

PT15-03 – CALA PT Program - Procedures
Revision 1.5 – February 10 2012



CALA
Proficiency Testing

TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PROCEDURES	1
2.1	Posting Of PT Schedule On Web Site (PTM and DM)	1
2.2	Notification Of PT Sample Shipment (DM).....	1
2.3	Review Of PT Sample Instructions (PTM and DM)	2
2.4	Reference Laboratory Competence (PTM)	2
2.5	Confirm Design Value (PTM).....	2
2.6	Review Of Web-Data-Entry Comments (DM and PTM).....	2
2.7	Identify All Non-Detects And Non-Reports (DM)	2
2.8	Outlier Removal (DM)	2
2.9	Produce The Reference Value Report (DM).....	3
2.10	Evaluation For Sample Homogeneity and Stability (PTM).....	5
2.11	Review Summary Reports (PTM)	7
2.12	Authorize Release Of Reports (PTM).....	9
2.13	Produce The Final PT Reports (DM)	9
2.14	Review Of Corrective Action Reports (PTM).....	12
2.15	Failure To Provide Acceptable Car (PTM and DM)	13
2.16	Information Kept On Each PT Study	13
3.0	CORRECTIVE/REMEDIAL ACTION FOR THE PT STUDY	14
3.1	Non-Compliance To Established Criteria	14
3.2	Preventive Actions	16
3.3	Correction Reports.....	16

CALA PT PROGRAM - PROCEDURES

1.0 INTRODUCTION

This document outlines the steps followed, and procedures performed by the Proficiency Testing Manager (PTM) and the Data Manager (DM) in the course of a PT study. The collaborators perform the functions as outlined in their respective contracts.

Most CALA documents referenced in this document are available in the CALA web-site library (www.cala.ca/library.html).

2.0 PROCEDURES

2.1 Posting Of PT Schedule On Web Site (PTM and DM)

By November of each year, the PTM provides a schedule of shipping dates, reporting dates and change deadlines to the DM for posting on the CALA web site (www.cala.ca/pt_ship_schedule.html). In general, the deadline for changes is four weeks before shipping, and the deadline for reporting is four to five weeks after shipping. Prior to posting, these dates are agreed to by the collaborators. An email is sent to all participants when the schedule is posted.

2010 PT Schedule					
	OCTOBER 2009	JANUARY	MARCH	JUNE	OCTOBER
Invoice/Ship Notice	August 6	November 10, 2009	January 7	April 15	August 12
Registration Deadline	September 18	December 18, 2009	February 12	May 21	September 17
Shipping	October 19	January 18	March 15	June 21	October 18
Reporting Deadline	November 20	February 19	April 16	July 23	November 19

2.2 Notification Of PT Sample Shipment (DM)

At least six weeks prior to a scheduled PT study, participants are notified by email of the pending shipment and provided with a link to their current registration list. This notice is provided with an invoice for the upcoming study. Participants shall request changes to their participation no later than four weeks prior to shipping.

2.3 Review Of PT Sample Instructions (PTM)

At least four weeks prior to shipping, the PT sample instructions are reviewed for continued applicability. Any modified instruction sheets are uploaded to the web site (www.cala.ca/Instructions.html).

2.4 Reference Laboratory Competence (PTM)

The current scopes of accreditation are reviewed for each Reference laboratory used by Environment Canada to ensure that they are still deemed competent. Copies of these scopes are maintained with each study file. This review may take place anytime throughout the study cycle.

2.5 Confirm Design Value (PTM)

The design values are confirmed with verification data from the Reference laboratory and by comparing against the consensus mean. This review is intended to only identify gross differences that may have resulted from a serious error in sample production.

2.6 Review Of Web-Data-Entry Comments (DM and PTM)

Prior to the evaluation of any participant data, the comments entered by participants during web-data-entry are reviewed and, where necessary, corrections are made to the raw data. Recurring comments may result in further investigation. This is also an opportunity for participants to add analytes to their PT registration.

When corrections are made, or when results are reported through the comments field of the web-entry page, the DM makes these entries into the database and the entries are verified for accuracy by the PTM.

Note (1): The web-data-entry system is structured to limit the number of decimal places that are entered during the submission of PT results. If the maximum number of decimal places is exceeded, the lab cannot submit the data.

Note (2): A number ending in a five (5) is always rounded upwards in the CALA database.

2.7 Identify All Non-Detects And Non-Reports (DM)

All results that were reported with a <, > or that were not submitted are temporarily removed from the initial set of raw data for the purpose of outlier removal and calculating the performance statistics. To prevent biased estimates, all chemistry data that is reported as zero are treated as a non-submitted result.

2.8 Outlier Removal (DM)

Outliers are temporarily removed using the Grubbs Test:

- i) all results for a unique test group/sample ID/analyte combination are sorted in ascending order ($x_1, x_2 \dots x_n$);

- ii) the mean (\bar{X}) and standard deviation (s) of the data set are calculated;
- iii) T is calculated for the first and last result in the sorted series as;

$$T = \frac{|(x_i - \bar{X})|}{s}$$

- iv) if the largest T value is greater than the value from the Grubbs Table, the point is temporarily removed;
- v) steps i) to iv) are repeated until no more points are removed.

2.9 Produce The Reference Value Report (DM)

2.9.1 Calculate the Adjusted Mean and Median

The adjusted mean and median are calculated for each test-group/sample ID/analyte combination.

Adjusted Mean: the arithmetic mean calculated subsequent to removal of outlier data points.

$$Mean = \frac{\sum x_i}{N}$$

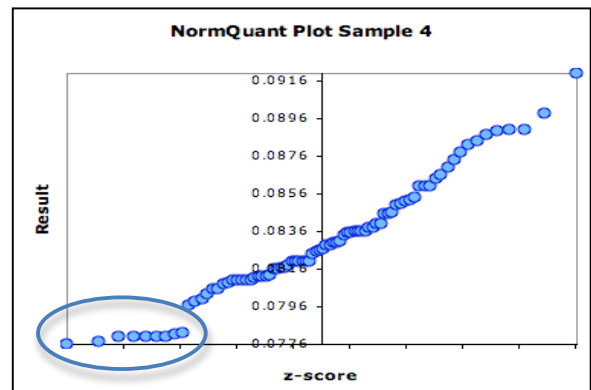
where x_i = Participant result

N = number of participants (outliers removed)

Median: the median (middle value) provided subsequent to removal of outlier data points. If N is even, the average of the middle two data points is used.

2.9.2 Identify the Assigned Value (\bar{X})

The adjusted mean is the default assigned value. However, upon a visual examination of the data distribution (e.g., normal quantile plot) points at either end of the distribution may be temporarily removed if they appear to fall significantly outside the distribution. For example, the points circled in the plot to the right may be removed and the adjusted mean re-calculated. If this is done, the same points are temporarily removed when calculating the inter-laboratory standard deviation (2.9.4).



Alternately, if the data deviates significantly from a

normal distribution such that the use of an arithmetic mean will bias the assigned value, the robust mean and standard deviation as described in ISO 13528 (algorithm A) will be estimated. The robust mean will be used as the assigned value.

When participation levels are less than 11, or if there are a large number of non-detects, a decision will be made as to whether to use the consensus mean, the mean estimated using the robust statistics detailed in ISO 13528, the Reference Value, or to exclude the data from evaluation. The decision to use a value other than the consensus mean is made by the PTM.

2.9.3 Identify the Standard Uncertainty of the Assigned Value.

The standard uncertainty of the assigned value is estimated as:

$$u_x = 1.25 \times stdev / \sqrt{N}$$

Where stdev = inter-laboratory standard deviation as estimated below.

N = number of participants (outliers removed).

2.9.4 Identify the Assigned Deviation Value (s)

The inter-laboratory standard deviation (stdev) from the reported results (outliers removed) is estimated from,

$$stdev = \sqrt{\frac{\sum (x_i - \bar{X})^2}{N - 1}}$$

where x_i = reported result

\bar{X} = adjusted mean of results

N = Number of participants (outliers removed)

The regression equation standard deviation $s!$ is estimated using the regression equation estimated from historic studies (see PT15-05-CALA PT Program – Regression Equations).

$$s! = m \times \bar{X} + b$$

where m = slope of regression equation

\bar{X} = assigned value

b = intercept of regression equation

If the data does not require further investigation, the standard deviation used to calculate the z score is determined as follows:

- The regression equation standard deviation $s!$ is used if this number is higher than the inter-laboratory standard deviation ($stdev$);

- The inter-laboratory standard deviation (*stdev*) is used if this value is higher than the regression equation standard deviation.

Note: If the robust mean is being used as the assigned value as described in 2.9.2 above, then the standard deviation of proficiency will be either the regression equation standard deviation or the robust standard deviation, whichever is higher.

When a reliable consensus value cannot be obtained from the data set, the assigned deviation may be obtained from the robust statistics detailed in the Harmonized Protocol (2006). The decision on whether to use a value other than the consensus standard deviation or the regression equation standard deviation is made by the PTM.

2.9.5 Produce Summary Reports for PTM Review (DM)

The *Reference Value Report* (PT04) the *Proficiency Summary by Parameter Report* (PT07) and the *Test Value Report* (PT29) are printed and given to the PTM for review. The PTM conducts a preliminary examination of the reports to identify any obvious problems prior to issuing the preliminary reports. As well, the PTM produces the Summary by Instrumentation Histogram Reports through use of the Data_Examination.xls spreadsheet.

2.9.6 Produce and Distribute Preliminary Reports (DM)

Following the procedures detailed in section 2.13, preliminary PT reports are prepared in csv format and emailed to participants. This is done within one week of the study deadline and is done before a thorough examination of the data is completed.

2.10 Evaluation For Sample Homogeneity and Stability (PTM)

The uncertainty associated with sample homogeneity and sample stability should not contribute significantly to the overall uncertainty of the PT evaluation.

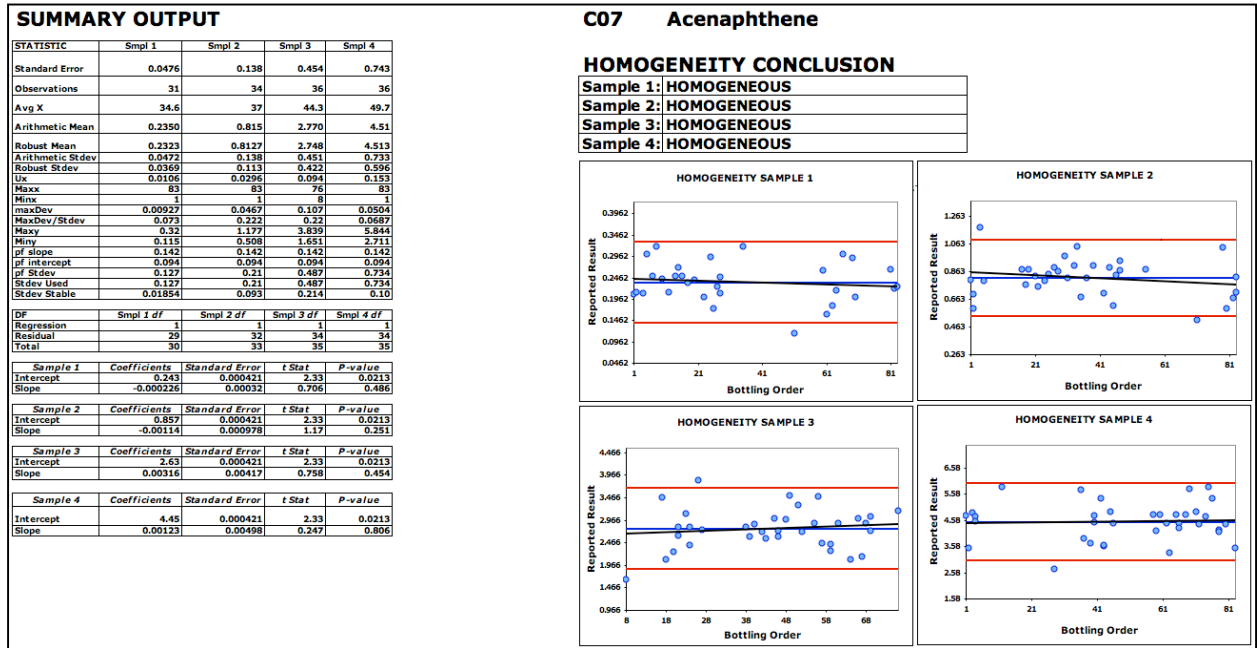
Any concerns raised in 2.10.1 and 2.10.2 are investigated and recorded in the study specific PT Summary Report. In addition to the data examinations detailed below, these reports may also include examinations of data distributions for normality, skewing, and bimodality, and comparisons of the inter-laboratory standard deviations as compared to those from historic studies.

2.10.1 Use of Participant Data to Evaluate Homogeneity

For each production lot of PT samples, regression analysis is conducted on participant result against bottling order using the StabilityRegressionAnalysis.xls spreadsheet. A real homogeneity problem will display a trend in the data (increasing or decreasing) where the slope of the regression is significantly different than zero at $\alpha = 0.05$ ($p < 0.05$ when regression analysis is conducted) and the ratio of the maximum deviation from the assigned value to the standard deviation of proficiency testing is greater than 0.5.

When homogeneity is confirmed to be unacceptable, the standard deviation of proficiency testing is increased to the point at which the ratio mentioned above is < 0.5 .

The picture below shows a spreadsheet screen capture for C07 Acenaphthene that does not demonstrate any homogeneity problems.



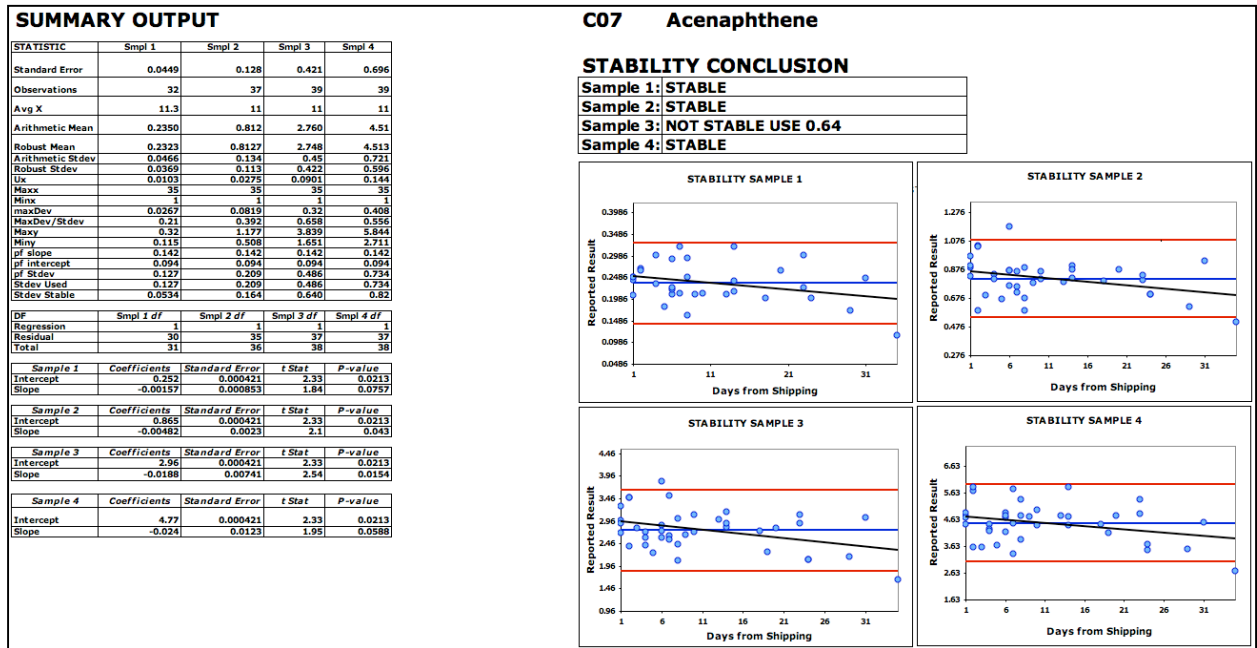
2.10.2 Use of Participant Data to Assess Sample Stability

For all of the samples, CALA plots the reported result against the date of analysis using the Data_Examination.xls spreadsheet. This approach has the benefit of taking conditions during sample shipping into account.

A real stability problem will display a trend in the data (increasing or decreasing) where the slope of the regression is significantly different than zero at $\alpha = 0.05$ ($p < 0.05$ when regression analysis is conducted) and the ratio of the maximum deviation from the assigned value to the standard deviation of proficiency testing is greater than 0.5.

When stability is confirmed to be unacceptable, the standard deviation of proficiency testing is increased to the point at which the ratio mentioned above is < 0.5 .

The screen capture below shows an analyte that had a confirmed stability problem.



2.11 Review Summary Reports (PTM)

2.11.1 Review Reference Value Report (PTM).

The DM provides the Reference Value Report to the PTM for review. The following procedure is used for all analytes except C20 asbestos and C05B microbiology by presence absence:

- The reference value, adjusted mean and median are examined. The criteria for acceptance of these data are:
 - The verification analyses from the current study is not significantly different from the consensus mean (i.e., within 2 standard deviations of the consensus mean); and,
 - The verification analyses from the current study are not grossly different from the design values. This is just to identify where there may have been serious errors in the production of samples. This only calls into question the validity of the study if the concentrations are significantly outside the published concentration ranges.
- See Section 3 for actions to follow if these criteria are not met.
- The adjusted mean is within 2s of the median value. Repeated occurrence of non-conformance with this criterion is an indication that the distribution of data deviates significantly from normality and will result in a detailed data examination by the PTM and presentation to the Program Committee for discussion.

2.11.2 Examination of Inter-laboratory Standard Deviation (PTM)

For each analyte, relationships are maintained for the historic sample concentration versus inter-laboratory standard deviation. From this data, a warning limit is established (see PT15-

05-CALA PT Program – Regression Equations for procedure to determine warning limits and the values currently being used.

If the measured inter-laboratory *stdev* value exceeds this warning limit, a flag appears in the *std dev flag* column of the reference value report and follow-up investigation is required.

2.11.3 Review Proficiency Summary by Parameter Report (PTM).

The Proficiency Summary by Parameter Report is reviewed for unusually high or low rates of failures.

Typical rates of z scores greater than 2.00 and the typical rates of PT scores < 70 both range from 5 – 15%. Repeated occurrence of rates significantly outside this range for any analyte may trigger a detailed data examination by the PTM. This examination will look at, but not be limited to, data distribution, number of participants, sample concentrations and breakdown by analytical method. If, in the PTM's judgment, there is a significant problem with the test group (or analyte) the issue is brought to a panel of the Program Committee for resolution.

2.11.4 Review Test Value Report (PTM)

The raw data is reviewed to determine if there are any analytes that have an unusually large number of non-detects or outliers.

If, in the PTM's judgment, there is a problem with one of the analytes, the information will be brought to a panel of the Program Committee for resolution.

2.11.5 Review PT Summary by Method Reports (PTM)

The summary of PT statistics by method (PT28) and the *Summary by Method Histogram Reports* are reviewed to identify potential, method specific, problems.

If a potential problem is identified, it is raised with the Program Committee for discussion and possible action. Actions may include, but are not limited to:

- Restricting participation to a limited number of methods; or
- Separate evaluation for different methods or method groups.

2.11.6 PT Study Approval (PTM)

After review of all data, the PTM provides approval to the DM to proceed with data evaluation and report production. This approval may include directions on modifications to the normal evaluation procedure. These may include, but are not limited to:

- The use of an assigned value or assigned deviation that is different than consensus derived values;
- Removal of one or more samples from the evaluation procedure; or
- Removal of one or more analyte from the evaluation procedure.

2.12 Authorize Release Of Reports (PTM)

Using all of the information available, the PTM produces a summary report, describing all possible problems and their likelihood of having a negative impact on the validity of the evaluation. This report contains rationale for authorizing or rejecting the completion of evaluation for analytes that have not met all PT criteria (e.g., homogeneity, stability, etc.). This report is forwarded to the Chair of the Program Committee for review and final approval is given by the PTM. Once approved, the DM is instructed to proceed with the production of reports with any qualifications that may be determined by the PTM. Any qualified evaluations that are not part of this documented procedure are clearly identified on the PT report.

2.12.1 Verification of non-automated data entries (PTM and DM)

Whenever assigned values or standard deviations other than those generated by the automated procedure are used, and whenever there is any other deviation from the automated procedure, the correctness of these manual changes are checked by printing sample reports (2.13.5) and a reference value report that include these changes. All changed data and associated calculations are manually checked and a record retained of this check.

2.13 Produce The Final PT Reports (DM)

The following procedure is used for test group except C05B microbiology by presence/absence and The PCB aroclors in C06B, C08 and C35.

2.13.1 Calculate z-Scores for Each Result

The outliers and non-detects are added back into the database in order to prepare the Final PT Reports for all the participants.

The assigned value is rounded to the number of significant figures and decimal points that will appear on the final report. The assigned deviation is rounded to the number of significant figures and decimal places that will appear on the final report.

The z score and absolute z score for each reported result is calculated as:

$$z \text{ score} = \frac{(x_i - \bar{X})}{s}$$

$$\text{absolute } z \text{ score} = \frac{|(x_i - \bar{X})|}{s}$$

If a laboratory has reported it's RDL during web-data-entry the following equations are used:

$$z \text{ score} = \frac{(x_i - \bar{X})}{\sqrt{s^2 + (RDL/3)^2}}$$

$$\text{absolute } z \text{ score} = \frac{|(x_i - \bar{X})|}{\sqrt{s^2 + (RDL/3)^2}}$$

Where x_i = reported result
 \bar{X} = assigned value
 s = assigned deviation
 RDL = the reporting detection level

Note 1: The RDL option is not available for test groups, C04B, C05, C11, C12, C13, C15 or C20.

Exception 1-Very High z Scores: If the calculated z score is > 6.6 or < -6.6 then it is set to 6.6 or -6.6 respectively.

Exception 2-Non-detect Values: If the reported value is non-detect, the following rules apply:

- If reported non-detect value is less than the assigned value, use the non-detect value to calculate a z score;
- If reported non-detect value is greater than the assigned value, then:
 - set z score at 2 if the PT analyte/test group is only offered in one concentration range;
 - set z score at 2 if the PT analyte/test group is the high range of a two range PT test group (e.g., C02B); and,
 - set z score at 3 if the PT analyte/test group is the full range or low range of a two range PT test group (e.g., C02A).

Note: If a laboratory reports a result lower than the reported RDL, this will be treated as a non-detect and evaluated accordingly.

Exception 3 - Greater than value: For C05A (microbiology) an accurately reported greater than value will be assigned a z score of 0. For all other greater than values, the greater than sign will be ignored and the value evaluated as a normal result.

Exception 4 - No Result Reported: If no result is reported, or if a chemistry result is reported as zero, the z score is set to 6.6.

2.13.2 Calculate Composite PT Score

The average absolute z score is calculated for each test group/analyte combination as

$$avgz = \frac{\sum \text{absolute z score}}{N}$$

where absolute z score = score as calculated in **2.13.1** above

N = number of samples per test group (generally 4).

The composite score for each test group/analyte is calculated as

$$PT \text{ Score} = 100 + (-15 * avgz)$$

where *avgz* = average absolute z score as calculated above.

2.13.3 Estimating and Flagging Bias

Biases are identified using the rescaled z score procedure. Calculate the rescaled z score as

$$RSZ = \frac{\sum z}{\sqrt{N}}$$

where *z* = the z score as calculated in **2.13.1** above

N = the number of samples in the test group (generally 4)

Flags are assigned for each test group/analyte combination as follows:

- $RSZ \geq -2$ and ≤ 2 no flag assigned;
- $RSZ > 2$ H (High);
- $RSZ > 3$ VH (Very High);
- $RSZ < -2$ L (LOW); and,
- $RSZ < -3$ VL (Very Low)

The above table is used to produce the sample specific bias report (PT08).

2.13.4 Interpretation of PT Results

The study specific Acceptable/Unacceptable status for each test group/analyte combination is assigned as:

- PT score ≥ 70 = Acceptable;
- PT score < 70 = Unacceptable.

For C05B-Microbiology by Presence/Absence, any deviation from the expected response for any sample is considered as unacceptable.

The proficiency status for each test group/analyte combination is assigned as:

- One unacceptable score = possible suspension (PS);
- Two successive unacceptable scores = suspension (S); or,
- Three successive unacceptable scores = withdrawal (W).

2.13.5 Custom Reports

If any of the evaluations are modified (e.g., eliminate one sample, eliminate entire analyte, etc.) the custom report clearly identifies the modified evaluation. The reason for the modification is also included in a PT Notice provided with the final report.

Custom PT reports are emailed to participants as pdf files. These reports include the Proficiency Testing Report (PT18), a cover letter (PT09-F), a notice of proficiency testing changes (PT09-Notice), if applicable, and Corrective Action Forms (PT23) for any unacceptable PT scores.

In addition to the mailed reports, electronic csv files are emailed to participants. These csv files contain the same information that is included in the custom report.

Each custom report contains information about the participant as well as,

Sample ID	PT code
Appendix number	Analyte
Method	Units
Assigned Value	Reported Value
Standard uncertainty of assigned value	s Value
z Score	Bias flags
Composite PT score	
Acceptable/Unacceptable status	

Summary reports (PT07, PT08, PT28 and the *Summary by Method Histograms*) are uploaded to the CALA web site for participant access.

2.14 PT Evaluation for Microbiology (Presence/absence) and PCB Aroclors

2.14.1 Microbiology by presence/absence

For the C05B microbiology samples, an unacceptable evaluation is assigned for any false positive or false positive.

2.14.2 PCB Aroclors

PCB aroclors are evaluated as a combination z-score and presence/absence procedure. Each of the four samples in the test group is spiked with a single aroclor. For the aroclors that are not spiked into the sample, a threshold concentration is estimated as a fraction of the spiked

aroclor concentration. For each aroclor, if a laboratory reports a false positive at a concentration above the relevant threshold value, then the aroclor is assigned an *UNACCEPTABLE* evaluation regardless of any calculated z-scores. If there are no unacceptable false positives, then the PT score is evaluated based on the z-score(s) of the sample(s) that were spiked with the aroclor.

2.14 Review Of Corrective Action Reports (PTM)

Participants are provided with blank corrective action report forms (CAR) for analytes that have unacceptable performance (see PT15-02-CALA PT Program - Policies, Section 2.7, for details). These are reviewed by the PTM for completeness. In reviewing the corrective action reports, the PTM does not normally make a judgment on the effectiveness of the corrective action. Acceptability of the report is generally based on an indication that a thorough investigation has been made, an attempt to identify a root cause has been made and a corrective action (or correction, if appropriate) has been identified.

2.15 Failure To Provide Acceptable Car (PTM and DM)

Should a participant, in the judgment of the PTM, fail to provide an acceptable corrective action report for a failed analyte, the PTM will issue a warning notice (PT09-Warning) with a deadline, reminding the participant of the consequences should an acceptable CAR not be provided. If the participant still fails to provide an acceptable CAR, a second notice is provided.

If an acceptable CAR is not provided, the DM will advance PT status to the next level (e.g., *Possible Suspension to Suspension*), make the necessary adjustments to a participant's scope of accreditation (if applicable) and notify the participant of the change (PT09-CAR Suspension).

2.16 Information Kept On Each PT Study

The following information is maintained for each PT study:

- Reference value data;
- Records of suitability of PT samples;
- Name and accreditation status of Reference laboratory used to provide verification analysis for PT samples;
- Non-conformances, remedial actions, and corrective actions for ongoing PT samples;
- Regression equations for ongoing PT samples;
- Instruction sheets for each study; and,
- Summary reports including *Reference Value Report*, *Test Value Report*, *Proficiency Summary by Parameter*, *Stability Examination Report*, *Homogeneity Examination Report*, and the *Study Comments Report*.

Information maintained in electronic format on the Data Manager's computer includes, but is not limited to:

- Confidential PT Report;

- Generic reports;
- Reference value reports;
- Notices of Status Change; and,
- Blank CAR Reports.

3.0 CORRECTIVE/REMEDIAL ACTION FOR THE PT STUDY

This section details the investigation, corrective and remedial action processes that are specific to the CALA PT program.

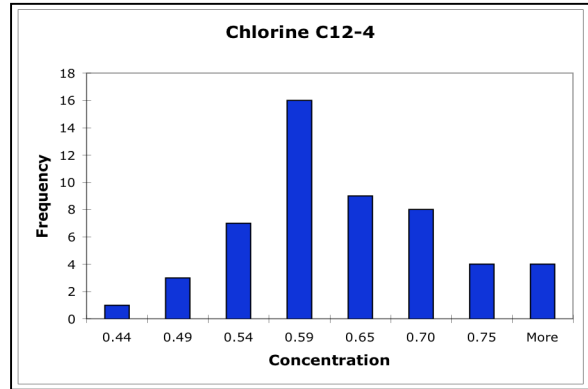
All aspects of the PT program fall under CALA's Continuous Improvement Procedures (Q24-*Continual Improvement*). There are some procedures, because of the use of Collaborator and Reference laboratories, which are specific to the PT program.

3.1 Non-Compliance To Established Criteria

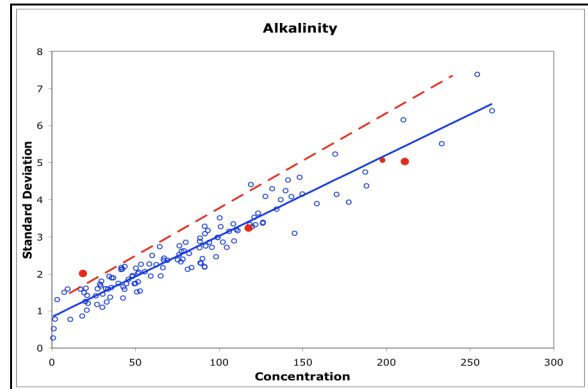
For each verification data that fails to meet the criteria outlined in sections 2 above (e.g., homogeneity, stability, flags on reference value report, etc.), an Investigation is conducted and recorded in the PT Summary Report. The initial investigation will be to assess the significance of the non-conformance and the potential impact on the viability and integrity of the study evaluations. If the non-conformance has a significant impact on the viability and integrity of the PT evaluation, then it is handled under the CALA ICAR system (Q24-Continual Improvement). Examples of this would include removing an analyte from the study, removing a sample from the evaluation, re-issuing a report due to an error, etc.

Although section 2.10 details some default actions to take when some non-conformances are identified, further actions may be taken at the discretion of the PTM. This may entail, but is not limited to, the following:

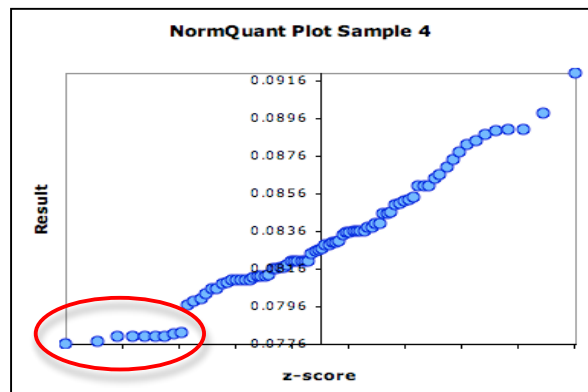
- A histogram may be produced to identify possible bi-modality or obvious skewing;



- A plot of historic standard deviations against assigned value, including the active study, may be produced to see if there is an obvious explanation for the flag. For example, the plot to the right displays one sample that had an inter-laboratory standard deviation that was higher than the warning limit. However, as the concentration was at the low end of the scatter plot, the flag is likely the result the bias at either end of the range that is inherent in the establishing of the warning limits;



- A normal quantile plot may be produced. If there are some points that do not appear to fall along the trend line, they may be removed and the assigned values re-calculated.



If the PTM judges that proceeding as normal will have an impact on the integrity of the study the following steps are followed:

- If only one sample is affected, that sample is removed from the evaluation procedure for the affected PT study. If more than one sample is affected, the issue is raised with a panel of the Program Committee (minimum of two members) and they make the decision on how to proceed. Actions may include, but are not limited to:
 - re-prepare the sample(s);

- exclude the affected sample(s) from the evaluation procedure; or,
 - exempt the entire analyte from evaluation in the affected PT round.
- Proficiency Testing Reports (PT18) will clearly identify when these deviations have been made. Whenever deviations are made, a notice is also included with the report explaining the rationale for modifying the evaluation procedure; and,
 - The PTM will review and document the effectiveness of the corrective action during the next PT study.

3.2 Preventive Actions

Non-conformances or opportunities for improvements (see Q24 for details) can be identified at all steps during the PT study. For example, a large number of similar comments during web data entry may identify a problem with the samples that is not identified as part of the routine verification analysis.

Any one of these observations may trigger the generation of a corrective action form by the PTM and subsequent root cause analysis and identification of corrective or preventive action by the Collaborator or by CALA.

As well, CALA receives feedback from several sources (e.g., Program Committee, workshops, presentations, training, etc.), all of which can trigger opportunities for improvement.

3.3 Correction Reports

Whenever a non-conformance is identified after Proficiency Testing Reports have been issued, the non-conformances are investigated as above and, if necessary, results are re-evaluated and corrected Proficiency Testing Reports are issued. The reports are clearly indicated as being **Revised** reports and the email containing the attached revised report will include a brief statement about the reason for the revision.

Whenever corrections result in changes to a laboratory's PT or accreditation status, the necessary changes are made to the Scope of Accreditation.