Canadian Institute of Actuaries | Institut canadien des actuaires

Draft Educational Note

Data Validation

Committee on Workers' Compensation

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Members should be familiar with educational notes. Educational notes describe but do not recommend practice in illustrative situations. They do not constitute standards of practice and are, therefore, not binding. They are, however, intended to illustrate the application (but not necessarily the only application) of the Standards of Practice, so there should be no conflict between them. They are intended to assist actuaries in applying standards of practice in respect of specific matters. Responsibility for the manner of application of standards of practice in specific circumstances remains that of the members.

MEMORANDUM

To: All Fellows, Affiliates, Associates, and Correspondents of the Canadian Institute of Actuaries

From: Faisal Siddiqi, Chair
Practice Council

Crispina Caballero, Chair
Committee on Workers' Compensation

Date: December 5, 2017

Subject: **Draft Educational Note—Data Validation**

This draft educational note is intended to provide guidance to actuaries in developing testing procedures for data used in the calculation of benefits liabilities for public personal injury compensation plans (PPICPs) and would have application to actuaries interested in data validation techniques more generally.

In accordance with the Institute's Policy on Due Process for the Approval of Guidance Material Other than Standards of Practice and Research Documents, this educational note has been prepared by the Committee on Workers' Compensation (CWC) and has received final approval for distribution by the Practice Council on November 28, 2017.

As outlined in subsection 1220 of the Standards of Practice, "The actuary should be familiar with relevant Educational Notes and other designated educational material." That subsection explains further that a "practice that the Educational Notes describe for a situation is not necessarily the only accepted practice for that situation and is not necessarily accepted actuarial practice for a different situation." As well, "Educational Notes are intended to illustrate the application (but not necessarily the only application) of the standards, so there should be no conflict between them."

Questions or comments regarding this educational note may be directed to Crispina Caballero, Chair of the CWC, at crispina.caballero@ws-ts.nb.ca.

Table of Contents

1. Introduction

The educational note on data validation for public personal injury compensation plans (PPICPs) is intended to assist practitioners in developing testing procedures for data used in the calculation of the benefits liability.

Under part 5000 of the Standards of Practice, section 5700, the actuary should prepare a report that

5700.01 . . . summarizes the data used for the valuation, the data tests conducted to assess the accuracy and completeness of the data used in the work, and issues regarding insufficient or unreliable data. . .

In addition, that report should include

5700.04 . . . a statement regarding data, which would usually be, "In my opinion, the data on which the valuation is based are sufficient and reliable for the purpose of the valuation." . . .

The general standards of practice (subsection 1530) provide the following guidance on data:

1530.01 If the actuary reports without reservation with respect to data, then the data should be sufficient and reliable for the work. If sufficient and reliable data are unobtainable but the defect in them does not negate the usefulness of the result, then the actuary should report a usual opinion with reservation in respect of data. If defects in the obtainable data preclude a useful result, then the actuary should so report or make no report.

1530.02 The work with respect to data consists of

identifying the data needed,

attempting to obtain them,

reviewing the data obtained, and

assessing sufficiency and reliability of the data obtained.

1530.06 Data are sufficient if they include the needed information for the work. For example, participants' dates of birth are needed to value the liabilities of a pension plan. Data are reliable if that information is accurate.

1530.09 Work usually is both data-dependent, meaning that the quality of the result depends on the sufficiency and reliability of the data, and data-intensive, meaning that the data are both voluminous and detailed.

In general, the actuary relies on internal actuarial staff, financial analysts, or information technology staff during the data validation process. In particular, data are often extracted by staff at the PPICP. As such, the actuary's task is typically reviewing data rather than creating data. The general standards provide the following guidance on reviewing data:

1530.11 Items to consider in reviewing data are

the procedures for, the controls over, and the qualifications of the persons responsible for, their preparation and maintenance,

their internal consistency, their consistency with comparable prior period data, and their consistency with external comparable data, such as other files with common elements,

their consistency with the governing plan documents and policy forms, and

the availability of independent confirmation.

The accuracy and validity of the benefits liability calculation is dependent on, among other things, the quality of the data used. Data frequently contain errors or are not fully complete. The actuary would use professional judgment when considering the appropriateness of data for a particular analysis. In doing so, it is important for the actuary to clearly understand the context of the data prior to using them for the analysis. The main purpose of the data validation process is to assess the sufficiency and reliability of the data used in the calculation of the benefits liability. It is not a formal audit to test the accuracy of the data. The actuary's role in this regard is further defined within the standards of practice:

1530.13 The actuary who takes responsibility for the data would classify them as one of the following.

Sufficient and reliable, in which case the actuary reports an opinion without reservation on data. That does not imply that the data are perfect. Data are rarely perfect; especially when they are voluminous or complex.

Defective, but not so as to negate the usefulness of the result, in which case the actuary reports a usual opinion with reservation which describes the defect, describes the work done and assumptions made to cope with the defect, and, if practical, quantifies the effect of the defect on the result.

So defective as to preclude a useful result, in which case the actuary so reports or makes no report. If a report is useful or legally required, then the actuary would describe the defect, describe the work done and assumptions made to cope with the defect, quantify a result if practical, and explain that an opinion is not given because it is not possible to estimate the effect of the defect on the result. If a report is neither useful nor legally required, then the actuary would make none.

5320.01 Where sufficient, reliable and relevant data are not available for the valuation of a specific benefit, the actuary should make appropriate assumptions or introduce appropriate methods to compensate for any perceived deficiencies in the data.

Most of the time, for valuation of liabilities, there is sufficient and reliable data. These data may still have flaws: missing data elements, inconsistent data, and/or values outside of allowable or conceivable ranges. However, if the flaws are limited to a small number of cases, or if a reasonable assumption, that has a limited impact on the overall result, can be made to compensate for the deficiency.

Defective data are either insufficient, unreliable, or both. Defective data differ from sufficient and reliable data in that a large number of records may be flawed, or a reasonable assumption cannot be made to compensate for the deficiency without having a significant impact on the overall result.

Whether defective data can still be used to give a useful result is a matter of judgment for the actuary and depends on the scale of the deficiency and the purpose of the work.

Common defects include dates of birth that are not available or are coded as a pegged date, such as 1900/01/01, that will trigger error flags. In these instances, a previous valuation file might contain the date of birth, but if not, an average age at valuation could be assumed and the corresponding date of birth derived, or some other reasonable assumption. Other common defects are inconsistent relationships among date of accident, date of birth, and start date of long-term income replacement benefits. Indicators of possible defects include the following:

- The presence of very old injured workers, say older than age 120;
- Long-term income replacement benefits that are negative or extremely large;
- Potential duplicate records for a benefit recipient; or
- Aggregate data where payment adjustments or negative payments are unreasonably large or too frequent.

Often, what precludes obtaining a useful result is the extent of the data defects. Errors in a small percentage of the records where reasonable assumptions could be made would generally still allow for a useful result. Where most of the basic data elements such as age, amount of benefit, and date of accident are missing, the data become too defective to provide a useful result.

Aside from assessing the quality of the data, the data validation procedures may also identify benefit trends or other useful information for validating the appropriateness of valuation assumptions or methods.

Benefits provided by PPICPs can include income-replacement benefits, loss of function benefits, survivor benefits, healthcare benefits and vocational rehabilitation benefits. The specifics of these benefits vary according to the Act of each province or territory. Further, within PPICPs, valuation methodologies are generally on a seriatim (individual claim) basis or aggregate (blocks of claims) basis. The level and details of data validation would be appropriate to the valuation method. For instance, validation of data elements such as date of birth, date of accident, and current benefit amount would have a higher priority under a seriatim approach and for benefits such as long-term income

replacement benefits. On the other hand, more time would generally be spent on validating and explaining payment trends by time periods when using the aggregate approach. Any data validation process developed would be robust enough to handle a variety of benefit types, and sufficient for the requirement of the valuation method or approach used.

At a minimum, the actuary would review or ensure the development of a number of data control and validation reports. The actuary would use professional judgment in determining the minimum amount of data validation necessary to provide confidence that the data are reasonably complete and accurate for the purpose of the valuation.

PPICPs may validate their data on an ongoing basis prior to their year-end valuation, as well as during the year-end valuation process. For example, quarterly or monthly projections may be conducted to assess the PPICP's financial position between year-end valuation dates. These projections may include validation of aggregate payment and/or claimant data. Similarly, the PPICP may monitor experience on an ongoing basis. The results of such exercises may alert the actuary to issues with the underlying data. Whether data validation is completed on an ongoing basis throughout the year, or whether it is completed annually as part of the year-end valuation of liabilities, the major components and considerations are largely the same.

PPICPs calculate their benefit liabilities by applying the actuarial present value method to either individual claims (individual valuation models) or groups of claims (aggregate valuation models).

This note provides guidance on validating data for use in the valuation of benefits liabilities including broad system and administrative considerations, considerations specific to common valuation models, and other considerations.

2. Administrative Operations and Systems

The actuary would normally maintain a working knowledge of the administrative operations and systems of the PPICP in order to properly understand the context for the data. The areas that follow could be considered.

2.1 Data Extraction Process

Data for the calculation of the benefits liability are often provided to the actuary by staff at the PPICP. The actuary would normally have a broad understanding of the systems used to store data at the PPICP and the processes used to extract data for the valuation. In addition, the actuary would normally understand the definitions of the relevant data elements in each file and the relationships among data elements in separate files. Such understanding allows the actuary to use the data correctly and to understand how the data elements relate to one another, both within a data file and among data files. Understanding the proper relationships among data elements allows the actuary to assess the consistency of information within the data and is an important part of the validation process.

2.2 General Data Validation and Control Reports

The actuary could consider relevant quality control reports pertaining to data coding at the PPICP or validations completed by staff responsible for data extraction. If relying on the data validations completed by internal staff at the PPICP, the actuary could review the validations for completeness and accuracy. Further, the actuary could perform any additional validations that may be required to assess the sufficiency and reliability of the data.

2.3 Comparison to Previous Valuation Data

A broad area of validation is to compare the data supplied for the current valuation with those provided for a prior period. In particular, total payments by benefit type, accident period, and payment period can be compared between the data extract for the current valuation and that for the prior valuation. Significant changes between common historical periods in the two data extracts would not be expected. The actuary could check the consistency of historical payments between the current and prior data extracts and investigate the reasons for any discrepancies. A similar check can be conducted on claimant demographic data. While active claimant data will change from valuation to valuation, significant changes to the demographic details (e.g., date of birth) of claimants found in both valuations is not expected. The actuary can check the consistency of demographic data for claimants found in both data sets and investigate any significant discrepancies.

2.4 System Changes

Occasionally, changes may be made to the systems used to store data at the PPICP or to the routine used to extract data. In circumstances where such changes are considered material, the actuary would normally ensure that the changes do not impact the quality of the data used to calculate the benefits liability. One method for doing so is to extract the data both before and after the system change (or, alternatively, using the old and new extraction routines) and compare the results to check for significant differences. Such a review can be conducted by the actuary or by internal PPICP staff and reviewed by the actuary.

In addition, changes to the valuation system used to calculate benefits liabilities may impact the type of data or format of data required by the system. While such changes are unlikely to impact the reliability of the actual data extract, they could impact its sufficiency if new data elements are required by the valuation system that are not present in the original extract. A parallel test comparing the new and old valuation systems may show areas where the data requirements or data processing of the valuation system have changed.

2.5 Reconciliation to Finance/Audit Reports

It is important that the actuary confirms that the data provided for the valuation are consistent with the PPICP's accounting records. Specifically, the aggregate claims payments for the current year in the valuation data could be compared and reconciled

to the general ledger of the PPICP and any material differences would be explained. It would be helpful if this reconciliation is completed by major benefit category and by accident year, or broken down by current accident year and prior accident years.

2.6 Claims Processing and Backlog Reports

To the extent that they are available, the actuary could consider claims processing and backlog reports. Such information is valuable for interpreting the valuation data and their underlying trends. Claims backlog reports can be especially important for benefits that are valued using aggregate models. Such models typically use past patterns to project future experience, and the future projections for a particular accident period can be greatly impacted if a significant backlog exists for that period at the valuation date. Secondly, a significant claim backlog can also impact the factors used to project future experience. As an example, significant claim backlogs can occur with hospital benefits where an injured worker receives intensive treatment in a hospital for an extended period of time but the invoice is sent to the PPICP only upon patient discharge. In such a case, the payments for the affected accident period may appear understated until the invoice is received and/or paid. Data validation queries could check for potential claim backlogs in those cases where a backlog can have a significant impact on the accuracy of the benefits liability calculation. The actuary could consider claim processing levels when reviewing experience trends, evaluate processing levels in relation to what is typical for the PPICP, and make any necessary adjustments to the valuation data to account for the potential variances.

2.7 Implications of Legislative/Policy Changes

The actuary would maintain a current working knowledge of the relevant administration systems, claims adjudication practices, benefit provisions, and policies. Any changes in these items would normally be reflected in the data extraction, validation, and reconciliation processes where necessary. The actuary would normally consider the effect of changes in benefit policies and provisions when evaluating the results of data validation queries, in particular, those that involve period-over-period comparisons. Further, adjustments to current data validation processes and/or additional data validation checks may be required to confirm whether a benefit or policy change is being appropriately reflected in the valuation data. Valuation data consistent with the change provides another measure of the reliability of the source data.

2.8 Claims Cut-off Dates

If relevant, the actuary would normally understand the cut-off dates used for the valuation extract and could consider whether adjustments to the data are necessary to account for the specific cut-off dates used. Changes to the cut-off dates used from one valuation to the next can impact year-over-year comparisons and projections of future experience under certain aggregate valuation models.

3. Individual Valuation (Seriatim) Models

Individual valuation models apply the actuarial present value method to individual claims. Certain benefits for a PPICP are typically valued using an individual projection for each claimant, taking into account claimants' demographic data, benefit amount, and benefit terms. This valuation approach is typically used for benefits in payment where the claimant is identified as of the valuation date and has benefit payments that occur at regular amounts and frequencies. Benefits types that typically have these features include, but are not restricted to, long-term income replacement benefits in payment, and survivor income benefits in payment. Healthcare benefits, on the other hand, would generally not be valued at an individual level, as both the frequency and severity of payments are not regular. However, individual projections of healthcare costs are often used for certain claimants that are expected to have significant ongoing healthcare costs at reasonably consistent frequency and severity.

Individual projection models typically require several key pieces of data about the claimant including the following:

- Age;
- Gender;
- Award amount;
- Payment timing;
- Indexation formula; and
- Benefits end date.

Benefits that are valued using an individual projection require much more detailed validation of individual claimant demographic data elements than do benefits that use an aggregate valuation model. For instance, having accurate dates of birth for claimants is very important for calculating the liability for long-term income replacement awards, but is not important for valuing healthcare liabilities using an aggregate valuation model.

3.1 Valuation Source Data

Prior to completing the liability calculations, individual claimant data are reviewed to confirm they are sufficient and reliable for the valuation of individual awards. The actuary would normally check the data for the following:

- Missing and/or invalid data elements—for example, confirming that all claimants have a valid date of birth.
- Duplicate records.
- Consistency with benefit terms—for example, checking for claimants receiving benefits beyond the benefit end age or for benefit amounts above (or below) the maximum (or minimum) benefit.
- Outliers (i.e., extreme benefit amounts or ages) and confirming outlier values with PPICP staff.

- Consistency with claimant data for prior valuations—claimants in both valuations would generally have the same demographic data elements (e.g., date of birth, gender). Further, the change in benefit amount payable from the prior valuation can be validated against expected using the indexing formula for the benefit.
- Consistency of data elements within a data file—for example, a claimant's date of accident would be reasonable given his/her date of birth.
- Consistency of data elements across data files—these checks ensure common data elements on separate data files are consistent. For example, a claimant who is receiving both a pension award and a long-term income replacement award would have consistent demographic information on both files.

If applicable, the actuary would normally review any significant discrepancies identified during these checks with PPICP staff and ensure that the discrepancies are resolved to their satisfaction either through the provision of additional data or explanation, as needed.

3.2 Valuation Projections

The payments projected by the valuation system can be compared to the actual payments made to the claimant. Given that individual awards often have benefit payments of a known amount occurring at a regular frequency, testing the correspondence between projected payments and actual payments following the valuation is a test of the underlying data quality or the quality of the projection method. For example, the actual payments made to claimants in the month following the valuation date can be compared to the payments projected by the valuation systems for that month on a claimant-by-claimant basis.

There are three main cases that the actuary could consider with this test:

- Claims where the payment projected by the valuation system is significantly different than the payments actually made in the period. Such differences are often due to revisions in the claimant's benefit entitlement or due to retroactive payments.
- Claims where payments were projected by the valuation system but no payment was actually made in the period. This may be due to claims terminating after the data extract cut-off date or due to inappropriate records on the original data extract.
- Claims where actual payments were made in the period but no payment was projected by the valuation system. These may be due to claims starting benefits after the data extract cut-off date or due to records missing from the original data extract.

If applicable, the actuary would normally confirm the reasons for the discrepancies in each of the cases noted above and make any necessary adjustments to the data. When reviewing the results of this test, the actuary may examine an appropriate sample of

claims within each case, rather than all claims, in order to verify whether any systematic errors are likely to exist.

In cases where benefits for individual claimants are unstable, either due to rate changes or claimant recoveries, discrepancies between actual benefit payments and those projected by the valuation system may not be indicative of a data issue. An example would be short-term income replacement benefits that are valued using an individual projection. In addition, retroactive payments to claimants and payments outside of the regular payment cycle for the PPICP may generate false exceptions. The actuary would exercise professional judgment in determining the appropriate application of such a test and when interpreting test results.

The reporting timelines of the PPICP may dictate the ability of the actuary to conduct a comparison of valuation projections to actual experience prior to finalizing valuation results. An alternative in these circumstances may be to conduct such a comparison prior to the valuation date as part of the pre-valuation checks. For example, for a December 31 valuation, actual payments in December could be compared to those projected by the valuation system using a November 30 data extract.

4. Aggregate Valuation Models

Aggregate valuation models apply the actuarial present value method to groups of claimants by using past experience patterns to project future experience for the group. These models are typically used for benefits where the frequency and amount of payments is highly variable for individual claimants but aggregate blocks of claimants show relatively stable patterns over time. Benefits that are typically valued using an aggregate valuation model include, but are not restricted to, healthcare benefits, short-term income-replacement benefits, outstanding long-term income-replacement awards, and loss of function awards.

Aggregate valuation models typically require historical claims payments or claim counts broken down by accident period and payment period/award period for each benefit valued. As well, the award amount for past claims is often needed to develop cost-per-award assumptions for models that project the number of future awards.

Benefits that are valued using an aggregate valuation model generally require less validation of individual claimant demographic data elements than benefits that use an individual valuation model. Instead, ensuring the completeness of historical experience data (payments or award counts) and the accuracy of payment amounts, award amounts, and date assignments is paramount. For instance, an incorrect accident date or payment date on a significant payment amount can alter the pattern used to project future payments and impact the calculated liabilities under an aggregate valuation approach.

4.1 Valuation Source Data

For benefits valued using an aggregate model, the actuary can review the historical data to be used in the aggregate valuation calculations for evidence of potential issues. For example, the actuary can review the following:

- Actual experience trends by duration across accident periods. A significantly different pattern for a specific accident period may be indicative of a data error or a change in claims processing. For example, if claims are abnormally low compared to the norm for a specific accident period, it may be indicative of a claims processing backlog.
- The historical aggregate payment data for anomalous activity such as large payments after several periods of low payments or negative payments due to large third-party recoveries.
- The consistency between date assignments (i.e., award date equal to or after accident date, payment date equal to or after accident date).

When reviewing these trends, the actuary would normally keep in mind the credibility of the underlying experience. Payment experience can be quite thin for small PPICPs and for large PPICPs at later durations, such that deviations in experience in those cases may not necessarily be indicative of anything unusual. A consideration would be to review trends quarterly instead of monthly. Another possibility is to group certain related benefit types to form a large experience base. For certain payment types, adjustments to data, such as negative payments, can significantly impact the aggregate valuation results.

Adjustments may be required to the actual historical payment data before applying an aggregate valuation model to ensure that all data are on a consistent basis for projecting future experience. For example, adjustments may be required in short-term income replacement valuations to put all payments on a basis consistent with the current income replacement rates where benefits have been paid at different rates in the past. Similarly, adjustments are often required to remove the impact of an unusual event that affects payment patterns (i.e., changes in claims processing, large third-party recovery, etc.). The actuary would normally perform checks to ensure that all required adjustments are applied appropriately to the historical payment data.

PPICPs generally have numerous transaction types and the actuary will frequently combine payments from various transaction types into broader categories for valuation purposes (e.g., physician, drugs, and hospital transactions may be combined in a healthcare category). If the actuary relies on the valuation system to do this, it is important to make sure that the mapping of the transaction type to a valuation category is accurate. Also, there may be new transaction types added to the system from time to time. It is important that these new transaction types are mapped to the appropriate valuation category. The actuary may also check that the mapping from transaction type to valuation category is consistent with historical data and investigate the cause of any unexpected variances.

In addition, the actuary would normally reconcile the valuation year payments in the data supplied for the valuation to the PPICP's accounting records. This is important for all benefit types but especially so for benefits valued using certain aggregate valuation models because their liability is directly impacted by the accuracy of historical payment information.

The actuary would normally ensure that the historical experience is consistent across data sources. In particular, the consistency of the data supplied for the current valuation can be verified against the corresponding data supplied for the previous valuation. For example, historical payments for common accident period/payment period cells would generally match. In addition, historical award counts for common accident period/award period cells would generally match. Historical award counts may also be compared to data generated from other data files where possible (e.g., counts from past and current income-replacement claims). Finally, award experience for the most recent year can often be compared to reports from the claims services department tracking the number of awards granted in the last year. The actuary could investigate the reasons for any significant discrepancies arising under such consistency checks.

Finally, some aggregate valuation models require a projection of future award values in addition to the number of future awards. Often, the assumed future award is based on historical experience so the actuary would review the historical claim records for anomalous award values (e.g., extremely low or negative awards or awards greater than the maximum benefit where applicable). In addition, the average liability for awards granted in the most recent valuation can be compared to recent experience as significant differences may point to issues with the award counts and/or values.

5. Other Considerations

5.1 Experience Prior to Valuation

In general, PPICPs may monitor experience during the 12 months prior to the year-end valuation date. This process of tracking claims experience can take the formal form of either a monthly or quarterly interim valuation of liabilities, the informal form of an evaluation of emerging new accident claims, and/or a comparison of actual claims experience to expected for prior accident years.

The formal monthly or quarterly valuation of liabilities may use some simplified processes compared to the year-end valuation of liabilities. These projections may include validation of aggregate payment and/or claimant data. Any emerging results varying materially from expectations may point to an underlying data issue or trend that needs to be confirmed.

The informal monitoring of actual claims experience uses projected experience (cash flows and/or claim counts) from the prior year-end valuation. For example, current year new accident experience can be tracked against new accident payment development for recent accident years. Similarly, actual experience in the valuation year can be compared to expected experience from the previous valuation. Actual-to-expected ratios outside of normal ranges may be indicative of issues in the underlying data or in

emerging results. Ranges for normal ratios of actual to expected are based on the actuary's professional judgment taking into account the benefit type, experience history, and operating environment of the PPICP.

As a broad check, the liability from the previous valuation can be reviewed in light of experience since then. The actuary can investigate any significant discrepancies. In particular, the variances may point to an issue with the underlying data, and the actuary may want to perform a more detailed review of the valuation and experience data to confirm whether this is the case.

The formal or informal processes provide a validation of claim developments as well as trends and can be done on a more granular basis by employer category and benefit types.

5.2 Gain and Loss Analysis

As part of the valuation process, an analysis of gains and losses is typically completed. It determines the impact of various factors on the liability, including changes in claimant data, changes in economic assumptions, claims experience different from expected, etc. If the gain-loss process identifies material liability changes due to changes in a claimant's data, the actuary would normally confirm with PPICP staff that the data changes are accurate.

5.3 Data Control Reports

The actuary may review or develop a number of high-level and detailed data control reports. In addition, the actuary may review certain check tables for data used in individual valuation methodologies where appropriate. The actuary would use professional judgment in determining the minimum number of data control reports and checks necessary to provide confidence that the data are reasonably complete and accurate for the purpose of the valuation. If regularly produced, these reports can often be used to discern trends that may necessitate the development of detailed ad hoc reports for further analysis.

High-level data control reports are mainly used to assess overall data consistency and may include the following:

- A report showing the number of payment transactions and amount paid by year of payment. This can be used to ensure total payments are consistent from one year to the next.
- A report showing payments grouped by category of employer (assessed or self-insured employers) and/or benefit category used in the valuation system. This can be used to ensure no payments were lost in the data roll-up process.
- A report showing payments by benefit category for the valuation year only. This report can be used to ensure payments are consistent with the broader summary of payments by accident year.
- A report showing payments by benefit category for all accident years other than the valuation year. This report can be used to ensure payments to the previous

year-end on the current database are consistent with the payments on the previous year-end database.

Detailed data control reports are used to review data at a more granular level and may include the following:

- A report comparing total payments by payment type codes to total payments by benefit codes used in the valuation system. This can be used to confirm that no data are lost in the roll-up process and that no new payment type codes have been added to the administration system but not allocated to valuation benefit codes.
- A report comparing payments by payment type code at the previous year-end to those recorded at the current year-end. This can be used to identify any retroactive changes in payment type codes.
- A report showing payments by category of employer and/or benefit category on claims incurred in the valuation year. This can be used to reconcile payments generated by the finance general ledger system.
- A report showing payments by category of employer and/or benefit category on claims incurred prior to the valuation year. This can be used to reconcile payments generated by the finance general ledger system.
- A report comparing payments by benefit category to those included in the aggregate valuation model calculations. This can be used to ensure that all the appropriate payments have been included in the liability calculations.

Finally, data validation reports can be used to review the data and valuation results for individual valuation models and may include the following:

- A report showing the demographic data and award amounts for new awards granted in the valuation year. This can be used to validate the information for new awards.
- A report showing the demographic data and termination reason for claims terminated in the valuation year. This can be used to validate the number of terminations and that the terminations are appropriate as per the PPICP's policy.

5.4 Reliance on Others

Often, the actuary relies to some extent on internal actuarial staff, financial analysts, or information technology staff to extract data, produce data reports, and update existing data validations. As such, the actuary's role when it comes to data validation often includes relying on and reviewing the work of others to some extent. Relying on the work of others is permitted practice and is guided by the general standards of practice. When relying on the work of others for data extraction and/or validation, the actuary would normally perform or ensure the development of sufficient checks for reasonableness to ensure that such work is appropriate for use in the calculation of benefits liabilities.

5.5 Materiality

The actuary would consider the materiality of any defects identified in the data validation process. Corrective action may not be required for certain defects identified in the source data if the impact on the end result is not significant. The actual threshold used to identify whether corrective action is needed depends on the purpose of the work and the actuary's professional judgment. For the calculation of benefits liabilities, this threshold may be influenced by the type of valuation being performed (e.g., financial reporting, funding), the operating environment and relevant policies of the PPICP, and the inherent limitations on the accuracy of the pertinent valuation approach. When assessing the impact of a data defect on the end result, the actuary would take care to consider the underlying cause of the defect and whether it may be impacting areas other than those identified in the data validation process.

5.6 Going Concern Valuation

A wind-up or settlement valuation may require a more detailed data validation process than a going-concern valuation. Given the nature of PPICPs, valuations of benefits liabilities are typically conducted on a going-concern basis.