p> <p>a) Previously penalty interest was not calculated for contributions made 1 day after the schedule date if a quarterly contribution is due on the schedule date.</p> <p>b) If PPA, no longer double count interest at the effective rate during the penalty period.</p> <p>c) If PPA, fixed the treatment of penalty interest on prior year contributions that create a credit balance. If there are additional cash contributions, the penalty interest is an additional discount to these cash contributions. If not, the penalty interest is added into the minimum required contribution. This treatment is per a conversation with Carolyn Zimmerman of the IRS on 06/06/08.</p>
06/04/08	Fixed incorrect calculation of J&S annuities in Administration Factors when using generationally projected mortality.
06/04/08	Fixed the expected return on assets calculation for all available accounting standards to reflect any employee contributions.
06/03/08	Fixed Normal Cost displayed in output if PPA, an aggregate cost method, and contribution policy is minimum or maximum.
06/02/08	<p>Fixed PPA quarterly contribution calculations:</p> <p>a) In general, removed penalty interest from the minimum required contribution calculation (see penalty interest entry on 06/09/08 above).</p>

	<p>b) No longer apply interest on cash contributions from the date paid to the date due to determine if quarterly contributions have been satisfied.</p> <p>c) Reduce the Carryover Balance by the amount used to pay quarterly contributions regardless of whether cash contributions made at a later date are sufficient to fund the minimum contribution.</p>
05/26/08	In calculating the number of participants decrementing from active service for purposes of determining PPA projected benefit payments used to determine the effective interest rate, experience decrement rates were being used on and before each future valuation date and valuation decrement rates were being used subsequent to each future valuation date. This caused the effective interest rate to not converge in a case which had dramatically different experience and valuation decrement assumptions. The projected benefit payment calculation has now been modified to reflect experience assumptions prior to each future valuation date and valuation assumptions thereafter.
05/19/08	If PPA and there is an end of year additional contributions, fixed rounding of contribution.
04/24/08	Fixed n-year Gain/Loss Analysis issue whereby post-decrement probabilities (and in the case of the death benefits, percent married) were not applied to the expected liability for actives who decremented during the period. This introduced a spurious loss due to decrements, offset by an equal unreconciled gain for decrementing actives. 1-year Gain/Loss Analysis runs were not affected.
04/22/08	In a PPA Valuation set that reflects a contribution schedule, changed the date of the calculated final contribution to be the later of 8.5 months after end of plan year, 1 day after the schedule date or 1 day after the last contribution date in the schedule.
04/17/08	For a PPA forecast when there is a contribution receivable and a contribution schedule and the user chooses to use contribution timing to calculate interest on the receivable for the first year funding investment return, use the contribution schedule, rather than the total accounting contribution receivable, to determine the undiscounted funding contribution receivable.
04/17/08	Under PPA law, changed the quarterly contribution calculation to apply interest at the effective rate from the date the payment is made (or credit balance) to the date the quarterly is due per 4/11/2008 proposed regulations.
04/17/08	For a PPA forecast, no longer assume benefit restrictions apply if the funded ratio exactly equals the target liability benefit percentage for purposes of waiving credit balances.
04/17/08	Under PPA law, changed the effective interest rate calculation to only be based on the not-at-risk liability per the 12/28/2007 proposed regulations.
04/17/08	Under PPA law, fixed the effective interest rate calculation in a valuation set, deterministic or stochastic forecast when the PPA Target Liabilities are overridden.
04/11/08	<p>Fixed items under Canadian Registered mode when the selected Provincial Law is Manitoba:</p> <p>a) Updated the gain/loss amortization period to be 15 years instead of 5 years.</p> <p>b) Fully incorporated the concept of a solvency valuation.</p>
03/26/08	Under PPA law, no longer assume benefit restrictions apply if the funded ratio exactly equals the target liability benefit percentage for purposes of waiving credit balances.
03/11/08	Fixed calculations with spot interest rates when using Calculate Annuity Factors to generate values for a Benefit Component Table.

03/10/08	In Canadian Registered mode, corrected the calculation of plan changes and assumption changes. Previously, the output showed the correct plan and assumption changes but these amounts were double counted as they were also included in the gain/loss item. Additionally, in exhibits and internal amortization calculations, \$0 was reflected for plan changes and active assumption changes. The plan and active assumption changes were actually getting amortized as part of the gain/loss.
03/07/08	In OPEB mode, fixed bug amortizing a prior service cost declining over life expectancy. The future working lifetime was being used instead.
02/29/08	Modified the assets used in the PBGC Premium calculation under PPA to include discounted contributions receivable per proposed regulations.
02/29/08	Improved interpolation of effective interest rates and PPA funding interest rates in a forecast by using non-logarithmic instead of logarithmic interpolation for these values, which is more accurate for interpolating non-liabilities.
02/26/08	The valuation assumption options for "PUC=UC for cashbal and career avg" and "PUC benefits>=UC benefits" were being ignored for PPA max tax liability unless PUC actuarial liability method was turned on.
02/23/08	Changed ProVal so that unit credit 415 limits are used for PPA calculations even when unit credit method is turned off in Valuation Assumptions.
02/20/08	Fixed cash balance component UC attribution if crediting is not annual. Previously, the UC value was increased each year assuming annual crediting. Note that this could also affect PUC values if either of the following valuation assumption options are turned on: "benefits with expected increases (PUC) always greater than without (UC)" or "PUC equal to UC for cash balance and career average components".
02/20/08	Fixed calculation of inactive life expectancy in OPEB mode for temporary annuities. The prior calculation did not include the life expectancy associated with the probability that the participant would survive the entire temporary period.
02/05/08	Fix various amortization-related calculations in Canadian Registered mode: <ul style="list-style-type: none"> <li>a) Correct payment when there is an actuarial gain and a solvency unfunded and user elected to adjust post-5 year payments.</li> <li>b) Correct amortization period after adjusting the outstanding balance for a change in the solvency unfunded when user elected to reflect scheduled solvency payments in going concern unfunded calculations.</li> <li>c) Correct calculated increase in ongoing bases when a solvency base was pro-rated down.</li> <li>d) When increasing ongoing liability bases for solvency bases that have been reduced, negative bases are no longer considered, but bases with exactly 5 years to go are considered.</li> <li>e) Adjusting existing ongoing liability amortization payments for an experience gain during a forecast when solvency bases exist now properly reflects any grandfather solvency period.</li> <li>f) Ignore any existing ongoing liability amortization amounts with a remaining period less than or equal to the solvency amortization period when there is a new solvency payment and the user chooses to adjust post-5 year payments.</li> <li>g) If solvency bases are reduced and there are no adjustable ongoing liability bases, put the new unfunded at 30 years. Previously a 15 year period was sometimes used.</li> </ul>
02/04/08	If an accounting roll forward benefit payment amount is present in the Asset & Funding Policy, the amount is now also used to roll forward ABO and VBO.

	When version 2.27 was released, the accounting roll forwards were changed so that any override would only apply to EBO and PBO.
01/29/08	Fixed bug in OPEB mode in which ProVal sometimes applied the wrong post-decrement member mortality to active spouse benefits. To hit the bug, the Plan Definition must include active benefits for more than one contingency (e.g., retirement and disability). In addition, the Valuation Assumptions must specify different post-decrement mortality for these contingencies (e.g., different mortality for retirees and disableds) and the claims timing must either be beginning of year or not include a mortality adjustment. In this case, one contingency will have correct results for spouse benefits (e.g., retirement). For other contingencies (e.g., disability), active spouse benefits utilizing the payment form "Joint Life Annuity to Spouse" or "Reversionary Annuity to Spouse" will reflect post-decrement member mortality from the wrong contingency (e.g., from retirement).
01/25/08	Per proposed regulations 1.430(f)-1(h)(5), do not subtract the credit balance when determining whether the plan sponsor is eligible to reduce the minimum required contribution by any credit balance for the first year after transition to PPA during a forecast. This bug was added on 1/9/08.
01/25/08	Fix Solvency calculation in Canadian mode to correctly switch to post-commencement mortality after commencement when calculating post-decrement mortality.
01/17/08	Fixed OPEB mode roll forward bug introduced with version 2.27. For plans with participant contributions, accounting roll forwards for active participants may not been correct.
01/09/08	If an accounting roll forward benefit payment override is used, and the ABO is equal to the PBO at the valuation date, the ABO will now be set equal to the PBO at the measurement date.
01/09/08	Per proposed regulations to IRC section 430, changed prior year FTAP and related calculations for the initial PPA valuation year during a pre-PPA and PPA forecast.
01/09/08	Correctly determine the end of a temporary or certain period when such period is defined by table in a payment form that's also deferred by table. Previously, ProVal was adding the deferral period to the certain or temporary period.
01/09/08	When multiple benefits with certain periods were present, some of which were defined by table and some not, when those defined by table were not created last, and when the certain periods were different between the different benefits, then the certain periods for one certain benefit may have been applied to a different certain benefit.
01/09/08	Fixed PPA waive credit balance bug. Previously, for 2008 plan years, even if the user did not check the "eligible for waive balances transition rule" option, ProVal was using 92%, rather than 100%, as the transition percentage funded ratio to determine whether or not benefit restrictions were required and credit balances should be waived.
01/03/08	Changed calculation of liability returns in an excess efficient frontier to reflect employee contributions.
01/03/08	415 limits were not getting applied to PPA max tax liabilities unless the PUC actuarial liability was also getting calculated.
12/25/07	Fixed calculation of REA expected benefit payments for decrementing actives when multiple REA benefits were present.
12/14/07	In OPEB mode, records with a missing spouse coverage field will be excluded, potentially changing the results, when inactive spouse medical coverage is being



valued and a fraction covered default assumption is not provided in the census specifications. Previously, it would value member coverage only.

- 12/14/07 Fixed unfunded liability used for the normal cost calculation during a forecast for funding calculations under an aggregate method (e.g., FIL) where the unfunded liability is amortized on an "open" basis to a fixed year.
- 12/14/07 Fixed calculation of plan change bases when using the Deterministic Assumptions "Additional Plan Amendments - Benefits Increase for Actives" or the Stochastic Assumptions "Active Plan Amendments". (These assumptions increase all active liabilities and normal costs by a specified percentage.)  
Previously:  
1. Plan changes bases were calculated incorrectly when such amendments occurred in more than one year. The plan change base after the first amendment was calculated using an arithmetic formula when a geometric one was required.  
2. When an assumption change also occurred and the plan change is valued first, the funding plan change calculation was using the assumptions at the original valuation date instead of those in the immediately preceding year's valuation.
- 12/14/07 Fixed minimum contribution calculations for the Quebec Province under the Canadian Registered Plans mode when there is a solvency deficiency. Previously the ongoing and solvency amortizations were considered required payments, but not the normal cost. Note that this change was made for Ontario in 2/06 and we are not currently certain whether the other provinces (excluding Alberta) are being calculated correctly on this issue.
- 12/14/07 For Canadian mode Valuation Sets with a current year actuarial loss and a subsequent negative plan or assumption change event that is less than the absolute value of the loss, the negative event is no longer double-counted in the current year amortization.
- 12/14/07 Contribution-related output will now be calculated (rather than blank) in public, SERP and OPEB mode stochastic forecasts using a flat % of payroll contribution policy with no specified actuarial cost method and no accounting liabilities.
- 12/14/07 For Canadian funding runs, put the Solvency liability and normal cost on a consistent basis to facilitate roll forwards. The optimal age for both liabilities and normal costs will be the decrement age at which the liability is greatest, but if the liability is virtually the same at multiple decrement ages, the decrement age at which the normal cost is greatest will be used as the tie-breaker.
- 12/14/07 Changed ProVal to allow for a projected headcount and one beginning of year payment for each future valuation in a core projection in the case of an inactive OPEB participant who is older than the 100% mortality age on a valuation basis but not (in core projections) on an experience basis. I.e. the participant is always assumed to die immediately, but doesn't. Previously, a beginning of year payment was granted for the initial valuation year but not for subsequent valuation years. A reversionary annuity for two participants who are beyond the 100% mortality age will still produce a zero net benefit, but will now produce a beginning of year headcount. Previously no headcount was produced because ProVal interpreted the absence of any future benefit as being beyond a temporary period. The chance of this affecting a real life case is negligible.
- 12/14/07 Fixed the calculation of experience benefit payments containing lump sum factors that vary by duration from decrement date when middle of year decrements are assumed for experience purposes. To get the middle of year benefit amount, we average two benefit amounts: one assuming decrement at the beginning of the year and one assuming decrement at the end of the year. The end-of-year

- benefit amount was being calculated with interest rates variable as of the beginning of the year rather than as of the end of the year.
- 12/14/07 Enhanced Gain/Loss Analysis tool to run over n-year intervals, where n is an integer greater than 1. While you could previously run an n-year gain/loss, it reconciled a 1-year projection of liabilities with the end-of-period liabilities, yielding questionable results.
- The gain/loss for continuing actives has changed slightly for (a) contributory plans utilizing a spread-gain cost method and (b) plans which term cost benefits. Previously, this generated a small (spurious) gain/loss which was categorized as "unreconciled". It is now categorized among the various active decrements.
- Corrected calculation of unanticipated liability gain/(loss) when term costing benefits and using an immediate-gain method (shown only for 1-year period). The term cost is now added to the liability gain/(loss) (rather than subtracted) and includes interest to the end of the year.
- 12/14/07 Fixed REA liabilities that were slightly off in the highly unusual case where experience mortality was 1 at young ages.
- 12/14/07 The methodology for calculating the liability return for an excess liability return efficient frontier has been changed such that administrative expenses, term cost and PBGC premiums are always excluded from the normal cost.
- 12/14/07 Several bugs relative to accounting liability roll-forwards (when the measurement date is later than the valuation date) have been fixed:
- a) The allocation between active and inactive accounting liabilities has changed slightly. Previously the expected benefit payments for inactive benefits not yet in pay status were not considered, causing the active liabilities by benefit to not add up to the total liability.
  - b) Fixed OPEB benefit payment override during a deterministic or stochastic forecast when there are no initial inactive participants. Previously a spurious "zero benefit payments were overridden" message was issued and only the gross benefits (not the participant contributions) were adjusted. Thus, the benefit payments used for the roll-forward may have been lower than the desired override, producing higher than appropriate liabilities.
  - c) Fixed the ABO and VBO roll forward when there is a benefit payment override. Previously the active ABO and VBO by benefit did not add up to the total.
  - d) The ABO and VBO are now rolled forward based on the ABO expected benefit payments rather than the PBO expected benefit payments. However, note that ProVal only stores a single value for inactive expected benefit payments, so when there is a rollforward override, the ABO and VBO rollforwards will reflect the inactive portion of the overridden PBO expected benefit payments.
  - e) Corrected the rounding on rolled forward active liabilities by benefit (ABO, VBO, PBO, EBO, APBO, EPBO) so they add up to the appropriate total. (Active liabilities are defined as the total liability minus the nonactive liability.)
  - f) Corrected rounding on +1%/-1% active OPEB liabilities, when there's a rollforward, so the active and inactive liabilities add up to the total.
  - g) Fixed bug when overriding \$0 expected benefit payments during a forecast that includes a plan amendment. The plan amendment benefit was included in the spreading of the override, and then zero'd out, so the override actually used was too small. This change affects accounting and current liability overrides.

07/27/07	Fixed opening Funding Standard Carryover Balance in a pre-PPA and PPA forecast if there is an additional end of year contribution in the year before transition. Previously, this contribution was not included in the Funding Standard Carryover Balance.
07/16/07	Refined the calculation of the PPA effective interest rate to increase speed and the likelihood of convergence.
07/11/07	Adjusted calculation of projected benefit payments in a core projection with plan amendments.
07/09/07	Fixed bugs running a Valuation Set that includes a current liability mortality change event. First, fixed bug whereby the current liability from the current liability mortality change event was used as the final current liability regardless of subsequent events. Second, fixed bug whereby some overrides may have been ignored if the Valuation Set contained a current liability mortality change event.
06/22/07	Revised the calculation of the PPA prefunding balance. Excess contributions will now receive interest at the effective rate instead of at the investment return.
06/14/07	In OPEB mode, fixed the calculation of a plan change base and amortization under IAS 19.
05/29/07	Fixed bug in Nondiscrimination Tests > Accrual Rates which caused the individual results variable zCVCP (Covered Compensation) to be calculated in the year prior to the plan year being tested, rather than on the first day of the plan year being tested. This affected the General and Coverage Test if the test was done on a Benefits basis. The bug was introduced with the initial release of ProVal 2.26.
05/23/07	Fixed bug running a valuation set with multiple events that include a current liability mortality change event when the current liability mortality change event was not the last event.
05/23/07	In a Pre-PPA and PPA forecast, always allow a plan with less than 100 participants in the prior plan year to be eligible for the transition rule to determine the exemption from the shortfall amortization base. Previously, this exemption was only based on the current liability funded ratio for the previous three years.
05/17/07	Fixed potential bug that occurred when a mortality table that was projected to a fixed year was changed by using the Options button. Incorrect projected rates could potentially be saved, though correct rates were shown on the screen. This bug only occurred when the last change made to the table was the change through the Options button. Any mortality tables with projection to a fixed year will be recalculated when the client is updated.
05/16/07	Fixed gain/loss bug when PVFS/PVFL timing was m.o.y or e.o.y (i.e., not b.o.y.). The bug (a) excluded actives from the b.o.y. headcount in the gain/loss status reconciliation exhibit and (b) erroneously categorized the gain/loss for continuing actives (the expected liability was categorized as an "Active Decrements: Retirement" gain and the actual liability was categorized as a "New entrants" loss).
05/15/07	Fixed bug in the valuation set exhibit "Distribution of Inactive Benefits Inforce" that placed participants in the wrong category between "Retired, Survivor, and Disabled" and "Vested". Occurred (sometimes) when a valuation set added multiple valuations together and some inactive status codes did not appear in all valuations (e.g., the first valuation contained "Vested" and the second valuation contained "Retired" and "Vested").
04/18/07	Reversed 3/21/07 change below to ITA maximum as it applies to the Solvency liability. ProVal will once again project the dollar maximum beyond the valuation date in accordance with the increase rate assumptions.

04/05/07	Corrected active PPA target liabilities in a core projection for benefits with a certain period or a life insurance payment form. These liabilities were too low by $V^n$ , where n is the projection year, starting at 0 (therefore, the valuation year was correct).
04/02/07	Fixed a bug, added with this version 2.26, that scaling factors were not being applied to stochastic forecasts in Public and OPEB modes. (The checkbox was being turned off before the run.)
03/29/07	Applied Solvency liability options grow-in rights, immediate eligibility for termination benefit, and zero pre-election mortality to new entrants in a core projection.
03/23/07	Fixed bug that eliminated post 1995 DRC bases if the current liability funded ratio was > 100%. This should be 90%.
03/21/07	Fixed ITA maximum as it applies to the Solvency liability. Previously ProVal was erroneously projecting the dollar maximum beyond the valuation date.
02/22/07	In a multi-factor capital market simulation, correct the 1-year Treasury Bill return to reflect the "expected term premium of 30-year government bonds over 1-year treasury bills" (the term premium parameter). Previously a 0 term premium parameter was used for this calculation, but the user-specified term premium parameter was used for all other purposes.
02/22/07	In a forecast, fixed the final amortization payment of a new accounting prior service cost. Previously, because of rounding, it was possible that a small portion of the base remained unrecognized.
02/22/07	Under IAS 19 accounting, fixed the prior service cost calculated in a valuation set event if there is an inactive plan change. Previously, if there was a negative plan change, all active and inactive plan changes were incorrectly being combined as active and amortized as an active plan change.
02/22/07	Modified FAS87 accounting negative plan amendment methodology. Negative plan amendments will offset any existing outstanding amortization bases and all payments will be prorated by the change in balance. Previously we did not allow payments to increase because of a negative plan amendment.
02/22/07	Fixed bug in Nondiscrimination Testing Accrual Rates tool when using the Annual method and the plan is integrated with Covered Compensation or PIA. ProVal will now always use the Covered Compensation amount in affect at the beginning of the testing period. Previously, ProVal was using the same value for Covered Compensation at the beginning of the testing period as at the end of the testing period.
02/22/07	In U.S. Qualified mode, if there is a contribution schedule and an additional contribution, adjust the additional contribution to not allow the total contribution to go outside of statutory constraints.
02/22/07	In U.S. Qualified mode, if there is a contribution schedule and the measurement period ended on 1/28 to 1/31, the following year was used to determine if the period was a leap year for discounting contributions. This affected ultimate cost, FASB expected return on assets, and projected assets for funding and accounting.
02/22/07	Corrected active liabilities associated with decrementing at age 100, which were previously too high in the case where the assumptions used age 100 as the 100% retirement age.
02/22/07	Made a slight adjustment in OPEB mode to the way that expected benefits payments are allocated between those who are active at the beginning of the rollforward period and those actives already decremented at the beginning of the

- rollforward period. Though the total liabilities will not change, this may result in a slight shift of liabilities from one sub-category to another within a benefit.
- 02/22/07 Fixed bug in gain/loss analysis in which the beginning of year valuation uses calendar year interest rates. The interest rate used to determine the expected liabilities was using the rate from the calendar year after the correct one.
- 02/22/07 Fixed the early retirement reduction for deferred ITA maximum benefit limits when 100% retirement occurs prior to age 60 (age 55 for public safety plans). In this situation, the early retirement reduction for the age at 100% retirement may have been used rather than the age 60 (or age 55) reduction.

#### ProVal version 2.25

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- 11/15/06 In OPEB mode, fixed table look-up for an age by service or service benefit formula component table when any service other than <date of hire> was used to look-up the table factor.
- 10/26/06 Fixed mortality projection for tables starting at ages later than 15. Previously, if the user entered a mortality table that started at an age later than 15, and selected generational projection with a non-custom scale, the scale values would be assigned to incorrect ages for valuations and core projections. This bug was introduced with Version 2.25.
- 10/26/06 Fixed mortality projection in Experience Studies. Previously, if a table used generational projection with a non-custom scale, the mortality projection was not being applied. This bug was introduced with Version 2.25.
- 10/13/06 In U.S. Qualified mode, if administration expenses are not included in the funding cost but PBGC premiums are and expenses are included in the liability projection for the current liability full funding limit, the calculation included expenses in the asset projection for the current liability full funding limit calculation. This bug was introduced with Version 2.25.
- 08/31/06 Modified our calculation methodology for the PPA '06 Unfunded Current Liability Maximum to make it an end of year calculation, similar to the prior calculations. Previously, this calculation was assumed to be at the beginning of the year. This calculation was introduced with the 8/28/06 patch.
- 08/28/06 The operators #PMTYEAR and #DECYEAR were returning the wrong years for new entrants in a core projection by assuming that all new entrants enter on the valuation date rather than in the future year of assumed entry. Note that the difference, #PMTYEAR-#DECYEAR, was always correct.
- 06/27/06 Fixed the GASB minimum supplemental cost calculation in OPEB mode when the contribution policy is not Normal Cost + Supplemental Cost and the user selected a level percent amortization. ProVal was calculating the minimum supplemental cost using a level dollar amortization.
- 06/27/06 Fixed the GASB supplemental cost calculation when the ARC policy is Normal Cost + Supplemental Cost using funding bases, the contribution policy is not Normal Cost + Supplemental Cost, and funding amortization bases are open. In this case, the ARC was being calculated with a closed amortization.
- 06/27/06 Lifetime maximums were being frozen at the end-of-year value rather than being projected to decrement in a case where the last benefit processed used accrual rate proration.
- 06/27/06 Custom stochastic variable expressions involving the stochastic variable INFL were not being evaluated correctly when part of the expression was directly to the right of INFL without an intervening right parenthesis. For example the expression INFL\*100 would have been a problem, but the expression 100\*INFL or (INFL)\*100 would not have been.

- 06/27/06 Tables values were not being calculated for more than 86 years in the future. This was causing problems (length error or erroneous results for core projections with new entrants where the number of projection years exceeded 86. Note: the erroneous values would only be for new entrants in years 87+.
- 06/27/06 In U.S. Qualified mode, modified the PBGC Premium calculation to round members to the nearest 1 to calculate the flat-rate premium and calculate discounted paid contributions if there is a contribution receivable for the variable-rate premium.
- 06/27/06 Fixed penalty interest calculation bug in the quarterly contribution calculation for plan years beginning 3/1 of a leap year.
- 06/27/06 In U.S. Qualified mode, honor the user entered minimum funding amortization payment if it is within the selected rounding quantity of the calculated amortization payment.
- 06/27/06 Nondiscrimination cross-testing no longer assumes mortality before the testing age to convert DB benefits to a contribution basis or DC contributions to a benefits basis.
- 06/27/06 Adjusted rounding for NC+SC Contribution policy so that amortization payments are rounded before they're summed rather than after.
- 06/27/06 In valuation projected headcounts and benefits, we zero out the headcounts when no benefits are payable (for example if the temporary period has expired). Doing this separately for each basis (EPBO, APBO, etc.) was significantly slowing down processing time. To speed things up, we now zero out the headcounts for all bases when no benefits are payable on an EPBO/EBO basis. This could cause some differences in the projected headcounts for the other bases.
- 06/27/06 Truncate monthly PIA to \$1 to be consistent with SSA and PIA tool. See SSA website: SSA Policy RS 00601.020 Rounding Of Benefits

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ProVal version 2.24

- 04/24/06 Corrected permitted disparity adjustment on a benefits basis (the contributions basis was fine). The "if" conditions now compare covered compensation (CVCP) to average annual compensation (AAC), rather than to plan year compensation (COMP).
- 04/13/06 Fixed percentiled pension expense (dollars) for stochastic forecasts using the Normal Cost + Supplemental Cost contribution policy and an End of Year Additional Contribution.
- 04/03/06 Fixed linear attribution for participants whose attribution service begins after the valuation date.
- 03/20/06 Fixed bug setting up maximum funding bases if FIL funding method, more than one event is being processed, and liabilities do not change in the second or later event. Previously, additional bases equal to the first event were being established.
- 03/15/06 Fixed gain/loss bug for inactive members entitled to a deferred certain annuity (or deferred certain and life annuity or deferred certain and joint life annuity) as of the beginning of the year, but are dead as of the end of the year. This created a spurious inactive member mortality gain roughly equal to the present value of certain payments, offset by an equal unreconciled loss.
- 03/15/06 Fixed gain/loss bug for inactive members entitled to a lump sum that is deferred without life contingencies. Participants with this payment form were generating a spurious inactive member mortality gain and, if the participant was still alive at the end of the year, an offsetting spurious loss for continuing inactives.

03/10/06	<p>Fixed two forecasting bugs with respect to asset valuation methods that distinguish between fixed income and equity assets:</p> <p>a) During a stochastic forecast, any first year override of the investment return now also affects the fixed income return.</p> <p>b) During a deterministic forecast with different funding and accounting returns, the accounting fixed income return is now consistent with the accounting total return (rather than the funding return).</p>
02/23/06	Fixed REA valuation projected benefit payments when active REA benefits were present, vested liabilities were requested, and the post-decrement mortality assumption was not the same for retired, vested terminated and retired members. Previously, the REA benefit payments were being actuarially reduced twice.
02/13/06	<p>Fixed unfunded liability calculations in the Canadian Registered Plans mode under various circumstances:</p> <p>1) Under the Frozen Entry Age (FIL) cost method when there are initial ongoing liability bases and the plan is in surplus on an ongoing basis, or if the plan has solvency bases but requires a reduction in the solvency amortization to come back into balance on a solvency basis.</p> <p>2) Under individual cost methods when there are initial ongoing and solvency bases, the plan is fully funded on an ongoing basis and, while unfunded on a solvency basis, requires a reduction in the solvency amortization to come back into balance on a solvency basis.</p>
02/13/06	Fixed minimum contribution calculations for the Ontario Province under the Canadian Registered Plans mode when there is a solvency deficiency. Previously the ongoing and solvency amortizations were considered required payments, but not the normal cost.
02/13/06	Fixed unfunded solvency liability calculation for the maximum tax deductible contribution in the Canadian Registered Plans mode. Previously the solvency liability was compared to the market value of assets rather than the solvency assets.
02/01/06	FAS, IAS and CICA expense calculations now consistently use compound interest rather than simple interest for the interest on expected benefit payments, employer contributions and 420 transfers.
12/22/05	Pay-as-you-go forecasts will no longer generate spurious assets when the measurement date is not equal to the valuation date.
12/06/05	Fixed calculation of gain/loss for REA benefits for inactive participants who are over the coverage cessation age. Previously, ProVal was expecting that they could have died during the year when actually they can't die for valuation purposes because they are beyond the age when death "counts".
11/29/05	<p>Individual results for benefits (i.e., Current accrued benefits, Current year accruals, Projected benefits, and Largest projected benefits), were not being zeroed out for participants who are excluded by the benefit eligibility selection expression.</p> <p>Now, for example, if a user selects the individual result "zCurrBft_trm - Current Accrued Benefit from Termination" (i.e., the total across all termination benefits) and has 5 termination benefits of which only 1 applies by virtue of selection expressions, then the 4 irrelevant benefits will no longer be included in the total.</p>
11/29/05	In Canadian mode, if the plan is exempt from the maximum tax deductible contribution, fixed bug that sometimes limited the contribution.

- 11/29/05 Fixed the aggregate method normal cost calculation when the contribution policy is Normal Cost + Supplemental Cost and the amortization period type is "open." Previously a non-zero unfunded liability was used in the normal cost calculation.
- 11/29/05 Fixed the FIL w/PUC cost method maximum basis normal cost calculation in US Qualified mode. Previously, the minimum basis normal cost was used in the calculation instead of the projected unit credit normal cost.
- 11/29/05 Fixed the FIL w/PUC cost method normal cost calculation in Canadian mode. Previously an aggregate calculation was made.
- 11/29/05 Fixed the aggregate cost method normal cost calculation in Canadian mode when minimum funding amortization bases exist and the contribution policy is Normal Cost + Supplemental cost. Previously, a non-zero unfunded liability was used for both the contribution and the minimum contribution calculations, rather than just for the minimum contribution.

#### ProVal version 2.23

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- 11/08/05 Fixed variable accounting past service cost amortization bugs. Previously, the payments were inappropriately adjusted when the measurement date year differed from the valuation year. Also, if a positive adjustment to the payments was required for a negative amortization base, the entire base may have been amortized in the first year. (This bug was added with the 10/3/05 patch.)
- 11/03/05 Fixed GASB calculation of the ARC reflecting the maximum amortization period if the plan is overfunded. Previously it was always using the calculated ARC as a minimum when it should have been a maximum if the plan was overfunded.
- 11/03/05 For GASB Annual OPEB/Pension cost calculations, include interest on the adjustment to the ARC (Amortization of the NOO/NPO) based on the contribution timing parameter.
- 10/25/05 In OPEB valuation sets, corrected display of inactive projected headcounts & benefits when the active basis (which should be irrelevant) was set to APBO or APBO Normal Cost. Previously, the pre-Medicare and post-Medicare values were shown, respectively.
- 10/20/05 In OPEB valuation sets, only produce +1%/-1% trend results if at least one accounting valuation has +1%/-1% trend sensitivities turned on. Previously +1%/-1% trend results were calculated when accounting valuations were present, potentially producing misleading results. Now the +1%/-1% results are blank if there are no trend sensitivities in the underlying valuations. Additionally, the +1%/-1% valuation set exhibit will be ghosted if there are no sensitivities.
- 10/03/05 Fixed GASB amortization if the contribution policy is not Normal Cost + Supplemental Cost. ProVal was setting all the GASB amortization years to 20, regardless of the amortization parameters. This bug was introduced with ProVal Version 2.23.
- 09/28/05 Fixed OPEB mode claims adjustment when claims are adjusted by trend and different pre- and post-Medicare trend rates are specified. The middle or end of year trend adjustment at age 64 now uses the pre-Medicare age 65 rate. Previously the post-Medicare age 65 rate was used.
- 09/19/05 In a valuation's projected headcount and benefits, exclude active employees not included in the liabilities due to the participation requirements. Also, in OPEB mode, zero out the headcount for temporary benefits once the benefit has expired. For these reasons, the projected headcount in valuation may not match the headcount in a core projection.
- 09/19/05 Changed emerging inactive headcounts (i.e., current actives who decrement) for Joint Life Annuity and Certain & Joint Life Annuity payment forms. The percent



married and percent electing J&S factors are now applied, resulting in a slightly lower headcount. This affects projected headcounts in both a valuation and core projection.

- 09/19/05 Fixed calculation of liability gain/(loss) for inactives with a life insurance benefit when a non-annual benefit payment frequency is specified.
- 09/19/05 In OPEB mode Valuation Sets with a plan change where average service to full eligibility only includes those fully eligible and scaling factors have been applied, the average service to full eligibility may change. Previously it was impossible to scale this average service, but now it is possible because a separate denominator is reflected.
- 09/06/05 Corrected calculation of "project & prorate" accrual rates when the service start date is in the future (i.e., after the valuation date). Previously, the service at the projection age (i.e., proration service) was measured from the valuation date rather than the service start date.
- 08/22/05 Re-corrected determination of OPEB decrement age and service operators #DECAGE, #DECSVC and #DECPTS when referenced in subformulas. This bug was corrected in version 2.22 on 4/18/05 (see below), but then inadvertently re-released in this version 2.23 on 6/24/05.
- 08/17/05 Fixed actual benefit payments in later projection years (generally greater than 10) that occurred when a user added core projections in a forecast, some, but not all, of the cores reference lump sum factors, and at least one of the cores that doesn't reference lump sum factors has lump sum sensitivities turned on and includes new entrants.
- 08/03/05 Refined liability rollforward calculations when the measurement date differs from the valuation date to more accurately allocate expected benefit payments between actives who decrement during the year and inactives. The total value of liabilities is not affected.
- 07/18/05 Fixed OPEB mode subformula bug wherein the member component value for a table referenced in a subformula may have been used in the calculation of the spouse benefit when the subformula was referenced for both member and spouse benefits.
- 07/18/05 In the Gain/Loss Analysis tool, fixed calculation of liability gain/(loss) for inactives with a "REA Post-decrement Death Benefit" who were younger than the REA commencement age (i.e., the spouse's death benefit was deferred). Previously, an artificial gain was introduced in the "inactive mortality" category, with an offsetting loss in the "unreconciled" category. The artificial amount was roughly equal to (but slightly less than) the REA liability.
- 07/18/05 In pension valuations, fixed projected benefits for inactive REA benefits. This pertains to the full projection of benefits; expected benefits and liabilities were not affected. Previously, the percentage married (for inactive members without spouse information) was not applied.
- 07/18/05 Corrected liabilities for inactive life insurance benefits in OPEB core projections. Previously, liabilities for inactive life insurance were discounted (with interest and mortality) back to the initial valuation date. Thus, while liabilities were correct on the initial valuation date, liabilities for future valuation dates were too low. This problem was introduced with version 2.23.
- 07/15/05 In the Gain/Loss Analysis tool, fixed calculation of liability gain/(loss) for decrementing actives, i.e., participants who were active at the beginning of the year and inactive (or missing) at the end of the year. Previously, expected benefit payments were zeroed out for benefit definitions referencing lump sum factor components. This introduced an artificial "unreconciled" gain for decrementing actives equal to the missing benefit payments.

In addition, if actual benefit payments were set to "use expected", the total liability gain/(loss) was high by the missing benefit payments. Alternatively, if actual benefit payments were provided, an artificial "benefit payment" loss was introduced equal to the missing benefit payments.

- 07/08/05 Fixed PBGC variable rate premium rounding. Rounded the present value of vested benefit and plan assets down to the next lower whole dollar in the PBGC variable rate premium calculation. Rounded the full funding limit to \$100 or \$1,000, depending on size, before comparing to the contribution amount to determine if the plan is exempt.
- 07/05/05 Fixed linear proration to decrement when it was based on a Service Definition with rounding. Previously, rounded service to decrement was used for the proration. Now, unrounded service is used. Note that linear proration to benefit eligibility (or full eligibility) was always correct.
- 07/04/05 Fixed lookup for table Benefit Formula Components for purposes of vested liabilities. Previously, if a service-related table was used, table service was based on a field or service definition, and service was frozen for vested liabilities (Advanced... button), then "rounded attained age - rounded hire age" was used for vested liabilities rather than reflecting the service field/service definition.
- 06/24/05 Rounded unfunded vested liability up to the next \$1,000 in PBGC variable rate premium calculation per PBGC form instructions.
- 06/24/05 Changed treatment of vested liabilities under a middle of year decrement assumption. Previously, the benefits valued for vested liabilities were beginning of year (practically speaking, this affected ERFs and lump sum factors). Unit credit benefits used mid-year benefits; now vested liabilities do too. This change increases active vested liabilities (which are generally less than half of the total vested liability) under middle of year decrements by 0.5%-2% for typical inputs.
- 06/24/05 When processing an actuarial gain in Canadian mode, if the solvency liability is currently in surplus, ignore the fact that a solvency base may exist from the prior valuation (which would normally require that the first n years of ongoing liability payments be "protected").
- 06/24/05 During a forecast for plan sponsors with less than 151 defined benefit (DB) plan participants, adjust the Additional Funding Charge based on the greater of the number of DB plan participants specified in the Asset & Funding Policy and the (rounded) number from the prior year as projected during the forecast. This is an improvement over the 2/18/05 fix previously made for this subject.
- 06/24/05 Fix bug in GASB ARC calculation when the ARC contribution policy is same as contribution policy or contribution policy less percentage and the minimum supplemental cost calculation was negative. The resulting ARC was zero in cases where it should have been positive because the contribution policy was positive.
- 06/24/05 In OPEB mode, if rounding is selected, round the Present Value of Future Lives and Valuation number to \$1, consistent with pension modes. This may change the calculated normal cost under a flat dollar aggregate funding method.
- 06/24/05 Fix bug in treatment of salary history for PIA calculation tool when the law year is later than the termination year. Previously, the most recent salary entered was assumed, in the calculations, to be the salary for the year prior to the law year, regardless of the year of termination.
- 06/24/05 Fixed spurious minimum base that was created if a valuation set event was specified that did not change the unfunded liability for funding (e.g., an accounting event) and the Asset & Funding Policy specified an FIL funding method, no existing minimum bases, and a positive credit balance. The spurious base was equal to the credit balance.

ProVal version 2.22

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05/10/05	Changed the 415 limits so that the 3-year final average salary considers salaries all the way back to date of hire, not just back to date of participation.
05/10/05	Cost of living adjustments based on user expressions were not getting evaluated for benefits whose formula was otherwise identical to another (previously evaluated) benefit.
05/09/05	For Canadian mode stochastic forecasts, no longer do calculations for trials that should not be affected, such as for allocation of an actuarial gain or adjustment for changes in the solvency unfunded. This may change results slightly.
05/09/05	Corrected subtotals in Experience Studies when the subtotal field's codes were not in numeric order. Previously, subtotals could have been assigned to incorrect codes.
04/28/05	Fix bug in stochastic solvency liability interest rate calculation. The 30 yr Treasury yield was always being used as the benchmark even if the corporate yield benchmark was selected.
04/18/05	Corrected determination of whether OPEB decrement age and/or service are required to evaluate #DECAGE, #DECSVC and/or #DECPTS operators for nonactives. If these operators were referenced only in subformulas, they previously evaluated as 0.
03/30/05	Fixed bug in calculation of a combined lifetime maximum in OPEB mode whereby a benefit was being counted against the combined maximum even though the participant wasn't eligible for the benefit.
03/01/05	ProVal and ProAdmin were not calculating the Social Security PIA correctly when: (a) using a frozen PIA law year, (b) overriding salaries before decrement, (c) starting PIA salary history at a specified age, and (d) valuing someone hired before that age.
02/24/05	Corrected attribution to full eligibility when full eligibility is governed by the earliest eligibility for any benefit and the service field used for one or more benefit eligibilities differs from the service field used to determine full eligibility.
02/22/05	Corrected gain/loss analysis for inactive participants with a REA benefit. The unreconciled amounts for continuing inactives Vested to Vested was previously too high.
02/18/05	Correct PFEA sunset determination of the maximum basis current liability (when the Deterministic Assumption valuation interest rates are left blank and the initial RPA and maximum basis interest rates differ) for projections with an initial valuation year of 2005 or later.
02/18/05	In U.S. Qualified mode, for a tax year that differs from the plan year, change the calculation of the unfunded current liability maximum tax deduction to include interest to the end of the tax year rather than the plan year per 2004 Graybook Q&A 2.
02/18/05	During a forecast for plan sponsors with less than 151 defined benefit (DB) plan participants, adjust the Additional Funding Charge based on the greater of the number of DB plan participants specified in the Asset & Funding Policy and the number projected during the forecast.
02/15/05	Correct application of asset value corridor when the actuarial asset value is negative prior to the application of the corridor.

02/01/05	ProVal was including for consideration the salary in the year prior to participation in the 3-year FAS used for the Section 415 maximum benefit calculation in the rare case where a participant's date of participation falls precisely on a valuation date anniversary. It will now only consider salaries in the year beginning on the participation date and forward.
01/13/05	In Canadian mode, fixed calculation of reduced amortization period for existing ongoing liability bases to account for a new solvency base. The prior methodology may have allowed the ongoing liability amortization payment to change.
01/04/05	Fixed a bug whereby, if running a valuation where COLAs apply to active participants and the participant data alternates between actives and inactives, under certain circumstances it was possible for the COLAs to not be applied to all of the active participants that they should have been.
12/17/04	Scaling factors will now be applied to funding expected benefit payments for initial inactives in Public, Canadian and SERP modes. This bug was introduced with Version 2.21.
12/14/04	Corrected default of spouse date of birth for REA benefits valued for current inactives when the spouse date of birth is not known, so it is defaulted based on the valuation assumptions. Previously ProVal was weighting the age difference based on the spouse sex rather than the member sex.
12/13/04	In the determination of whether a participant is eligible for at least one benefit in OPEB mode (with version 2.22, full eligibility can never occur before this point), ProVal will now consider the "date if earlier" field from the benefit definition.
11/22/04	When more than one REA benefit is present for different contingencies, and where such contingencies have differing post-decrement mortality tables, ProVal will now use a different mortality basis for each.
11/17/04	Corrected "in payment status" liability split in deterministic forecast exhibits for initial inactives. Previously, if a participant's benefit became payable before the end of the forecast, the liabilities were slotted as "in payment status" for all years. Now, they are not slotted as "in payment status" until the valuation year in which benefits commence.
11/03/04	Changed full eligibility classification such that, regardless of the full eligibility definition, a participant over 100% retirement age on the valuation date will always be deemed fully eligible (as long as they are eligible for at least one benefit).
11/01/04	Previously, the number and salary of the fully eligible were not calculated in an OPEB funding run with the PUC liability method turned off. This resulted in any run that included such funding assumptions reporting 0 number and salary fully eligible.
10/26/04	Corrected the projection of the Social Security Wage Base (SSWB) for new entrants. Previously the SSWB wasn't increasing with the entry year for new entrants. This resulted in the wage base being too low by the experience national average wage increase for the number of years from the initial valuation date to the new entrant entry year. As a result of this bug, ProVal was producing incorrect results for new entrants for any #CVCP, #SSWB or #PIA operators.
10/26/04	Inactive records without spouse coverage are no longer excluded from processing for invalid (rather than missing) spouse data.
10/26/04	Correct quarterly contribution dates and associated penalty interest for plan years beginning on other than the first day of a month. Also correct penalty interest for plan years beginning late in a calendar year such that the fourth quarterly contribution is due two calendar years after the beginning of the plan year.

- 10/26/04 Full eligibility, both for attribution and bucketing into fully or not fully eligible, is no earlier than when the participant is eligible for at least one benefit.
- 10/26/04 In OPEB mode, step rate attribution parameters at the Benefit Definition level for full eligibility attribution have been eliminated and any previously set parameters will be ignored. These parameters must now be set at the Plan Definition level.
- 10/26/04 Fixed bug whereby if a participant is fully eligible at date of hire, it was possible for attribution to be zero (instead of one). Participants will now always be fully attributed in any benefit they are entitled to if they decrement immediately.

#### ProVal version 2.21

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- 10/01/04 Fixed bug whereby accrual rates that become effective as of a certain date, but apply retroactively, may not have been applied in rare but sporadic circumstances. The rate change may not have been applied for participants with service as of the amendment date but no service accruals thereafter. Since the results depended on how the records were processed, the valuation results may have been correct while the results for a single sample life were incorrect.
- 09/30/04 Correct the excess efficient frontier liability return calculation when Actuarial Liability is the liability target. The wrong normal cost (usually 0) was being reflected.
- 09/15/04 Fix the calculation of asset mix returns during a stochastic forecast when an arithmetic average of the asset class returns is used (rather than the default geometric average approach). Returns were being limited to no less than 0 before the average was calculated. This bug was introduced in version 2.21.
- 09/09/04 Reversed 8/6/04 change with respect to rounding timing adjustments to four (4) decimals.  
  
Applied rounding to contributions under the "PBGC Variable Premium FFL exception" and the "Statutory Minimum + Credit Balance" contribution policies.
- 09/07/04 Add rounding to GASB Annual Required Contribution (ARC) calculations.  
  
Fix rounding for the asset valuation method that is a weighted average of the ratio of book to market values.
- 09/07/04 The calculations of the present value of employer contributions, the ultimate cost, and the target cost are now correct if there is a contribution schedule in the first year.
- 09/03/04 The contribution policy normal cost calculation for the normal cost + supplemental cost contribution policy, based on an aggregate funding method and an open amortization methodology, now correctly reflects the plan's unfunded liability. Previously normal cost under these assumptions was calculated using a \$0 unfunded liability.
- 08/26/04 Fixed "bucketing" of returns for the Excess Return Efficient Frontier when a Custom Capital Market Simulation is referenced and the order of the asset class names in the table differs from the order in which the assets were imported.
- 08/20/04 ABO and FAS 35 liabilities may have reflected incorrect lump sum factor interest rates if the liabilities were to be calculated based on the accounting discount rate and the parameterization for "specialized liabilities" was set to use the liability interest rate.  
  
Solvency liability is no longer treated as a "specialized liability" under any circumstances, so any imbedded lump sum factors will always be calculated based on their own specified interest and mortality assumptions.
- 08/18/04 Fix the first year's projected assets when there is a contribution schedule and PBGC premiums and/or other administrative expenses are paid out of plan

assets. Previously the assets were too high by twice the amount of expenses plus interest. This bug was introduced on 8/6/04.

- 08/06/04 Don't apply the probability of death to participant contributions for OPEB life insurance benefits. This finishes the item dated 12/04/03 below, which only made the change for initial inactives. Now actives (and emerging inactives) and initial inactives are treated consistently. Also corrected two problems with how initial inactives were handled: (1) the probability of death was still being applied to experience benefit payments in a core projection and (2) the valuation "expected benefit payments" due to participant contributions were being zeroed out after the first year of a core projection.
- 08/06/04 Under m.o.y. decrements, the OPEB benefit formula operators #DECAGE, #DECSVC, and #DECPTS were previously averaged at successive decrement ages (i.e., an additional 0.5, 0.5, and 1 year was added, respectively). However, since ProVal subsequently averaged the resulting payment forms values, it resulted in double averaging. #DECAGE, #DECSVC, and #DECPTS now return the value at the beginning of year of decrement regardless of decrement timing. Similarly, #DECYEAR now returns the calendar year as of the beginning of the year of decrement (this change only affects runs with valuation dates on 7/1 or later).
- 08/06/04 In pension modes if there are two benefit definitions with identical formulas, both containing a lump sum factor that are based on the underlying liability mortality (instead of the lump sum factor's own mortality), and there are specialized liabilities that are based on the valuation mortality assumptions, and the post-decrement valuation mortality tables differ between contingencies, ProVal was assuming that the value of the lump sum factor in the second formula was identical to the value of the lump sum factor in the first formula. ProVal will now evaluate them separately (because, in fact, the values may differ).
- 08/06/04 In pension modes, for lump sum factors based on the underlying liability mortality (instead of the lump sum factor's own mortality), when there are specialized liabilities that are based on the valuation mortality assumptions, and the underlying payment form is a joint annuity, ProVal was using the post-decrement valuation mortality table corresponding to the contingency of the benefit definition. ProVal will now use that mortality only for the member. For the contingent annuitant mortality within the lump sum factor, ProVal will now always use the "Survivor Beneficiaries" mortality from the valuation assumptions, regardless of the benefit definition contingency.
- 08/06/04 Improved the calculation of the actual return on assets when the valuation date and measurement date differ. The return on contributions, PBGC premiums, administrative expenses, and 420 transfers now accurately reflect the timing from the date they are made to the end of the fiscal year. These calculations use compound interest so they will not exactly match the calculation of the expected return on assets, which uses simple interest, with the same interest rate.
- 08/06/04 When rounding has been requested, any timing adjustments are now rounded to 4 decimals. This may change some results by \$1.
- 08/06/04 Slightly improve post-decrement headcount in pension core projections to factor in J&S forms and certain periods.  
Specifically:
- 1) For J&S forms the headcount is now based on the probability that either the member or beneficiary is alive, rather than just the member.
  - 2) For forms with a certain period, the headcount now remains constant during the certain period, rather than being discounted with mortality.

3) For certain only forms, the headcount now reverts to 0 after the certain period ends.

This affects both decrementing actives (a.k.a. emerging inactive) and initial inactive in a core projection. It also impacts the average age and average percent male statistics.

- 08/06/04 U.S. Qualified mode maximum tax deduction amortization bases in Valuation Set Exhibits may have been too high (and out of balance) for spread gain methods where the plan initially has a \$0 unfunded liability, the maximum basis unfunded liability is limited to \$0 and an event caused a non-\$0 amortization base to be created.
- 08/06/04 In the derivation of the 415(b) maximum benefit limit, the proration of the 3-year final average salary limit for less than 10 years of service can no longer drop below 1/10. Previously, the proration was simply service/10, which would be less than 1/10 for participants with less than 1 year of service. The impact on liabilities should be negligible for most cases.
- 08/06/04 Changed calculation of 415 limit such that the proration fraction and service fraction are frozen at the valuation date for unit credit and projected unit credit liabilities, and the 3-year FAS is frozen on the valuation date for unit credit. (This is likely to impact SERP plans.)
- 08/06/04 Changed the allocation between pay status and deferred of inactive participant liabilities (in particular, FAS 35, RPA, OBRA and PBGC variable premium) in pension modes such that if an inactive participant has any benefits in payment status, their entire liability is categorized as "currently receiving benefits".

#### ProVal version 2.20

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- 05/17/04 When running lump sum factors in a core projection and overriding the lump sum interest rate with the interest rate for specialized liabilities, ProVal was using the specialized liability interest rate from the valuation assumptions. It will now modify such interest rates by the assumed interest rate sensitivity specified in projection assumptions. This has no impact on baseline core projections but will change results for active specialized liabilities in high assumed interest and low assumed interest sensitivity runs which contain lump sum factors that have a special liability interest rate override, and in any forecasts based upon such core projections.
- 05/09/04 Fixed ProVal to use, rather than ignore, scaling factors for valuation headcount and valuation salary in Canadian mode.
- 05/03/04 Fixed allocation of liability gain/loss calculated under the Pure Unit Credit cost method. One of the symptoms of the bug was that the loss due to "system changes" exactly matched the end-of-year Actuarial Liability. Introduced in 4/06/04 update.
- 04/15/04 Fixed bug in interpolation algorithm that was causing erratic interpolation results for certain stochastic forecasts. If at least one trial's target interest rate for the interpolation was beyond the nearest anchor point by more than 3 times the range of the anchor points (e.g., a target rate over 20% with an anchor point range of 4%-8%), then near zero results may have occurred for interpolated liabilities in trials with target interest rates below the baseline anchor point (below 6% in the above example). This bug was introduced in version 2.20.
- 04/12/04 Changed the mortality basis for joint life lump sum factors used within a disability benefit where the user requests that the underlying RPA, PBGC and Gateway liability interest rate be used for the lump sum factor. Post-disablement mortality will now be used only for the primary annuitant, not for the secondary annuitant.

04/06/04	Fixed a bug wherein the full funding limit for a 2004 valuation may not have been correct because the 165% OBRA current liability full funding limit is no longer applicable as of 2004.
04/01/04	Fixed bug that occurred when the user selects an option indicating that a lump sum factor should be calculated using the mortality from the underlying liability for specialized liabilities. Within RPA, Gateway or PBGC liabilities, ProVal was using post-disablement RPA mortality instead of healthy life RPA mortality for lump sum factors used in death benefits and, conversely, using healthy life mortality instead of post-disablement RPA mortality for lump sums factors used in disability benefits.
03/15/04	Fixed bug calculating the funding assumption change liability during a deterministic forecast when the valuation interest rates are calendar year-dependent. This bug was introduced in ProVal version 2.20.
03/11/04	Fixed a bug introduced in version 2.20 whereby interest rate sensitivities were not being applied in a core projection that used calendar year interest rates and had no lump sum components.
03/05/04	Fixed bugs that may have resulted in individual results not always being correct for FAS35 and ABO output.
02/18/04	Fixed core projection bug wherein valuation interest sensitivity adjustments to the lump sum interest rate for lump sum factor benefit formula components were not applied when the components were evaluated for new entrants.
02/18/04	Fixed bug that resulted in potentially incorrect pension liabilities when: <ul style="list-style-type: none"> <li>1) there are at least three identical benefit formulas referencing lump sum factor benefit formula components,</li> <li>2) the contingencies of the identical formulas alternate between death and non-death benefits, and</li> <li>3) the lump sum factor benefit formula components are based upon spouse mortality rather than member mortality when used in a death benefit.</li> </ul>
02/12/04	Corrected the determination of lump sum benefit formula component valuation interest rates for the "high interest, baseline inflation, baseline lump sum interest" sensitivity in a core projection. Previously the valuation interest rates used for this sensitivity were too low by the difference between the baseline and the low interest rate sensitivity scenarios' valuation interest rates.
02/11/04	Corrected the gateway current liability interest rate during a stochastic forecast when the RPA and OBRA current liability rates are set to the minimum rate in the corridor. The RPA minimum rate was inadvertently being used for the gateway current liability.
02/04/04	Fixed bug that ignored service prior to date of hire in excess of one year for accrual definitions. In general results will now match what they were under 2.19.
02/04/04	Fixed bug which didn't properly reflect new rate schedules (i.e., "New Rates as of ...") that applied during periods of service prior to date of hire.
02/01/04	Fixed bug whereby ProVal was substituting the post-disablement mortality instead of the survivor beneficiaries mortality when setting the mortality for a specialized lump sum benefit formula component used for a death benefit in an OBRA liability. Similarly, it would have used survivor beneficiaries mortality instead of post-disablement mortality for a specialized lump sum benefit formula component used for a disability benefit in an OBRA liability. This change only affects cases which use different mortality tables for post-disablement mortality and survivor beneficiary mortality, have lump sum factors with the DNU checkbox checked and use the lump sum factor in a death or disability benefit within an OBRA liability.



01/27/04	Change logic for determining charges versus credits in U.S. Qualified mode minimum amortization bases exhibit to look at the outstanding balance rather than the payment. Previously, small balancing bases may have been omitted from the exhibit if their payment rounded to \$0.
01/13/04	Fixed bug that inappropriately excluded some inactive records because they were missing data required for active records. Only affected OPEB valuations and core projections.
01/12/04	Fixed bug projecting accounting assets during a stochastic forecast when there is a contribution schedule with non-\$0 accounting contributions (including the receivable). This bug, introduced in version 2.20, caused projected accounting assets in year 2 to vary for a given trial depending on how many trials were run.
01/02/04	Fixed problems that potentially resulted in incorrect experience lump sum benefit payment calculations for death benefits in a core projection.
12/22/03	Fixed bug in pension modes with inactive payment form "Lump Sum, Life Contingencies" with a deferred payment. Liabilities, and projected benefits, and projected benefits inforce were not being discounted with life contingencies. This bug was introduced with ProVal version 2.20.
12/17/03	For the x% of pay contribution policy in modes other than U.S. Qualified and Canadian, determine the minimum contribution to avoid negative assets by considering the actual, rather than just the expected, return on assets.
12/04/03	In OPEB valuations and cores with m.o.y. decrements, ProVal bucketed the actives fully eligible based on age/svc/pts at the m.o.y. whereas it based the attribution on beginning of year. This sometimes resulted in the incongruity of fully eligible actives having a normal cost. To be consistent with the attribution calculation, ProVal will now determine full eligibility at b.o.y. even if decrements occur m.o.y. The only participants potentially reclassified are those who become eligible during the year based on the age requirement (not service).
12/04/03	Historical data for the 1999 U.S. Social Security CPI has been changed from 0.024 to 0.025, reflecting a correction in the published amount pursuant to Public Law 106-554. Accordingly, results may change slightly for valuations and core projections involving Social Security PIA as well as the PIA Calculations tool.
12/04/03	For pension accounting core projections and deterministic forecasts, changed ProVal to produce a zero average expected future service whenever the total expected future service is zero.
12/04/03	A probability of death will now not be applied to participant contributions toward life insurance in OPEB mode.
12/04/03	Removed the double counting of interest on assumed administrative expenses in accounting calculations. Now assumed administrative expenses are added to the service cost after it has been adjusted for interest to the end of the year. The expected return on assets continues to be adjusted for the expected return on administrative expenses because they are assumed payable at the beginning of the year.
12/04/03	Corrected some bugs with respect to expected benefit payment overrides. The overrides will now work correctly: <ol style="list-style-type: none"> <li>1. In a forecast that includes plan amendments.</li> <li>2. With very old valuations and/or core projections in which the initial expected benefit payments were not cash, but the present value as of the beginning of the year. These bugs were introduced on 1/28/2002.</li> </ol>
12/04/03	Corrected some bugs in U.S. Qualified mode when a contribution schedule exists:

	<p>a. Corrected the reported minimum contribution and present value of employer contributions.</p> <p>b. Corrected the first year contribution when the contribution policy is to contribute the accounting expense. When a contribution schedule exists, the first year contribution is the scheduled contributions subject to the minimum required contribution, and then plus any additional contribution.</p> <p>c. Corrected the contributions included in the accounting expected return on assets and the projected accounting assets when the measurement date is after the valuation date and some scheduled contributions occur before the measurement date.</p> <p>d. The date of the first quarterly contribution amount assumed to be paid after the contributions in the user's schedule is now no earlier than 1 day after the schedule date rather than on the schedule date.</p> <p>e. Penalty interest is now charged until the earlier of the contribution date and 8 1/2 months after the plan year end.</p>
12/04/03	Corrected the reported maximum tax deductible contribution amount when the minimum required contribution exceeds the otherwise calculated maximum tax deductible contribution and contribution timing is prior to year end.
12/04/03	<p>Corrected some rounding calculations:</p> <ol style="list-style-type: none"> <li>1. The beginning of period service cost is now always rounded prior to adding interest to the end of the period. This bug was introduced on 1/27/03.</li> <li>2. The service cost details by benefit definition are now rounded consistent with the total service cost (i.e., both before and after applying interest to year end).</li> <li>3. OPEB mode calculations are now rounded such that gross benefits minus participant contributions will equal the total liability.</li> <li>4. In deterministic forecast output, when rounding was selected in the asset and funding policy, the output variable "Target Cost" was being rounded. Now, because it is a percent of payroll number rather than a dollar number, it will not be rounded.</li> <li>5. Round the supplemental cost under the normal cost + supplemental cost contribution policy.</li> <li>6. In Valuation Sets with events, round the active and inactive liabilities separately prior to calculating new amortization bases.</li> </ol>
12/04/03	Changed supplemental cost output in U.S. Qualified Mode with the Normal Cost + Supplemental Cost contribution policy to display the contribution policy supplemental cost under the open amortization methodology. Previously the Funding Standard Account supplemental cost was displayed.
12/04/03	Fixed bug in public, OPEB and non-qualified mode FIL normal cost calculation when there is no amortization of surplus. Previously the unfunded liability (surplus) was used in the normal cost calculation rather than \$0.
12/04/03	<p>Improved logarithmic interpolation results during a forecast in anomalous circumstances such as when:</p> <ol style="list-style-type: none"> <li>1. One of the values to be interpolated is \$0 while the other two are non-\$0. This situation could occur for a grandfathered benefit that is disappearing over time, where the rate of disappearance varies with the economic environment.</li> <li>2. The target point is way beyond the interpolation anchor point range.</li> <li>3. The results are only nearly non-monotonic, rather than strictly non-monotonic.</li> </ol>

12/04/03	Changed accrual rate calculation when service commences during a year that a new set of rates goes into effect to more accurately allocate the first year of service between the two accrual rate date intervals.
12/04/03	The all-purpose emerging inactive scaling factor, intended to be used for all emerging inactive liabilities and benefit payments, was not being applied to Gateway and RPA emerging inactive expected benefit payments. Therefore, unless a calculation of scaling factors was being performed, no scaling factors were being applied to these results. Now the all-purpose scaling factor will be applied to these results and, when performing a calculation of scaling factors, no special scaling factors will be calculated for them.
12/04/03	Fixed bug whereby ProVal was not ignoring a blank freeze/start table in a final average pay custom operator. This only occurred if a user creating the custom operator with values in the freeze/start table and then deleted them.
12/04/03	Fixed bug amortizing negative accounting plan changes when the active and inactive change for the event differed in sign or when a negative inactive plan change applied in a pension mode.
12/04/03	Modified some exhibit only output: <ol style="list-style-type: none"> <li>1. Added the applicable interest rates to many exhibits</li> <li>2. Corrected the OPEB mode benefit payments shown in the APBO rollforward.</li> <li>3. In U.S. Qualified mode, included any additional contribution in the Development of the Minimum Required Contribution and Schedule of Employer Contributions exhibits.</li> <li>4. Corrected the maximum amortization bases and related calculations when the initial unfunded was negative, the maximum basis unfunded liability is limited to \$0, a non-\$0 credit balance exists, and an event caused a non-\$0 base to be created.</li> </ol>

#### ProVal version 2.19

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07/23/03	Fixed error which occurred in OPEB mode when full eligibility follows changes in a step rate table. In most cases, processing halted with an INDEX ERROR. However, it is possible that eligibility (which determines the first change in the step rates) was determined from the wrong active benefit.
07/18/03	Fixed rounding problem affecting age-based and points-based accrual rates whereby about 50% of participants (depending on the direction that attained age and hire age round) could have passed through a breakpoint one year earlier than they should have.
07/18/03	ProVal will now apply retirement eligibility before extending the first 100% retirement rate to later ages. This is only an issue for calendar year-based retirement rates where retirement rates are set to 100% in some year and then return to lower rates thereafter. In this case, the retirement rates were 100% for all participants, even after the lower rates went into effect.
07/18/03	In pension modes, if, for at least one inactive benefit, a single payment form was selected for all inactive participants and that single payment form was a certain and joint life annuity, but there were no inactive benefits where a single payment form was selected for all inactive participants that was a joint life annuity (without certain period), ProVal assumed an age 14 beneficiary. ProVal will now calculate beneficiary age explicitly for all inactive participants in this situation.
07/18/03	Changed the fact that, when assuming middle of year decrements, ProVal was cutting in half expected benefit payments for lump sums without life contingencies in the year of decrement but not lump sums with life contingencies.

	ProVal will now display the full lump sum amount for expected benefit payments for all lump sums.
07/18/03	Previously, ProVal applied COLAs to lump sums without life contingencies but not to lump sums with life contingencies. ProVal will now ignore COLAs for all lump sums.
07/18/03	Changed Individual results to return zero instead of one when a participant's average future working lifetime contributes nothing to the AVFWL for the entire group. The average future working lifetime for the entire group (i.e., the valuation results) is not affected by this change.
07/18/03	Fixed bug that caused ProVal to not "Eliminate bases when in surplus" for an open amortization period in a situation where it was requested.
07/18/03	Changed val set in OPEB mode to ensure that a plan change only gives rise to a prior service cost, not a G/L. Previously a plan change had the potential to generate a small spurious gain/loss if accounting liabilities were being rolled forward.
04/21/03	No longer coerce decreases in the maximum compensation limit to be retroactive when they are attributable to user overrides of historical regulatory data.
04/21/03	Restrict penalty interest rate to be no lower than the valuation rate.
04/21/03	Correct determination of new negative ERISA minimum amortization bases in a Valuation Set with events under the FIL method. Previously the new base may have been limited by the Full Funding Limit unfunded liability rather than the plan unfunded liability.  Correct determination of new FIL method bases when the new base is negative and the expected unfunded liability is also negative (e.g., equal to the negative of the FSA credit balance). Previously a new positive base equal to the credit balance may have been created.  Fix bug wherein a negative unfunded liability base may have been created to eliminate a negative normal cost under the FIL method even if parameterization indicates "no new bases when UAL < 0".  Correct Canadian Registered mode Valuation Set calculations with multiple events where the baseline gain/loss event generates a gain. Previously the gain was double counted.
04/17/03	Fixed penalty interest calculation bug for plan years ending January 31 when one of the calendar years is a leap year. ProVal was looking to the calendar year containing the plan year end rather than the calendar year containing the plan year beginning to determine whether to adjust for the leap year.
04/12/03	Fixed PIA bug when PIA computation age is assumed to be attained at decrement. This bug was introduced with the 1/13/03 fix below relative to the National Average Wage at age 60.
03/21/03	Excluded participants from FAS87 and FAS106 working lifetime if excluded from PBO (APBO) due to not meeting the participation requirements specified in Valuation Assumptions.
03/17/03	Corrected determination of unfunded liability bases for plans using an individual funding method and potentially coming out of full funding, but which have a negative plan or assumption change that puts them back into full funding. Previously a loss base and associated amortization may have been inappropriately reflected.
01/15/03	Corrected rounding in the determination of whether or not a PBGC variable premium is payable. Previously the full funding limit (FFL) was compared to the end of year contribution rounded down to \$1 or \$100 if smaller. Now, in accordance with 29 CFR 4006.5(c)(5), the end of year contribution is compared

	to the rounded down FFL, where the rounding is to the lower \$1,000 if the FFL exceeds \$100,000, or \$1 otherwise.
01/14/03	Fixed a bug in the interaction of additional contributions and the PBGC Variable Premium FFL Exemption contribution policy. Previously, the contribution policy contribution was not limited to a minimum of \$0, so the additional contribution may have been added to a negative amount, resulting in too low of a total contribution.  Fixed bug in OPEB mode when lifetime maximums were utilized whereby ProVal was incorrectly ignoring post-decrement probabilities when they were specified.
01/13/03	PIA Calculations tool changes.  1. Correct determination of NAW at age 60 as used to determine bend points. The NAW at age 60 is now projected to the earlier of age 60 and termination age - 2 years. Previously, the NAW at age 60 was fully projected, regardless of termination age. This makes the projection of NAWs for AIME and bend points consistent.  2. When using the "salary history starts at hire age" option, the number of historical salaries in AIME is now determined as: law year - year of hire Previously, it was determined as: $[\text{\#ROUND}(1/1/\text{lawyear} \text{\#YEARDIF}(\text{birthdate} \text{\#DATEMINUS} 1\text{d}))] - [\text{\#ROUND}(\text{hiredate} \text{\#YEARDIF}(\text{birthdate} \text{\#DATEMINUS} 1\text{d}))]$ In some cases, these two methods may differ by 1 year due to rounding. For example, if birthdate = 9/19/1937, hiredate = 3/19/1955, and law year = 2003: new span: 2003-1955 = 48 years old span: $[\text{\#ROUND} 65.28688525] - [\text{\#ROUND} 17.5] = 65 - 18 = 47$ years  3. When using the "salary history starts at age x" option, the starting year for historical salaries in AIME is now determined as: $[\text{\#YEAR}(\text{birthdate} \text{\#DATEMINUS} 1\text{d})] + \text{start age}$ Previously, it was determined as: law year - $[\text{\#ROUND}(1/1/\text{lawyear} \text{\#YEARDIF}(\text{birthdate} \text{\#DATEMINUS} 1\text{d}))] + \text{start age}$ In some cases, these two methods may differ by 1 year due to rounding. For example, if birthdate = 9/19/1937, start age is age 18, and law year = 2003: new starting year: 1937 + 18 = 1955 old starting year: 2003 - $[\text{\#ROUND} 65.28688525] + 18 = 2003 - 65 + 18 = 1956$
01/08/03	Correct the National Average Wage reflected in PIA calculations for decrement/termination within 2 years of the PIA salary start age.
12/20/02	Fixed rounding of detail values so that details add up to the total in the case of rolled forward accounting values and forecasted inactive liabilities and benefit payments.
10/25/02	Fixed OPEB mode bug wherein inactive plan changes were not included in the prior service cost amortization if they were positive, and were double counted (in the unrecognized prior service cost only) if they were negative and there were previously existing positive prior service cost bases.
10/25/02	In OPEB mode, inactive life expectancy now measures the period from the valuation date to last payment rather than to death.
10/25/02	Fix problem in OPEB mode for active records for which hire age minus spouse setback (specified in valuation assumptions) was less than age 15. For (assumed) spouses of these records, table lookup values were not aligned with the correct ages.

- 10/25/02 The calculation of the Full Funding Limit Credit has been corrected when there is penalty interest which causes the minimum required contribution to exceed the full funding limit.
- 10/25/02 The adjustment for midyear decrements applied to linear proration to benefit eligibility and full eligibility has been changed. Previously, the service to midyear for proration purposes was determined as the average of the b.o.y and e.o.y. values. This approach was inaccurate in the transition year prior to reaching the full service requirement. Now, the service to midyear is determined by adding one-half year of service to the b.o.y values, subject to a maximum of the full service values. With the correction, attributed costs and liabilities may change slightly for pensions and retiree medical.
- 10/25/02 Lifetime maximums for reversionary annuities have been corrected. Lifetime maximums for benefits with a grace period (i.e., payments to the spouse stop n years after the member's death) have been discontinued (they were inadvertently allowed in version 2.18, but never worked properly). Lifetime maximums for life insurance benefits have also been discontinued.
- 10/25/02 Renamed and updated the contribution policy "Maximum w/o unfunded Current Liab." to "PBGC Variable Premium FFL Exemption". This policy is intended to avoid unnecessary payment of a PBGC variable premium. Previously this policy (1) double-counted the credit balance if the actuarial liability full funding limit dominated, (2) did not adjust for contributions paid prior to year end and (3) did not reflect the rounding tolerance permitted by the PBGC.
- Also corrected the determination of whether or not a PBGC variable premium is payable. This too may have double-counted the credit balance.

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#### ProVal version 2.18

- 09/10/02 Corrected error introduced in 9/06/02 patch. Core projections with only actives were not generating emerging inactive results.
- 08/06/02 Corrected treatment of Social Security Wage Base Regulatory Data Overrides. Previously overrides of the valuation date wage base were ignored due to ProVal's attempt to start with the correct unrounded wage base by using the 1994 Wage increased by the cumulative change in the National Average Wage since 1992.
- 07/23/02 Corrected discrepancy that could have arisen when overriding accounting benefit payments and there was also a roll-forward (due to a measurement date later than the valuation date). Previously, prior service costs arising from plan amendments may not have equaled the difference between the post-amendment liability and the pre-amendment liability. The difference was calculated ignoring the EBP override, while the rolled-forward liabilities displayed on the val set exhibit (both pre- and post-amendment) were rolled forward reflecting the override.
- 06/25/02 Corrected bug in the corridor method for Actuarial Assets and Market Related Assets in the situation where there are multiple corridors. Previously results may have been different than expected if the corridors were not parameterized as monotonically increasing.
- 05/31/02 Fix FIL bugs when new bases, \$0 initial FIL, negative initial UAL, and non-\$0 credit balance:
1. A test for negative or positive plan changes inadvertently created an inactive liability plan change equal to the credit balance when there was no inactive liability plan change. (The test was <0 rather than <=0.)

2. The new base was based on the difference of the liabilities adjusted for the credit balance rather than the difference in the unfunded liability adjusted for the credit balance.

- 05/20/02 In Valuation Set Output and Deterministic Forecast Output, rolled-forward vested liabilities (i.e., because the measurement date is beyond the valuation date) are now forced to zero for benefits which the user excludes from vested liabilities. This avoids a negative rolled-forward liability when expected benefits exceed normal cost. The zeroed-out amounts are reallocated to those benefits included in vested liabilities. Note that total vested liabilities are not affected by this change.
- 05/16/02 Corrected bug which caused an incorrect payment frequency adjustment to inactive liabilities in pension modes for certain and joint life payment forms with payment frequencies other than annual.
- 05/14/02 Corrected bug in calculation of RPA CL expected benefit payments when RPA current liability pre-decrement mortality differed from the valuation basis. Previously, pre-decrement mortality was on the valuation basis, rather than the RPA current liability basis. Note that only pre-decrement mortality was affected; the correct post-decrement mortality was used.
- 05/09/02 In OPEB mode, offset existing (positive) prior service cost bases if a valuation set plan change event includes a decrease in the inactive liability. Previously, ProVal assumed that any inactive liability changes would be positive (as is the case for pension plans).
- 05/09/02 In public pension mode, fix calculation of gain/loss to ignore any amortization bases when amortizing to a fixed date.
- 05/09/02 In U.S. Qualified Pension mode, correct use of current liability expected benefits override (entered in an Asset & Funding Policy) as applied to RPA expected benefits. The fix to benefit detail (added with the release of 2.18) inadvertently prorated RPA expected benefits in proportion to OBRA expected benefits, causing both the benefit detail and total to be incorrect. Note that if the calculated OBRA expected benefits and RPA expected benefits were identical, no error occurred.
- 04/26/02 Fix two bugs in the PIA Calculations tool:
1. Salaries prior to hire age were not being considered in the calculation of PIA, even though salaries prior to hire age could be entered. These salaries are now being considered.
  2. Use of a frozen law year was zeroing out the PIA.
- 04/16/02 Corrected bug in calculation of expected benefit payments for spouse life insurance benefits in OPEB mode. Previously, member mortality was used rather than spouse mortality for most purposes. This affected expected benefit payments for actives (in valuations and core projections) and inactives (in core projections only). Liabilities and normal costs were not affected.
- 04/11/02 Correct contribution schedule interest credit with respect to prior year (i.e., credit balance) contributions that do not become available until after a current year contribution.
- 04/11/02 Previously, participants with missing data in coded database fields used for inactive eligibility were excluded from that particular benefit but included for other benefits. Now any participant with a missing field used in defining inactive eligibility is excluded from the entire valuation.
- 04/11/02 Payment form definitions (for actives in pension modes) no longer permit both a temporary feature and a certain feature. Certain only annuities, which were implicitly specified by setting the certain period equal to the temporary period, are

now specified explicitly. Other combinations, such as certain for 10 years and temporary to age 65 will no longer be available. Deferred-to-age/ temporary-to-age factors calculated in Tools/Administrative- Factors where the temporary age precedes the deferral age will now produce zero rather than ignore the temporary age. Certain periods for all factors calculated in Tools/Administrative-Factors are now ignored for all form types except certain-only and certain- and-life.

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| 04/11/02 | Expected benefit payments for OPEB life insurance benefits have changed slightly under a middle of year decrement assumption. The change applies to actives in the year of decrement. Previously, the probability of receiving a life insurance payment in the year of decrement was $qx/2$ ; it is now $1-px^{0.5}$ . The percent difference is less than 0.04% for typical mortality rates.  |
| 04/11/02 | ProVal will now correctly calculate the service of a participant who was hired in the year that a new set of accrual rates goes into effect. Previously, it was applying the partial year the accrual is in effect on top of the partial year of service, which double counted the reduction in most cases.  |
| 04/11/02 | <p>In val sets and deterministic forecasts, ProVal will now use a more precise roll-forward from valuation date to asset measurement date of accounting liabilities. This eliminated a problem of totals not adding up in certain circumstances.</p> <p>Each of the pieces of liabilities are now rolled forward using pieces of the benefit payments that always add up to the total benefit payments. Whenever the total benefit payments are changed, due to a user override, setting expected benefit payments equal to actual benefit payments for PAYG, or interpolating between high and low interest/inflation scenarios, the pieces are changed proportionately. If overriding zero benefit payments, the total is spread evenly among all possible pieces.</p> <p>As the benefit payment split between continuing and decrementing actives is not currently stored by ProVal, an estimate is used to split total active benefit payments. The estimate is the ratio of decrementing active liability divided by (decrementing active liability + 5% of total active liability), reflecting the assumption that members who have already decremented at the beginning of the projection year are 20 times more likely to generate a benefit payment than the average active member. Where fully eligible active liability is available, a similar ratio is calculated but using 30% of the fully eligible active liability, rather than 5% of the total active liability.</p> |

#### ProVal version 2.17

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| 12/14/01 | Correct active and emerging inactive pieces of APBO/EPBO, including the fully eligible active APBO, such that they sum to the (unaltered) total APBO after roll-forward for a measurement date later than the funding asset date.  |
| 11/19/01 | Correct determination of required quarterly contributions to not, by default, add back any funding deficiency in determining the required current plan year contribution. Rather, the required contribution is determined as the lesser of the full funding limit and the other FSA charges and credits (including any funding deficiency but excluding any credit balance or penalty interest). |
| 09/21/01 | Correct quarterly contributions penalty interest calculation when there is a non-zero credit balance that doesn't actually arise (due to unpaid prior year contributions) before the first quarterly contribution is due.  |
| 09/19/01 | Correct Deficit Reduction Contribution offset to exclude any funding deficiency.   |
| 08/20/01 | Fix Additional Funding Charge bug, introduced with this version 2.17, if the Optional Rule but not the Transitional Rule was applied and the plan is exempt from the Additional Funding Charge. The Optional Rule amount was not being zero'd out for exempt plans.  |



08/17/01	Correct application of the pre-EGTRRA 2001 unfunded current liability maximum tax deduction to be predicated on more than 100, rather than at least 100, plan participants.
07/19/01	<p>Correct application of annual COLA limit for inactive benefits when simple interest COLAs are assumed. Previously, the current benefit amount (on the valuation date) was increased by the annual limit.</p> <p>Fix 2 frozen law year PIA bugs:</p> <ol style="list-style-type: none"> <li>1. Fix bug that results in a zero PIA for certain decrement ages if using a custom operator with (a) a frozen law year, (b) zero salaries after decrement, and (c) salaries before decrement projected backwards at a level rate or following changes in NAWs.</li> <li>2. Correct PIA with frozen law year and zero salaries after decrement to use zero salary in freeze year. This effectively freezes the value of the PIA at the frozen law year value.</li> </ol> <p>Fix bug that excluded more inactives than necessary when finding an inactive record with a missing commencement date or temporary stop date.</p>
07/03/01	Fix bug for inactive benefits with COLAs and annual or ultimate caps. When simple COLAs were assumed, ProVal ignored the caps. This bug was introduced with 2.17.
06/14/01	Fix bug with respect to stochastic constant rate (as opposed to variable by year) COLAs granted less often than annually and referencing core projections run under ProVal version 2.16. Previously the "less often than annually" parameters were not reflected and COLAs were granted annually.
06/14/01	<p>Fix bug occurring when the right argument to #IN contained leading space(s), e.g., A #IN ' ABC'. Previously, the leading space(s) were dropped from the right argument when it contained only a single item, not a list of items. Thus, the behavior of FIELD #IN ' ABC' and FIELD #IN (' ABC',' ABC') differed.</p> <p>Note that this change does not affect numeric right arguments to #IN.</p>
06/14/01	Change determination of U.S. Qualified mode Scaling Factors with respect to benefit payments ("Other Scaling Factors"). For obsolete reasons, RPA '94 benefit payments are scaled independently of other benefit payments. While these parameters were removed from the screens in early 2000, they are still used. Now they will automatically be set equal to the other benefit payment scaling factors when those factors are entered by hand. You can determine if there is a problem with your scaling factors by looking at them through the Scaling Factors View button. If values are displayed for RPA benefit payments (which only happens if the internally stored value differs from that used for other benefit payments), open the Other Scaling Factors dialog and then replace the Scaling Factors.
06/14/01	<p>Fix Additional Funding Charge bug that would apply if the optional rule had been elected and the contribution needed to increase the RPA current liability funded ratio to 100% was less than the transition and/or optional rule AFR. This change conforms the Additional Funding Charge exhibits to the Schedule B approach.</p> <p>Conform the treatment of any funding deficiency to be consistent with that already anticipated by the minimum contribution exhibit. Thus, if a plan is at or near full funding, any funding deficiency may no longer be payable. The determination of whether or not a PBGC variable premium is payable now also properly distinguishes between a credit balance and a funding deficiency.</p> <p>If a contribution schedule is used, correct the date of the "final contribution" to be the later of the end of the plan year or the day after the schedule date. Previously the end of the plan year was used regardless of the schedule date.</p>

Fix quarterly contribution bug that resulted in a negative credit balance being reflected in the penalty interest calculations when there was more than one scheduled contribution and more than one of these did not contribute to creating a non-\$0 credit balance.

- 06/14/01 Corrected calculation of the PBGC Variable Premium Liability for decrementing actives (i.e., emerging inactive) in core projections. The correction applies to cores with valuation assumptions that specify a funding COLA but do not apply the COLA to the PBGC liability. Previously, the resulting PBGC liability for decrementing actives had three possible errors:
1. It included the valuation COLA and twice the experience COLA. It should have included 0% valuation COLA and the specified experience COLA.
  2. It excluded benefits with a life insurance payment form.
  3. Benefits which were amended and involved a change in deferral, reflected the original benefit's COLAs, not the replacement benefit's.
- This change was introduced with a version 2.16 change that applied the valuation COLA to decrementing actives as the core projection experience assumption (see changes log entry on 3/23/2000, number 2).
- 06/14/01 Corrected calculation of unit credit (UC) liabilities for excess formulas (A minus B) which were projected to be zero for present value of future benefits (PFB), but currently non-zero for UC. In version 2.16 (but not earlier versions), a payment form value of 0.00 was used under UC for decrement ages with a zero projected benefit.
- 06/14/01 Custom #PIA operator with frozen law year now projects zero or level salaries from law year to decrement consistent with the "salaries after decrement" parameter. Previously, ProVal always projected level salaries from law year to decrement. This change effectively freezes the value of PIA for years following the frozen law year.
- 06/14/01 Calculation of the 100% final 3-year average aspect of the 415 maximum benefit was changed to exclude salaries prior to participation in accordance with IRC 415(b)(3). Since salaries are included for years "during which the participant was an active participant", salary in the first year of participation is included. This change does not affect plans where 415 participation service was set to <date of hire> (in Valuation Assumptions | Regulatory Data).
- 06/14/01 In experience studies, when excluding a record because of missing end of year data, exclude that record from the beginning of year data too (i.e., from the exposure). Previously, these records remained in the beginning of year exposure and were assumed to decrement during the year (retire, terminate, or die depending on beginning of year status).

#### ProVal version 2.16

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- 03/28/01 Revised the methodology for rolling forward the VBO based on the difference between the funding and measurement dates. The VBO is increased with a proportion of the ABO normal cost, where the proportion is the ratio of the active-life VBO to the active-life ABO. Previously this ratio was determined after the ABO had already been rolled forward.
- 02/26/01 Fixed quarterly contribution bug when a contribution schedule and a funding deficiency exist. The current year contribution for purposes of determining required quarterly contributions was under-estimated by 2 times the beginning of year funding deficiency, potentially producing a too low quarterly contribution requirement.

12/05/00	Corrected the Performance Index Asset Valuation Method for accounting expense when a growth factor is applied. The funding valuation rate had been used for the growth factor rather than the accounting expected return on assets.
11/20/00	<p>Corrected individual aggregate method asset allocation:</p> <ol style="list-style-type: none"> <li>1. Asset allocations had been incorrect when there were participants with an initial negative normal cost and participants with a \$0 initial asset allocation. In this case, assets are now limited to the PVFB for participants with a negative normal cost and their excess assets are re-allocated to the other participants proportional to existing assets until and unless all of the "other participants" have \$0 assets. In this latter case, any excess assets are allocated to the new entrants proportionate to their PVFB.</li> <li>2. Participants at or above the 100% retirement age (i.e., those with a \$0 present value of future salary/service) are now treated comparably to inactives in that their allocated assets are set equal to their PVFB.</li> </ol>
10/27/00	During a forecast, correct determination of whether or not a variable PBGC premium is payable to (1) treat the credit balance with interest as a contribution and (2) not reflect any carryforward.
10/24/00	Eliminate any current liability full funding credit bases under the aggregate method for Valuation Sets and forecasts with an initial 2000 or later plan year. Provide a warning for initial 1999 plan year aggregate method runs with such bases, and eliminate the bases in 2000 during a forecast.
10/18/00	Correct employer contribution calculation under the aggregate method with a NC+SC contribution policy. If the amortization parameters had been set to use a fixed date, a non-\$0 supplemental cost amortization had been used in the contribution determination.
09/16/00	Fix bug related to payment forms involving a deferral age or period and a temporary period. The temporary period now always starts at commencement age (i.e., after deferral has ended). Previously, the temporary period started at various points: attained age (pension & OPEB inactives), decrement age (OPEB actives), or commencement age (pension actives; note that this group is not affected by this change).
08/14/00	Correct final average with non-consecutive salaries allowed. For an n-year average, records with decreases in the first n years of employment but no decreases thereafter reverted to a final n-year average.
08/02/00	<p>Fixed gain/loss bugs related to continuing actives.</p> <ol style="list-style-type: none"> <li>1. For gain/loss runs with multiple (for example, n) e.o.y. valuations using different databases, continuing active sources were generally n times the true value. An offsetting error appeared as an unreconciled amount.</li> <li>2. For gain/loss runs where "RecID" was used in an e.o.y. valuation's selection expression, ProVal incorrectly identified the continuing actives.</li> </ol>
05/26/00	<p>The IRC Sec. 412(l) Additional Funding Charge (AFC) calculations have been corrected in the case where the Optional Rule applies and dominates and the OBRA '87 current liability rate differs from the RPA '94 current liability rate. Previously ProVal's AFC calculations were done as of the beginning of the plan year and then brought forward at the RPA '94 rate. Now ProVal's calculations are as of the end of the plan year, consistent with the Schedule B instructions.</p> <p>This change alters the "Additional Funding Charge - RPA '94 Law" exhibit by changing terminology, adding a (blank) line to item 8 (Preliminary AFR) and deleting 2 lines from item 11 (AFC).</p>
05/12/00	The calculation methodology for interest on expected contributions has been changed in the case where a schedule of contributions is provided. Now the

number of days from each contribution date to the fiscal year end (i.e., one year from the measurement date) is used rather than an average contribution time, and a compound, rather than a simple, interest adjustment is used. Also, contributions scheduled for a date earlier than the measurement date are now ignored for the return on expected contributions and interest on any additional contribution is now reflected for the period between the plan year end and the fiscal year end.

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| 05/04/00 | Corrected automatic calculation of scaling factor for accounting average expected working lifetime in non-OPEB modes. Previously scaling factors were such that the total working lifetime was the same in seriatim and grouped runs. Now the average will be the same but the total will not.  |
| 04/20/00 | Corrected beginning of plan year determination for non-beginning of year valuations. This affects U.S. qualified phase-in/out calculations, quarterly contribution interest calculations from the end of the prior plan year, penalty interest relative to the 4th quarterly contribution (which had been assumed due in the wrong calendar year for end of year valuations), and the beginning and end of plan year dates shown in the exhibits.<br><br>For forecasts with contributions equal to accounting expense, corrected PBGC premium determination to properly reflect whether contributions at least equal to the full funding limit were made.   |
| 04/19/00 | Changed calculation methodology for public mode funding period and Canadian registered mode "reduce amortization period" ongoing liability adjustments. The new methodology may create funding/ amortization periods that differ from the old by 1/100th years.   |
| 04/11/00 | Corrected U.S. qualified minimum contribution basis aggregate method normal cost to add any funding deficiency to assets in accordance with Revenue Procedure 80-50.<br><br>Corrected U.S. qualified maximum deduction basis aggregate method normal cost to adjust assets by any carryforward prior to calculating the normal cost.  |
| 04/02/00 | Changed methodology for percent male weighting of post-decrement mortality. Previously, ProVal averaged px's for actives and lx's for inactive. ProVal now averages tpx's (where x represents entry age for actives and attained age for inactive).   |
| 04/02/00 | For inactive at 100% mortality on the valuation date (typically age 111 and above), death is now distributed during the year in accordance with the benefit payment frequency parameter. Previously, death was assumed to occur immediately. This change also applies to the Calculate Annuity Factors option under Benefit Component Tables.   |
| 03/23/00 | Revised active (and emerging inactive) valuation and projection results in pension modes:<br><br><ol style="list-style-type: none"> <li>1. Actual and expected benefit payments are now directly calculated as cash, rather than the present value at the beginning of the year.</li> <li>2. The valuation COLA assumption is now applied directly to decrementing actives as the core projection experience assumption. Previously, core projection liabilities excluded COLAs, which were incorporated into the liabilities during deterministic and stochastic forecasts.</li> <li>3. Percent male adjustments for members and beneficiaries are now made to mortality probabilities (q's) rather than annuity values (a's). This treatment is consistent with OPEB mode.</li> <li>4. Under a middle of year decrement assumption, benefit payments and liabilities for decrementing actives now explicitly reflect 1/2 year mortality in the</li> </ol> |

year of decrement. In other words, 1/2 px for member benefits, 1/2 py for beneficiary benefits, 1/2 pxy for joint benefits, 1/2 qy for insurance benefits, and no mortality for certain benefits. Previously, this was approximated using the applicable full year's mortality divided by 1/2 px. This change also applies to the Gain / Loss Analysis Tool.

5. Corrected bug in core projections when the percent electing j&s (or percent married) was set to zero.

6. Corrected treatment of career average or unit benefit update plan amendments involving a change in payment form. Previously, the new payment form was recognized for in all years after the amendment for valuation purposes but only in the amendment year for experience. Now, ProVal consistently recognizes the new payment form in all years after the amendment.

7. Corrected treatment of plan amendments involving a change in post-decrement probabilities. Previously, new post-decrement probabilities were reflected for valuation purposes but not for experience. Now, both are reflected.

8. Corrected benefits inforce for benefits with a certain period. Previously, the inforce value decreased according to experience survival during the certain period.

9. Removed special case involving certain combinations of J&S fractions in active payment forms. Previously, if  $F_{xy}$  = fraction when both member and beneficiary are alive,  $F_x$  = fraction when only the member is alive, and  $F_y$  = fraction when only the beneficiary is alive, then in the special case where  $F_{xy}=F_x$  and  $F_y=0$ , the fractions were reset to  $F_{xy}=F_x=1$  and  $F_y=0$  (equivalent to a straight life annuity).

#### ProVal version 2.15

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01/26/00 Corrected contributions when the policy is to contribute the accounting expense and administrative expenses are included in the accounting expense. Previously the expected return on assets adjustment for administrative expenses was not included in contributions.

01/20/00 Revised initial inactive present values for life insurance, certain annuities, and certain and life annuities involving multiple payments per year (e.g., monthly). The current and prior approximation methodologies differ by several parts per 10,000 and are as follows:

Certain annuities

$$(1-v) / [m * [1-v^{1/m}]]$$

(current methodology)

$$(m+1)/2m + [(m-1)/2m]*v$$

(prior methodology)

Life insurances

$$v^{(m+1)/2m}$$

(current methodology)

$$(m-1)/2m + [(m+1)/2m]*v$$

(prior methodology)

where m is the number of payments per year and v is  $1/(1+i)$ .

Under the current methodology, certain annuities are valued exactly regardless of the number of payments, and a more standard approximation is used for life insurance. Under the prior methodology the approximation technique was the same for all payment forms.

This change establishes consistent methodology for initial inactives and decrementing actives. It reverses a change made effective 2/17/97. This change

also applies to the Calculate Annuity Factors option under Benefit Component Tables.

- 01/14/00 Corrected FAS expected future service scaling factors bug for non-OPEB mode inactive-only runs that were scaled and combined with active runs. Previously, if a scaling factor of 1 (the default) was applied to the accounting expected average working lifetime of an inactive-only run, the total expected future service was changed from 0. If this run was combined with one or more active runs, it changed the total and average expected future service for the plan.
- After the correction, all modes will work comparably in that a scaling factor other than 1 on the accounting expected average working lifetime (only), for a run with a 0 total expected future service prior to scaling, will be used as the average future service for the scaled run.
- 12/13/99 Corrected Core Projection to apply correct experience mortality for actives after decrement (pension only). Previously, the same experience mortality was applied to benefits sharing the same payment form, valuation mortality, and current liability mortality -- even if experience mortality differed.
- 11/24/99 Corrected evaluation of zero service condition as used to determine which "participants are included in (most) liabilities". A zero service condition inadvertently included all participants, regardless of the service field provided. Specifically, service was not allowed to be negative, so the condition "service >= 0" was always true. This bug was introduced with version 2.14.
- 11/23/99 Corrected Core Projection to apply experience COLA to initial inactives' PBGC liabilities even if valuation COLA isn't applied.
- 11/02/99 Corrected Valuation Set bugs with multiple events and the FIL method. Asset valuation method changes after 5/5/99 had been double counted as both a funding method and an assumption change. Also, bases limited to meet the user's full funding definition may have reflected a double counting of prior events.
- 11/02/99 Added 3 decimal (xx.x%) rounding to the RPA '94 Gateway test and 4 decimal rounding to the current liability funded ratio in accordance with the 1998 Schedule B instructions and form.
- 10/15/99 Corrected forecasting error in public and non-qualified modes when COLAs are specified in the deterministic or stochastic assumptions and the contribution policy reflects the full funding limit. Previously the COLAs (with the exception of any valuation COLA for initial inactives) were not included in the liability used to calculate the full funding limit.
- 09/27/99 Changed the rounding methodology for existing accounting amortization bases when rounding is selected in exhibits. Now a 2 decimal rounding of the amortization period is used for both previously existing and newly calculated amortization payments including any gain/loss amortization.
- 09/27/99 Corrected minimum contribution calculations when a contribution schedule is referenced and the valuation date is later than the first day of the plan year.

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ProVal version 2.14 (and earlier)

- 09/24/99 Corrected various bugs relative to forecasting Canadian Registered plans with an unfunded solvency liability.
- Also in Canadian mode, (1) adjusted solvency assets when a new ongoing liability is created as a result of the elimination of a solvency liability base, and (2) changed the calculation when ongoing liability payments over 5 years are adjusted to not allow the post 5-year payment to be negative.

- 08/31/99 Corrected bug computing mthly adjustments for j&s annuities when the fraction "when both are alive" = 0. This error only affected initial inactives and was typically less than 1% in magnitude.
- 08/23/99 Changed gain/loss methodology for Actives who become Retired or Vested at the e.o.y. ProVal used to override the e.o.y. status to Retired if retirement eligible or Vested if not retirement eligible. The new methodology uses the e.o.y. status to allocate the gain/loss but calculates the gain/loss in the same way. Thus, the gain/loss for Actives who become Retired will now be allocated solely to retirement under "Active decrements" and "Unreconciled amounts". Similar logic applies to Actives who become Vested.
- 08/18/99 Corrected gain/loss continuing active sources for plans involving PIA. Previously, a spurious loss was added to the "salary growth & regulatory increases" source and an offsetting spurious gain was added to the "unreconciled amounts - continuing actives" source. Changed gain/loss treatment of J&S beneficiaries where the member is rehired. The beneficiary is now assumed to have lived rather than died during the year. Typically, this translates into a small loss instead of large gain due to survivor beneficiary mortality, with a correspondingly lower unreconciled loss due to being rehired. The total liability gain/loss is not affected.
- 08/17/99 Corrected stochastic discount rate calculations to reflect any maximum change in one year specification when rates decline as well as when rates increase. This change may also affect funding interest rates and accounting expected return on assets if these rates were parameterized to vary stochastically. The change will NOT affect current liability rates.
- Corrected calculation of 100% of current liability maximum RPA additional funding charge to roll assets and liabilities to the end of the year at their own respective interest rates rather than both at the current liability rate.
- Corrected public mode funding period calculation to have an upper limit of 100 rather than 40 and to reflect level percent of salary amortization (these bugs were introduced in version 2.14).
- 08/16/99 Corrected treatment of funding deficiencies for full funding limit, additional funding charge and normal cost calculations. The credit balance used for these calculations is now limited to not less than zero.
- Corrected quarterly contribution requirement test to use the RPA current liability funded ratio rather than the gateway test funded ratio.
- Corrected gateway test funded ratios for RPA additional funding charge during a forecast and during an Asset & Funding Policy update (there was no problem with Valuation Set results). If less than the maximum rate had been used, the maximum rate funded ratio was not reflected in the update or used for the 2-year look-back test during a forecast.
- Corrected application of a flat percent of payroll contribution policy to require that expected end of year plan assets be no less than zero.
- 07/20/99 Fixed gain/loss bug related to alternative salaries in a b-o-y valuation when continuing active sources were analyzed. This caused either an INDEX ERROR or incorrect allocation of continuing active gains & losses. The total continuing active gain/loss was not affected.
- 07/09/99 Corrected criteria for determining service groups in age/service scatter charts. The previous and corrected criteria are shown below, where service is exact service based on the date of hire field specified in Census Specifications.

<u>Service Group</u>	<u>Previous criteria</u>	<u>Corrected criteria</u>
less than 1	service <= 1	service < 1

1 to 4	1 < service <= 4	1 <= service < 5
5 to 9	4 < service <= 9	5 <= service < 10
10 to 14	9 < service <= 14	10 <= service < 15
15 to 19	14 < service <= 19	15 <= service < 20
20 to 24	19 < service <= 24	20 <= service < 25
25 to 29	24 < service <= 29	25 <= service < 30
30 to 34	29 < service <= 34	30 <= service < 35
35 to 39	34 < service <= 39	35 <= service < 40
40 & up	39 < service	40 <= service

- 06/30/99 Fixed bug in core projections with amendments where the replacement benefit definition has a different payment form than the original benefit definition. The problem affected the last n years of a core related to new entrants hired n years after a plan amendment. Previously, these years' benefit payments, inactive liabilities, and inactive demographics reflected the old, rather than the new, payment form. This bug is a remnant left from a 10/13/98 fix that did not completely fix this problem.
- 05/07/99 Corrected determination of FIL bases during a forecast when the plan is fully funded. Previously a new base was set equal to the negative plan surplus. Now all positive bases are added and negative bases are subject to the user's full funding definition.
- 05/05/99 Corrected determination of ERISA minimum funding Valuation Set Frozen Entry Age (FIL) negative amortization bases when current bases exist and/or when the base is due to an asset valuation method change. When negative bases are added, ProVal limits the total frozen UAL to be no less than the user's full funding definition.
- If the funding method is changed to FIL as a Valuation Set Event, ProVal now forces the minimum and maximum bases to be in balance regardless of whether the user specified that the maximum unfunded should be limited to 0.
- Corrected the Valuation Set US IRC maximum deductible contribution to always match that developed in the Valuation Set Exhibits. Previously adjustments to balance the minimum and maximum bases may not have been reflected in the Valuation Set results.
- 05/04/99 Fixed bug involving RPA'94 current liability for disability benefits. Previously, disability benefits were valued under the valuation-basis disability mortality, not the RPA'94 basis, if the following conditions applied:
- a) the valuation-basis disability mortality matched the retired and/or vested terminated mortality, and
  - b) the disability benefit payment form matched a retirement and/or termination benefit payment form, and
  - c) the valuation-basis and RPA'94-basis disability mortality differed.
- 04/16/99 Fix bug involving the use of covered compensation tables frozen as of a given year. Previously, the covered compensation used for all decrement ages for a given record was the single value calculated as of the freeze year, with level wage bases from that year forward. For decrement ages prior to the freeze year, this implicitly involved projection of the wage base from the year of decrement to the year of freeze. Under the revised approach, wage bases are projected only to the earlier of the year of decrement or the year of freeze. Thus, covered compensation values at these earlier decrement ages will be commensurately lower.



Also, application of the \$3000 rounding rule to the covered compensation tables has changed slightly. Previously, tables frozen as of 1993 or earlier used the pre-1994 rounding rule. Now, the post-1993 rounding rule is used in all cases.

- 04/16/99 Fixed bug involving the use of a service or age by service salary merit scale in conjunction with either a #PIA operator or a salary definition wherein current salary is imputed from prior year salary. Previously, the service intervals for such merit scales started at age 18 in most cases instead of at hire age. Now, the service intervals extend from hire age. For ages prior to hire age, the merit scale values based on age/zero service are used.
- 04/16/99 Changed treatment of "project & prorate" accrual rates where the "Service req'd for ultimate accrual" is 0. In this circumstance, the accrual rates equal the "ultimate accrual" as soon as the "projection age" is attained, even if service is 0. Previously, if service was 0 so were the accrual rates.
- 04/16/99 Revised calculation of #ROUND for negative numbers of the form -n.5. Such numbers had been rounded to -n. Now they will be rounded to -(n+1). The results of the #ROUND operator on all other numbers are unchanged.
- 04/16/99 Fix forecast bug which determined the valuation COLA based on the first core projection in the list. Now the average COLA of all valuations is used. This information is only relevant for estimating the value of plan changes attributable to COLAs for emerging inactive for whom there is a non-zero valuation COLA. There is no effect in the more common case where a COLA different from the valuation COLA is valued as a gain/loss. There is also no effect on initial inactive for whom the valuation COLA is automatically included in projected liabilities.
- Implemented the Asset & Funding forecast parameter specifying whether experience COLAs are applicable to all benefits or just those in pay status. Previously the accounting valuation assumption for the first core projection was used regardless of how this parameter was set.
- 03/09/99 Fixed bug in stochastic forecasts using a multi-factor capital market simulator that was created from scratch rather than by modifying one of the illustrative simulators. The FAS 87 discount rate and other interest rates were not being changed from their initial values during the forecast.
- 12/22/98 Fixed bug with "Calculate annuity factors..." option in Benefit Component Tables. Erroneous values were produced if the youngest age in the table was greater than 15. This bug was introduced in version 2.13.
- 10/13/98 Fixed bug in core projections with amendments where the new benefit definition has a different payment form than the original benefit definition. Previously, post-amendment benefit payments and expected benefit payments (but not liabilities) reflected the old, rather than the new, payment form. This bug was introduced on 9/21/98 in ProVal 2.13; these values were correct for core projections run under ProVal 2.12 and prior versions.
- 09/30/98 Fixed bug in certain Valuation Sets with Assumption Change, Plan Change, or additional Gain & Loss events. If the baseline included both funding and accounting valuations, but an event included only accounting, funding interest rates were set to 100,000%, creating very large contributions (and vice versa for an event including only funding).
- 09/21/98 Records with a zero current salary as part of their Valuation Salary definition are now excluded from processing. This is done regardless of how the "invalid historical salaries" option is set in the salary definition. Note that this change does not apply to Alternative Salary definitions.
- 09/21/98 Revised Define Field by Table logic so that oldest age in the table (the age shown with >=) will apply to all records with an age greater than or equal to the

- table's oldest age. Previously, Define Field by Table returned a missing value for records with an age greater than the oldest age in the table.
- 09/21/98 Fixed inconsistency between sample lives and valuation results involving entry age normal (EAN) liabilities and employee contributions. Previously, sample lives showed a non-zero EAN liability for employee contributions. Now, sample lives correctly display a zero liability; valuation results were unaffected.
- 09/21/98 Fix error in pure unit credit calculations involving a benefit formula component of the "database expression" type with increase rates. Previously, the UC liabilities and costs were based on the evaluated database expression projected to future ages with the increase rates. Under the revised liability calculations, these values are not projected beyond the valuation date(s), resulting in commensurately lower liabilities.
- 09/21/98 Fix bug in certain FAS calculations involving salary decreases. Previously, averages near entry age based on periods less than the regular averaging period were included when searching for the highest average in the considered period at later ages. With the fix, the affected FAS values will be commensurately less.
- 09/21/98 Corrected assumption change calculations that double counted COLAs when both a COLA and an assumption change occurred in the same projection year.
- 09/21/98 Corrected calculation of J&S annuity factors in Benefit Component Tables when the "fraction of J&S benefits received when both member and beneficiary are alive" was 0. Corrected values are based on:  

$$pctx\ ax + pctx\ ay - (pctx + pctx - pctx) \ axy$$
Where pctx, pctx, and pctx are the fractions received when the member, the beneficiary, and both are alive. Previously, such values were calculated without the joint life annuity offset [(pctx+pctx-pctx) axy].
- 09/21/98 Revised active valuation and projection results for deferred joint life annuities. Previously, member mortality was used in place of beneficiary mortality to discount ax, ay, and axy, as in:  

$$v\ px\ ax + .5\ v\ px\ ay - .5\ v\ px\ px\ axy.$$
Now, member and beneficiary mortality discounts are applied separately, as in:  

$$v\ px\ ax + .5\ v\ py\ ay - .5\ v\ px\ py\ axy.$$
Corrected values for deferred joint life annuities are different by 1% to 2% for typical combinations of assumptions.
- 09/21/98 Change treatment of future new entrants during a core projection with plan amendments. Previously, new entrants in the year of a plan amendment were deemed to have no increase (decrease) in actuarial liability on account of the plan amendment. Under the revised approach, these new entrants will show a change in liability based on a comparison of their liabilities under the old and new benefit formulas. Thus, new entrants could now provide a non-zero component to the overall change in liability for a plan amendment.  
Also, in rare cases, the expected future service for new entrants may change in the year of a plan amendment. The change only affects cases where a benefit was projected to be zero (or negative).
- 09/21/98 Frozen Entry Age (FIL) negative normal cost adjustment and other new bases, as well as maximum basis fresh start, changed to reflect user's choice of full funding methodology.
- 06/19/98 Expenses are now included in the current liability normal cost for development of any additional funding charge, the full funding limits and the special deduction limit. Expenses are no longer included in the development of end of year assets. These changes are in accordance with Question 13 in the 1993 gray book.

- 04/18/98 Fix bug w/r to cash balance formulas that include empirical cash balances. In ProVal 2.11, formulas with zero formula accruals as of the valuation date and with non-zero empirical cash balances were evaluated at zero for all cost methods. Prior to version 2.11, the flaw existed only for the Projected Unit Credit liability method when accrual rate proration was used. With the fix, the empirical balances are used directly and projected according to the interest crediting rates. Similar comments apply to career average formulas that include empirical accrued benefits.
- 4/06/98 Various corrections to the determination of ERISA maximum and minimum amortization bases when a plan is at or near full funding, a carryforward exists or a reconciliation account balance exists. The COLA plan change is now correctly calculated if COLAs are provided to emerging, but not initial, inactive.
- 3/11/98 Historical salaries are now ignored for future new entrants in a core projection. In ProVal version 2.11, historical salaries were used for new entrants with past service, but without an adjustment for salary inflation. Current salary for future new entrants has not changed.
- 3/11/98 The 415(b) maximum benefit 3-year average salary calculation has been modified. Previously, this was incorrectly based on salaries subject to the 401(a) maximum compensation limit. Now, the salaries are not limited. In theory, this could change results.
- 1/26/98 Future current liability full funding credit bases for multi-employer plan are now amortized over 30 years. Previously, a 10 year amortization period was used. Corrected FIL method maximum contribution bases when a new base is automatically created to correct a negative normal cost and the funding standard account credit balance or accumulated reconciliation account is non-zero.
- 1/19/98 In the derivation of the 415(b) maximum benefit limit, the proration for less than 10 years of participation service can no longer drop below 1/10. Previously, the proration was simply service/10, which would be less than 1/10 for participants with less than 1 year of service. The impact on liabilities should be negligible for most cases.
- 1/15/98 Stochastic forecast results, for mixes after the first mix, have been corrected for plans affected by the TRA '94 transition and/or optional rules.
- 1/07/98 For #PIA calculations, the method of increasing national average wages for the two years prior to the valuation date has been changed. Previously during a Core Projection, these increases were based on the experience wage inflation assumption. Now, the comparable valuation assumption is used.
- 12/16/97 Improved the normal-distribution random number generator used in Capital Market Simulations. The old version generated only 500 distinct values in a limited range. The new version produces continuous values with unbounded range. This change affects simulated returns in the second significant digit, with the larger impact on the distribution tails. Correct the Output | Capital Market Simulation command methodology for calculating standard deviation.
- 12/04/97 The Valuation Assumption question "Relationship of Plan Year to Valuation Date Year" has been eliminated. Now, only the "Same year" option is supported. Previously, choosing "Plan Year is 1 year later" or "Plan Year is 1 year earlier" affected #AVGWB, #PIA, #SSWB, #CVCP, #MAXBEN, and #MAXSAL calculations as well as the application of maximum salary and benefit limitations.
- 10/15/97 Change methodology used for the evaluation of "career average" and "accumulation with interest" accrual basis formulas. Previously, any credited

service at entry age (e.g., entry into the plan five months before the valuation date) was dropped and the cumulative accruals were assumed to start from the rounded entry age. With the change, the accrued benefit as of entry age is set to the service at entry age times the accrual basis at entry age. Thus, all service credits are now taken into account.

Note that this change will directly impact only those cumulative formulas for which no empirical benefit has been supplied. Otherwise, the impact will be revealed only in the shape of the curve used to impute accruals leading up to the current accrued benefit.

- 9/08/97 Corrected some maximum full funding limit exhibit issues related to the 7/24/97 carryover corrections below. RPA assets (item 5(g) on the exhibit) had been calculated incorrectly when the valuation included an explicit expense assumption or a carryover.
- Changed the maximum basis balance equation minimum from \$0 to the negative of the carryover when the user specifies that the maximum unfunded liability is limited to 0 but a carryover exists.
- 7/31/97 Corrected calculation of interest on quarterly contributions for plan years beginning on a date other than January 1 and for valuation dates at other than the beginning of the year.
- 7/24/97 Corrected treatment of U.S. maximum deduction carryover in accordance with Revenue Ruling 82-125.
- 7/16/97 The 5/29/97 change with respect to the Accumulated Reconciliation Account (ARA) and aggregate funding methods has been refined/corrected. In accordance with the 1992 Gray Book, the ARA is not reflected for the normal cost development under the Aggregate funding method, but it is reflected under Frozen Initial Liability funding methods.
- 6/26/97 Corrected qualified plan current liability full funding calculations for contributory plans.
- The qualified plan minimum amortization bases specification to set up no new bases when the unfunded liability is negative will now work even if there are existing amortization bases. Any existing amortization bases will be retained.
- 6/09/97 Corrected Valuation Sets bug w/r/t events that changed assumptions from a static interest rate to calendar year dependent interest. Maximum basis amortization amounts had not been adjusted for the new interest rate.
- Corrected benefit payments for stochastic forecast referencing only accounting results. Benefits for emerging inactives had not been included.
- Corrected funding gain/loss for normal cost + supplemental cost contribution policies where contributions to the unfunded liability are other than the scheduled payment. Now any excess/deficit contributions are amortized in accordance with the amortization period specified for funding method changes.
- Projected liabilities for Netherlands minimum contributions corrected regarding recognition of interest and expected employee contributions.
- 5/29/97 Eliminated all references to waived funding deficiencies in the Asset & Funding Policy Prior Year Values screen. This may change equation of balance and quarterly contribution calculations.
- In accordance with question #2 of the 1992 Gray Book, the Accumulated Reconciliation Account is no longer subtracted from assets for aggregate funding methods.
- 5/15/97 Changed RPA '94 Additional Funding Charge target percentage to always round to 4 decimals.

4/25/97	Corrected calculation of COLA plan change amount for core projections performed under version 2.08 (new inactive coding).
4/04/97	Corrected amortization of negative plan amendments under FAS 87/106. Such amendments now reduce existing positive prior service cost bases (and/or the transition obligation under FAS 106) on a pro-rata basis.
4/01/97	Corrected calculation of deferral and temporary ages for inactive benefits when date fields are referenced. Previously rounded attained age was used as the basis for the calculation, producing anomalous results for participants born midway between valuation dates.
3/28/97	The routines performing PIA calculations have been entirely rewritten in order to eliminate a series of errors/problems. Compared to previous results, the revised PIA values can vary substantially, based on assumptions and decrement age. The magnitude and direction of these changes should be evaluated on a case by case basis. In several test cases, the new values at normal retirement age were found to be within plus or minus 5% of the prior values; while values for mid-career decrement ages varied by as much as 15%.
3/28/97	<p>The projection of wage bases under a calendar year increase rate assumption has been corrected. The Social Security National Average Wage (NAW) is now projected beginning with the increase rate for the year 2 years prior to the valuation plan year. In accordance with current law, Social Security Wage Bases, prior to rounding, then move in tandem with the NAW of 2 years before. Previously, both the NAW and the Wage Base were projected forward beginning with the increase rate for the current plan year. This change affects the results of ProVal operators #AVGWB, #SSWB, and #CVCP, as well as #PIA as implied above.</p> <p>Also, minor changes have been made in all projected wage bases due to superior techniques for rounding to the nearest \$300. These changes may affect liability values by several parts per 10,000.</p>
3/24/97	Corrected treatment of accounting only lump sum benefits during a forecast. Similarly to accounting only annuity benefits, they are excluded from actual benefit payments. (If funding and accounting benefits differ, ProVal assumes that the funding benefits represent the plan's actual experience.)
3/14/97	Corrected application of scaling factors to RPA '94 Current liability for emerging inactives.
2/17/97	<p>Revised (initial) inactive valuation and projection results:</p> <ol style="list-style-type: none"> <li>1. Corrected values for deferred joint life annuities are different by 1% to 2% for typical combinations of assumptions. This change also applies to the Calculate Annuity Factors option under Benefit Component Tables.</li> <li>2. Values for life insurance, certain annuities, and certain and life annuities have changed in the case of multiple payments (e.g., monthly). These values are different by several parts per 10,000 due to a switch to consistent methodology. This change also applies to the Calculate Annuity Factors option under Benefit Component Tables.</li> <li>3. Actual and expected benefit payments are now directly calculated as cash, rather than the present value at the beginning of the year.</li> <li>4. The valuation cost-of-living increase assumption is now applied directly to the initial inactives as the core projection experience assumption. Previously, core projection liabilities excluded COLAs, which were incorporated into the liabilities during deterministic and stochastic forecasts.</li> </ol>

5. A Census Specification life insurance payment form is assumed to be on the member's life. Previously, insurance coupled with a contingent annuitant life annuity was treated as insurance on the contingent annuitant's life.
6. The contingent annuitant life annuity payment form has also been eliminated; such benefits are now coded as joint life annuities. This methodology may affect the average percent male and average age statistics since these will reflect the member's sex and age instead of the contingent annuitant's.
7. The previous J&S Annuity-Period Certain payment form is no longer available because it's ambiguous. Moreover, it is unlikely that ProVal's Census Specification conversion will produce the desired results if this payment form was previously referenced. (A warning will appear on the update in this case.)
8. During a core projection, the head count results are now based solely on experience survival probabilities for the primary life on the data record. Thus, for example, participants with certain only annuities or deferred lump sums will remain in the participant count after their liabilities are \$0.
9. Census Specification and data checking is now more rigorous. Records may now be excluded from processing that were previously thought to have generated reasonable results.

Please note that these changes apply to valuation inactives and core projection inactives. Emerging inactives (from active status) during a core projection are not affected.

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| 2/17/97  | Cost of living increases (COLAs) are now applied to benefits in deferral status if the valuation assumptions included a non-zero COLA during the deferral period.  |
| 2/17/97  | Components of a Benefit Formula or Accrual Basis that referenced a Selection Expression no longer set non-unity values to 0. Previously, Selection Expression components were evaluated as if the expression were preceded by "1=". These have been renamed "Database Expressions" and the "1=" test removed.  |
| 1/16/97  | Fixed bug in #DATEPLUS and #DATEMINUS that caused the result to be one year later than expected in some (mostly rare) cases. The error occurred when adjusting the final result so that November would have no more than 30 days. For example, 5/31/95 #DATEPLUS 6m returned 12/1/96, rather than 12/1/95.   |
| 10/21/96 | Fix bug w/r to determination of benefit eligibility in conjunction with a valuation assumption of mid-year decrements. Previously, benefit eligibility was always determined at the beginning of each year based on the projected age, service, and date statistics at successive valuation dates. Thus, under the prior approach, a record first attaining eligibility for a particular benefit during the first 6 months of the year would be deemed first eligible in the next year, notwithstanding the possibility that an assumption of mid-year decrements may have been specified. |
|          | With the correction, records are tested for benefit eligibility at the assumed point of decrement rather than at b.o.y. Thus, for mid-year decrements, about half the records will show first eligibility for a particular benefit one year earlier than before, resulting in slightly higher liabilities in most cases.   |
|          | Note that for purposes of benefit eligibility under mid-year decrements, the valuation assumption w/r to b.o.y. or mid-year decrements is controlling. This is true even though it is possible to specify contrasting valuation versus experience assumptions in this regard during a projection.  |
| 10/21/96 | Change in application of valuation COLA assumption to PBGC liabilities. Now, a single valuation COLA assumption applies to all liability calculations, except that the user has the option to force a COLA assumption of zero for the PBGC basis irrespective of the assumption applied to all other bases.  |

10/17/96	PBGC variable premium liability is now interpolated during a forecast if it exists in the underlying core(s), whether or not PBGC premiums are included in plan expenses.
9/12/96	Correct FAS cumulative gain/loss calculation during a forecast when a contribution receivable exists.
8/25/96	Fix bug w/r to FAS-106 expected working lifetimes for amortization of prior service cost. Previously, the calculation was based on the probability of surviving in service to the full eligibility age, assuming eligibility for a benefit coverage. Now the calculation is similar to that for the amortization of FAS-106 gains and losses or the transition obligation, except that only those yearly segments through the earlier of the full eligibility date or the first 100% retirement age are used. Thus, to the extent that there are positive benefits payable upon decrement before the full eligibility date, the revision will produce higher values.
8/08/96	ProVal now reflects the contribution receivable specified in the Asset & Funding Policy for the development of FAS 87/106 expected return on assets and prepaid/accrued cost, as well as the projection of accounting assets to the next year. Timing of receipt into the trust is assumed to be consistent with other contributions. Previously this variable was not used.
7/26/96	Maximum contribution basis full funding limit corrected to explicitly reflect the minimum 90% unfunded RPA '94 current liability limit. This change affects small plans, plans attempting to contribute the maximum excluding the unfunded current liability (to avoid PBGC variable premiums), and the determination of whether or not PBGC variable premiums are payable.
7/23/96	In accordance with question 4 of the 1996 Enrolled Actuaries Meeting Gray Book, minimum basis amortization bases are only erased if an accrued liability full funding limit credit remains after the RPA '94 90% current liability override.
7/22/96	<p>ProVal will now interpolate interest rates for deterministic forecasts where the underlying core projections included calendar year dependent interest rates. The Deterministic Assumption Set interest rate is assumed to represent that calendar year's rate, with the subsequent pattern of rates consistent with the valuation assumption structure. Thus, if the valuation assumptions were .075 for 1997, .08 for 1998 and .085 thereafter, and the Deterministic Assumptions indicate a .08 rate for 1997, then the 1997 valuation assumptions used will be .08 for 1997, .085 for 1998 and .09 thereafter.</p> <p>Consistent with the treatment of other law changes within ProVal, the Rev. Proc. 95-51 10 year amortization of method changes is now only applied for forecasts beginning with plan year 1995 or later.</p> <p>Initial bases with an amortization period of less than 1 year are now correctly valued. Previously, except in the exhibit display, the outstanding balance of such bases was reduced proportionate to the amortization period.</p> <p>The treatment of benefit payments for pay-as-you-go contributions has been changed. In order to avoid spurious FAS 87 gains/losses, expected PBO benefit payments are set equal to actual benefit payments. Previously actual benefit payments had been set to expected in some cases.</p>
7/18/96	Corrected the standard deviations (and efficient mixes) calculated by the Efficient Frontier command. For a brief time, the correlation matrix was not symmetric. This led to erroneous standard deviations and the possibility of inefficient mixes where three or more asset classes were selected.
6/10/96	Some logic corrections with respect to deterministic and stochastic forecasts have been made:

	<p>1. Previously, the plan and/or assumption change amount (and balancing gain/loss) attributable to emerging nonactives had been incorrectly calculated (generally underestimated).</p> <p>2. Previously, the logic regarding applicability of the PBGC variable premium had incorrectly reflected the credit balance, and had not accounted for interest on contributions made prior to the end of the year.</p>
6/10/96	The detail output for valuation sets and deterministic and stochastic forecasts has been corrected to reflect interest and/or roll-forward adjustments applicable to the total, so that the detail components now add up to the total. This change affects non-OPEB mode benefit payments, service cost interest, and the roll-forward of accounting liabilities.
5/07/96	<p>Salary Definitions changed the treatment of historical salaries for current salary (i.e., #SALARY), final average salary (i.e., #FAS), and PIA (i.e., #PIA) calculations:</p> <p>1. Invalid salaries are now replaced with valid values, per the user's option. Previously, invalid values were used.</p> <p>2. For PIA calculations, salaries prior to entry age are now disregarded; imputed values are used instead. Previously, actual salaries to the earlier of hire or age 20, but not before 1950, were used.</p>
4/24/96	A bug with respect to the application of postdecrement probabilities has been corrected. Previously, if postdecrement probabilities had been entered in valuation or projection assumptions but the benefit formula was later changed such that postdecrement probabilities were not applicable, the prior postdecrement probability assumptions were applied.
4/23/96	Treatment of expenses in the development of the FASB cumulative unrecognized gain/loss has been corrected.
3/01/96	The PBGC Variable Premium Liability is now calculated using the RPA '94 (new) current liability mortality. Previously, the calculation was using the old current liability mortality.
2/21/96	<p>The aggregate method normal cost for qualified plan minimum funding calculations is now forced to zero after expenses are added, not before.</p> <p>Treatment of expenses for FASB pension cost has been changed to be consistent with funding treatment. Accordingly, expenses are assumed to be beginning of year, with interest reflected in both the service cost and the expected return on assets. Previously no interest adjustments were made.</p>
2/09/96	Corrected error in the calculation of the vested new current liability when it is based on a mortality table that differs from the valuation mortality assumptions. The wrong lx table had been used.
2/03/96	Change in application of first funding age. Previously, PROVAL did not apply a funding eligibility screen to records to be included in the alternative ABO and FAS-35 calculations. With the revision, the funding eligibility screen will be incorporated with the calculations under the alternative accounting UC methods.
1/24/96	<p>Change in calculation of first funding age. Previously, ProVal determined a first funding age for each record based on the age and service parameters for first funding age and then compared this age to the first age for which the record would be eligible for a benefit. If this benefit eligibility age was earlier, then the first funding age as otherwise calculated was set to the eligibility age. Under the revised approach, this potential override has been eliminated.</p> <p>In addition, alternative basis FAS 35 and ABO liabilities were not subject to the first funding age constraints. This has been corrected.</p>



The Social Security PIA bug noted below at 3/13/95 has been corrected. Historical Regulatory Data Overrides are no longer necessary to get correct PIA calculations for valuation years prior to the current year. In addition, projected National Average Wage amounts are now rounded to the nearest \$1, not the nearest \$300.

The behavior of arithmetic operator #INT has been corrected with respect to negative arguments. Previously, the expression #INT -2.2 incorrectly produced the value -3. The correct value should have been -2.

1/19/96 Direct calculation of qualified mode New Current Liability is now available. Prior to this date, the New Current Liability had been set equal to the Old Current Liability during a valuation or core projection.

Vested liabilities are now correctly calculated. Vested liabilities are available for the New and Old Current Liability, the ABO, and the FAS 35. In addition, the PBGC Variable Premium Liability is calculated only on a vested basis (though currently using the Old Current Liability mortality basis).

1/09/96 In accordance with Revenue Procedure 95-51, Valuation Set Events have been modified to amortize post-1994 plan year funding method changes over 10 years.

Implementation of stochastic first year override of inflation corrected with respect to inflation-based plan amendments such as cost of living adjustments.

12/06/95 Accounting Expected Benefit Obligation (EBO) is now rolled forward consistently with the other accounting liabilities when the accounting measurement date differs from the valuation date.

Corrected maximum basis normal cost for:

- aggregate method where amortization bases, such as for the current liability full funding credit, are applicable; and
- frozen initial liability (FIL) methods where a credit balance exists and the frozen unfunded liability is currently \$0.

Corrected FIL methods to do the following:

- Re-initialize (amortized as a method change) to avoid negative statutory normal costs. A negative normal cost is still permitted under the "NC+SC" contribution policy.
- Limit plan, method and assumption change layers to the change in the underlying liability (or less if appropriate based on plan's funded status and user specifications), rather than re-initializing to the total current unfunded liability.
- Do not attempt to correct when initially out of balance.

Correct "NC+SC" contribution methodology to do the following:

- Roll forward contribution policy bases similarly to ERISA minimum bases, not ERISA maximum bases. Any differential from expected is amortized as a gain/loss.
- Do not eliminate bases when the unfunded liability is negative.
- Do not override an initial \$0 frozen unfunded liability.

Reflect user selection of assumption change amortization period. (Previously had used amount labeled "initial unfunded", which defaulted to 20 years in modes where not requested.)

10/30/95 Corrected ERISA gain/loss calculations when funding under the "Normal Cost + Supplemental Cost" methodology. Previously, if the initial funding unfunded liability bases were out of balance with the ERISA minimum amortization bases, then the ERISA minimum gain/loss base was incorrectly set equal to the funding gain/loss base.

	Corrected roll forward of ERISA maximum deduction amortization bases to reflect limit adjustments prorated based on the end of year contribution to the unfunded liability. Previously, the initial unfunded liability and beginning of year contribution, respectively, had been used, resulting in small inaccuracies in the payment allocated to each base.
10/24/95	Corrected select and ultimate table methodology. Previously, select rates equal to zero were overridden with the ultimate rates. Now select rates are used during the select period regardless of value.
10/24/95	Corrected the reduction of section 415 maximum benefits for benefits deferred beyond the 100% retirement age. Previously, deferral was limited to the 100% retirement age, resulting in an increased reduction of the limit. Corrected use of the deferral age argument to #MAXBEN, which was previously ignored.
9/29/95	Correct forecasting error w/r to PTL liability. With the correction, PTL liabilities will be somewhat larger than before. Depending on the active mortality assumption, the magnitude of the change is a cumulative increase of about 1% for each year of a projection beyond the first.
9/25/95	Correct calculation of future capital gains to be consistently on a "current year basis" unless the user specifies "historical basis". Previously, historical capital gains arising after the first year of a forecast were partially included in realized capital gain determinations. Note that total asset returns have not been affected by this change, only the allocation of returns required for some asset valuation methods. Correct accounting capital gains to be based on accounting rather than funding assets. Change accounting market-related asset calculations to be based on accounting administrative expenses rather than funding, to be consistent with the determination of accounting market assets.
9/13/95	Correct evaluation of Benefit Component Tables referenced as Benefit Formula Components when the character types of the Benefit Formula Component name and its formula reference differ (such as when the name is all uppercase and the formula reference is all lowercase). In some cases, such as OPEB tables that are referenced for both participant and dependent calculations, the second reference (usually dependents) indexed incorrectly.
8/22/95	Correct OPEB forecasting error w/r to "nominal payments, valuation basis" for nonactive insurance benefits. With the correction, the projected payments after the first year will be slightly higher.
8/14/95	Correct forecasting error w/r to participants projected to survive on an experience basis to ages beyond the first valuation age for 100% retirement. In cases where the first 100% retirement age on an experience basis was older than the parallel valuation age w/r to the first 100% retirement rate, participants surviving beyond the first valuation 100% retirement age in the second and subsequent years of a projection were omitted from the liability calculations. With the correction, projected liabilities may be significantly higher after the first year of a forecast for the aforementioned combination of experience and valuation retirement rates. Previously, it was possible to perform valuations or projections in which the sum of the decrement probabilities at any age equaled or exceeded unity. Now, for ages before the first 100% retirement rate (or probability), the sum of all decrement probabilities must be strictly less than one. Correct error w/r to use of survivor or dependent lx's under a setback assumption. Previously, for a setback of, say, three years, the survivor/dependent lx's were truncated at age 107 for a mortality table with rates

to 110. With the correction, liabilities for active benefits with a survivor or dependent contingency will increase by about 0.1 to 0.01 percent. Note that liabilities for current nonactives are not affected.

7/28/95 Corrected core projection bug with respect to the benefit formula component valuation increase rates used for interest sensitivity calculations. If interest sensitivities were selected, and increase rates were applicable to a benefit formula component, core projection interest sensitivity runs may have incorrectly reflected valuation increase rates equal to twice the interest rate change, regardless of the projection assumption interest rate sensitivity specified for the benefit formula component. Note that there was no problem identified with respect to baseline results, inflation sensitivities, accrual basis formula components or projection increase rates.

7/07/95 Corrected adjustment of section 415 maximum benefits for retirement prior to age 62 and after Social Security normal retirement age (SSNRA). When full mortality is applied, pre-62 415 limits for participants with SSNRA 65 or 66 will generally be lower under the corrected methodology by 2% - 5%. When "no mortality" was applied, the corrected methodology will produce more significant differentials that increase for lower retirement ages at all SSNRAs. Also under the "no mortality" scenario, the corrected methodology produces higher 415 limits over SSNRA, that increase with retirement age.

The 415 limit reduction when no mortality is applicable prior to retirement age has been clarified and corrected, and is now in accordance with IRS Notice 87-21. The corrected ProVal methodology without mortality during the deferral period is as follows:

For pre-62 retirement:  $[v^{62-X}] * [a_{62} / a_X]$

For post-SSNRA retirement:  $[(1+i)^{X-SSNRA}] * [a_{SSNRA} / a_X]$

When mortality applies, the appropriate  $L_x$ 's are incorporated into the formulas above.

Note that it is no longer possible to specify "no mortality" for the 415 limit reduction, and a new parameter has been added to indicate no mortality during the "deferral" period, which will produce the results indicated above.

7/06/95 Miscellaneous changes in the calculation of plan contributions with regard to full funding limits, interest on benefit payments, credit balance, contribution carryover, term costs and expenses, as follows:

Change treatment of interest on benefit payments to use estimated cash benefit payments directly, rather than the present value of benefit payments as of the beginning of the year. This changes projected end of year assets for current liability full funding limit calculations, thereby changing all current liability full funding limit amounts.

Correct "contribution necessary to fund 100% of current liability" to use lesser of market and actuarial assets, rather than actuarial assets only.

Correct treatment of credit balance and contribution carryover when full funding limit applies. Previously the credit balance had not been subtracted from the full funding limit; the current liability full funding limit had been overstated by two times the end of year credit balance/carryover; and the carryover had been subtracted from the minimum basis 90% current liability limit.

Correct treatment of term costs and expenses for maximum contribution calculations under individual methods (previously they had been double counted), and for full funding limit calculations (previously the term cost had been excluded).

- 6/23/95 Correct treatment of Funding Standard Account Credit Balance in calculation of RPA '94 Phase-In contribution. Previously the contribution required to meet the target Current Liability funded ratio inadvertently double counted the Credit Balance. This resulted in a potential overstatement of the minimum contribution by an up to the Credit Balance adjusted with interest to the end of the year.
- 6/19/95 Correct errors w/r to linear attribution to benefit eligibility and to full eligibility under PUC and UC methods. Previously, the implied starting point for attribution was based on the PUC/UC linear attribution service field. Now, this starting point is determined by the benefit eligibility and full eligibility service fields, respectively. In addition, the ending point for the attribution period was previously set to the valuation date next following the satisfaction of the benefit or full eligibility conditions. Under the revisions, the end point for the attribution period is determined by the benefit or full eligibility service accrued upon satisfaction of the respective eligibility conditions. Thus, the attribution period will be one-half year shorter on average than before. This leads to commensurately higher liabilities and normal costs during the attribution period under both of the referenced linear attribution options.
- Correct inconsistency w/r to processing of benefit eligibility condition or exception date fields. Previously, these date fields were compared to successive benefit determination dates as part of the eligibility calculations. At the same time, service and age extrapolated from the census determination date was used to process the parameterized eligibility conditions and exceptions. Now, the census determination date is used in all cases for the eligibility calculations.
- 5/19/95 Covered Compensation rounding methodology revised in accordance with Revenue Rulings 95-30 and 93-20. With this change, rounded values will never exceed the wage base. Moreover, the post-1993 rounding rules will only apply to forecasts with a beginning plan year of 1994 or later.
- The 1994 unrounded maximum compensation and maximum benefit limitations have also been adjusted slightly in accordance with the rounding methodology described in general information letter 103-465.
- 4/13/95 The application of the post-1994 rounding rules of historical statutory data has been revised from the 3/13/95 implementation. Previously, forecasts with an initial plan year earlier than 1995 would have the post-1994 rounding rules apply in forecast plan years 1995 and after. Now, the post-1994 rounding rules will only apply to forecasts with an initial plan year of 1995 or later.
- Correct error w/r to the age and sex of actives who decrement by way of death. Previously, the age and sex of the participant was never converted from the members' to the dependents'.
- 3/14/95 Correct error w/r experience mid-year decrements. Previously, projected nonactive liabilities for valuation years after the year of decrement from active status during a forecast were slightly understated. This was due to the use of a full year survivor discount from the point of mid-year decrement to the next valuation date instead of a half-year discount. Similar comments apply to benefit payments and population statistics for those actives who are projected to decrement during a forecast.
- Correct error w/r projection of nonactive liabilities for the second and subsequent valuations during a core projection. For a J&S annuity with the beneficiary's benefit based solely on joint life contingencies, the prior coding did not discount the portion liabilities attributable to joint contingencies for the impact of experience joint life survivorship. With the revisions, these projected liabilities are noticeably lower.
- 3/13/95 Historical statutory data updated for 1995 values and for post-1994 rounding in accordance with GATT. All post 1994 valuation results (including future

projection years) will change to reflect maximum benefit and compensation rounding.

Note that (due to a bug not yet corrected) pre-1995 valuation results for PIA offset plans will change under this release. Original results can be replicated via the Override Statutory Data option: set 1993 and 1994 Nat'l Avg Wage to 22935, and 1994 CPI to 0.026.

3/08/95 Applicable percentage within ERISA minimum contribution Additional Funding Charge calculations rounded to 2 decimal places prior to subsequent calculations in accordance with Form 5500 Schedule B instructions.

2/23/95 Corrected error w/r to "Certain Annuity (no life)" inactive payment form. Previously (briefly), this form was valued like a temporary annuity (i.e., with survivorship discount during the certain period).

2/10/95 Revision of formulation for mid-year decrements. Previously, the following expression was used to describe the present value as of the beginning of the year of decrement of an annuity benefit contingent upon a mid-year decrement probability:

$$PV = qx * [0.5 * (Bx + Bx+1)] * [0.5 * (ax + (v * px * ax+1))],$$

where  $px$  is based on non-active mortality. This reduces to:

$$PV = qx * [0.5 * (Bx + Bx+1)] * [ax - 0.5],$$

which implies an extra  $0.5px$  discount. This is so because  $ax$  is discounted from b.o.y., including mortality, whereas  $qx$  accounts for all contingencies through mid-year. Note that the mid-year adjustment applies only to ages before the 100% retirement age.

The revised expression is as follows:

$$PV = qx * [0.5 * (Bx + Bx+1)] * [v^{0.5} * [0.5 * (ax + ax+1)]],$$

which is larger than the previous formulation by an order of magnitude of  $[0.5 * (1 - px)]$ . Thus, revised liability calculations for mid-year decrements prior to the 100% retirement age will be correspondingly larger.

Correct error w/r to adjustments for PTL mid-year retirement decrements. Previously, adjustments were made for ages prior to the first 100% retirement age from the regular valuation basis instead of from the PTL basis.

Correct error w/r to expected benefit payments, Current Liability basis. Previously, expected payments on account of current actives were incorrectly set to zero if serial annuities were required for the active valuation (e.g., calendar year interest rates). Now, the expected payments are the same for either annuity structure, with the possible exception of records with fractional gender.

Correct error w/r application of serial annuity values (e.g., based on calendar year interest rates) for current actives during a Core Projection. Previously, such annuity values were offset by one year of age for each year into a projection.

Thus, in one typical example, active liabilities for benefits with immediate annuity payment forms degraded at a rate of about 3% per year. At the end of a 5 year projection, such liabilities were understated by a factor of about 14%.

Conversely, liabilities for deferred annuities were overstated at a cumulative rate of about 5% per year into a projection.

Overhaul of calculations w/r to FAS-87 working lifetimes. See FAS87WL. The new approach will change results as follows:

1. Correction of a computational error. For a typical example, the revision produces a total future working lifetime for the plan that is about 9% less than before.

2. Requirement for positive projected benefit. Previously, eligibility for any benefit at a future contingent decrement age was the requirement for inclusion in the special FAS-87 calculation. Now, there is the additional requirement that the associated projected benefit payable be greater than zero.

3. Recognition of plan amendments. Previously, potential changes in eligibility conditions or positive vs. non-positive projected benefits attributable to plan amendments were not taken into account. Now such changes are recognized, starting with the earliest valuation year for which a change is effective.

4. Adjustment for mid-year decrements. Previously, the working lifetimes calculation was the same regardless of the assumption w/r to mid-year decrements. Now, if mid-year decrements are assumed, then an additional half-year of working lifetime (weighted by the appropriate qx and subject to the inclusion test) is included for the year of decrement. This adjustment is made only for ages prior to the first 100% retirement age.

2/09/95 Bug fixed relative to stochastic forecasting of actuarial assets under the spread gain method using gains (losses) based on expected assets.

1/18/95 Scaling factors bug fixed that was caused when output reshaped for 5 vs 9 core interpolations (rec'd by Chicago 1/8). Factors were not reliably applied to the correct output items.

1/05/95 Asset projections modified to reflect employee contribution as of the middle of the year rather than the beginning of the year. This treatment is consistent with the calculation of employee contributions, as well as the treatment of benefit payouts.

#### Asset Valuation Method Issues:

Corridor method re-instated. Any plans that referenced the corridor method prior to the October 5, 1994 update to asset valuation methods had their parameters adjusted such that the corridor limits were applied as overall limits, and the method was set to a weighting of market and expected actuarial values where the weight was the old "out of corridor adjustment factor". This will not produce proper corridor method results, even in the first year. Such plans will have to be re-parameterized manually.

Forecast calculations using the weighted average of market and actuarial values methodologies have been corrected. This change affects all 3 options for calculating the expected actuarial value.

New FASB asset valuation method added: weighting of market and expected market-related assets.

Calculation of expected market-related assets for FASB corridor method corrected to use prior year market-related assets rather than prior year market assets.

11/10/94 Application of maximum salary changed to apply decreases in the historical limit retroactively in accordance with IRS regulations. Thus, 1994 \$150,000 limit is applied to all pre-94 salaries for a 1994 valuation. However, for a 1993 valuation, \$235,840 is used for 1993, \$222,200 for 1992, etc., with a minimum limit of \$200,000 prior to 1989.

11/09/94 Generic benefit changes and career average updates revised so the "past" is changed as well as the future. Thus, the EAN accrued liability and normal cost will be the same in the year of the change as if the new formula had always been in place. The ability to replicate the prior methodology (thereby making the actuarial gain/loss independent of whether plan changes occur) has been retained internally (see BCHGdPAST), but is not available to the user.

Coding has been completed to (1) apply benefit multipliers after calculation of the career average plan update and (2) treat any change in the multiplier reflected in

the career average plan update formula as a permanent change. Previously, the amount of the career average update was underestimated because the current age accrued benefits before and after the update, but after the multipliers were applied, were subtracted to determine the update, if any. Note that this change was generally implemented on 10/27, but a fix relative to new entrant calculations was completed 11/9.

One or more career average updates followed by a generic change to the same formula now works correctly. Previously, liabilities were correct, but the value of the plan change was not. (It's my understanding that) ProVal still cannot properly handle multiple sequential amendments on a single benefit that reference different benefit formulas.

11/05/94 Section 420 Retiree Medical Transfer Excess Pension Assets calculation revised to beginning of year in accordance with IRC.

10/27/94 Projected Unit Credit and Unit Credit normal costs are no longer forced to be no less than zero.

10/19/94 FAS Average future expected service has been corrected to be total expected future service for those expected to benefit divided by the number of participants expected to benefit, rather than dividing by the number of total actives.

Projected FAS expected future service has been corrected by normalizing the Lx table to begin at 1 in future years rather than at tPx.

10/10/94 Projected assets during a forecast have been adjusted to better reflect return on cash flow. Previously, a full year return was credited on beginning of year cash flow; now a half year return is credited on mid-year cash flow.

Administrative expense is now included in Service Cost rather than Interest Cost.

Projected administrative expense has been corrected under future inflation assumptions that vary over time. Double accumulation had been applied.

A bug has been corrected w/r calendar year valuation inflation assumptions. During a projection, the CY assumptions as applied to new entrants were offset one year for each year that entry occurred after the benefit determination date, i.e., the first valuation date. The magnitude of the change in results depends on the assumptions involved.

A bug has been corrected w/r to the salary merit scale used for experience purposes. If the valuation merit scale and the experience merit scale were different and if PIA's were used in any of the benefit formulas, then incorrect age-related merit scale rates were used to increase salaries during a projection. With the correction, projected salaries and liabilities will be noticeably different to the extent that the two merit scales differ.

A bug has been corrected w/r to any linear prorate options used in conjunction with the salary prorate version of the PUC cost method. Previously, if the service field for proration purposes implied service prior to entry age, then this service was not weighted for lack of a salary assumption prior to entry age. Now, all such service is weighted by the entry age salary in order to arrive at the overall proration factors.

A bug has been corrected w/r to the determination of "midyear" experience benefits at and after the first 100% retirement age. Previously, if midyear decrements as well as distinct valuation and experience retirement rate tables were assumed, then experience benefits were determined as of the beginning of the year starting with the first 100% retirement age on a valuation basis instead of on an experience basis. With the correction, and if the critical combination of assumptions apply, then emerging nonactive liabilities and cash flows may be noticeably different.

Term costing no longer applies to the Current Liability or PBGC Variable Premium cost methods even if it applies to the regular valuation. Previously, term costing was applied to these two cost methods in parallel with the methodology for the main funding valuation. Note that term costing does not apply to any accounting valuations, since there is no provision for input w/r to term cost parameters on the accounting valuation screens.

The application of certain benefit formula multiplier tables has changed. Previously, a multiplier table that applied to a formula with a deferred payment form was adjusted by replacing the "age at decrement" values with "age at deferral" values. This approach was followed both for pre-maximum formula multiplier tables and for maximum benefit multiplier tables. Under the revised approach, no such adjustments are made; the tables are used directly "as is". Thus, this change will affect previous results according to the difference between tabular values at decrement age versus deferral age for formulas with deferred payment forms. Note that previous results for such cases can be duplicated by reconstituting the pertinent multiplier tables, inserting deferral age values at decrement age.

9/17/94

The development of annual employee contributions paid in to the plan as an offset to employer normal cost has been changed. The previous approach basically assumed that, for EAN valuation purposes, all contributions were paid in at the beginning of the year by all employees in the plan as of each valuation date. For UC/PUC valuations and experience purposes, it was assumed that contributions were paid in by all employees in the plan, with a half-year discount for interest and survivorship.

Under the revised approach, employee contributions are assumed to be paid in at mid-year as an approximation to continuous payments. Thus, each surviving employee's annual contribution amount is discounted for one-half year of interest to the beginning of the year. In addition, if decrements are assumed to occur at the beginning of the year, then those employees who do decrement are deemed to make no contribution. If mid-year decrements are assumed, then employees who decrement are deemed to make half of the annual contribution amount, which is then discounted for one-quarter year of interest. Though predicated on a continuous payment model, this approach does not anticipate salary increases during the year, if in fact salary is the basis for employee contribution amounts. The same revised approach is used for both valuation and experience purposes.

The net effect of the changes is to produce somewhat lower adjusted employee contribution amounts, which are then used as an offset to normal cost. However, it should be noted that in other regards, PROVAL's treatment of the annual employee contributions paid in may still produce bogus results because of problems arising from its status as a "benefit" formula.

It should also be noted that the normal costs and adjusted paid-in employee contribution amounts as calculated for the two supplemental Unit Credit methods are not compatible. This is so because PROVAL always develops the employee contribution amounts, which offset the total normal costs, for all the unit credit methods using the regular valuation assumptions; whereas the normal costs for the two supplemental methods are based on the particular assumptions specified for each method. Presumably then, the cost calculations for the two supplemental methods are never used. See similar comments w/r term cost at 8/10/94.

Previously, any linear attribution flags associated with a particular benefit formula applied equally to both PUC and UC cost methods. Now, separate attribution flags are required for each type of cost method. Until there are new entries for distinct flags according to type of cost method, old flags will continue to apply to both types of cost methods.



Funding eligibility screens are now applied to calculations for active records under the PUC and UC cost methods as well as to term costs during the regular valuation. The funding eligibility screen is still not applied to the following methods: PTL, Current Liability, Alternative FAS-35, PBGC Variable Premium, or Alternative ABO. Previously, such screens applied only to EAN methods.

However, it should be noted that in the case of the PUC and UC methods, there is no direct analog to the concept of the funding span (which is derived from the funding eligibility conditions) as used under the EAN methods. Under the unit credit methods, any record which satisfies the funding eligibility conditions has liabilities determined directly from the benefits accrued or allocated as of the valuation date. No consideration is given to accumulated normal costs from previous funding opportunities, implied or otherwise.

Coding for the salary prorate version of the PUC method has been modified slightly. Previously, fractional weightings from the linear proration service field were reflected in the calculations for all benefits, not just those with linear prorate options in effect. Now, the basic approach is simply to use linear proration from entry age to decrement age, weighted by the salary scale. This produces minor changes, if any.

For benefits with PUC linear prorate options in effect, the methodology is unchanged. The linear proration factors are developed as under the accrual prorate PUC method and are then weighted by the salary scale.

9/06/94 Reverse changes w/r to Plan Termination Liability as of 7/12/94. The previous calculations are correct, subject to treatment of employee contributions. The changes made at 7/12/94 applied the maximum benefit limitations incorrectly. The reversal will significantly increase the calculated liabilities for actives with current accruals subject to the maximum limits.

8/10/94 Previously, term costing applied to the Current Liability (or Alternative FAS-35) method or to the PBGC Variable Premium (or Alternative ABO) method only if term costing was in effect for the regular valuation AND if the assumption set for that method was identical to that for the regular valuation. This was obviously inconsistent, since the application of term costing could vary based on the assumptions used for the various methods. Now, if term costing is in effect, it applies uniformly to the liability calculations for all cost methods. That is to say, no liability is reflected for benefits which are term costed.

However, it should be noted that the normal and term costs as calculated for the two supplemental Unit Credit methods are not usable. This is so because PROVAL always calculates term costs independently of any cost method using the regular valuation assumptions, whereas the normal costs for the two supplemental methods are based on the particular assumptions specified for each method. Presumably then, the cost calculations for the two supplemental methods are never used.

7/12/94 Coding w/r to first funding age has changed. Previously, integer arithmetic was effectively used to compare census data to funding requirements, resulting in incorrect splits of those to be included in or excluded from the funding calculations of the valuation. Thus, the new version will produce lower headcounts for the number of actives valued, unless the funding eligibility requirements are zero.

In addition, the valuation headcount or the incidence of normal costs may change slightly due to other corrections w/r to funding eligibility.

Results for Plan Termination Liability have changed. Previously, an extended vector representing accrued benefits as of the valuation date was used in the liability calculation. However, the replicated accrued benefits were not always the same, generating incorrect liability values. This has been fixed, but will

produce significantly lower liability values for actives subject to the maximum benefit limitations.

A bug w/r individual benefit EAN funding (i.e., when EANCODE=1) has been fixed. Previously, the period of future NC for a particular benefit was one year more than that implied by the funding span. Thus, the corrected coding may produce higher individual AL's than before.

- 6/29/94 A bug w/r to accrued service values for new entrants has been corrected. Previously, accrued benefit service for new entrants was erroneously determined from a database date field rather than being set to a constant value, if so indicated under Projection Assumptions/New Entrants. Under these circumstances, new entrants may have had several years of accrued service at entry rather than, say, zero years of service. Thus, liability values on account of new entrants during a projection were overstated to the extent of the excess accrued service.
- 6/01/94 Core projections with valuation interest and inflation sensitivity analyses for plans with customized accrual bases may produce different results on account of such bases. Switches weren't always matched correctly if missing.  
Revised treatment of record input for nonactive level income option in NONACTPOP.
- 4/28/94 Revised YEARDIF produced minor changes in age and service calculations based on census data.
- 4/13/94 Revised INIT#deltaPMTFORM inadvertently corrected bug w/r to deferred J&S annuities for nonactives. Fringe condition of nominal active retirement benefit w/o annuity.