Audit Manual Chapter 13, *Statistical Sampling*
Summary of Proposed Revisions

The revised sections of Audit Manual Chapter 13 clarify or update current statistical sampling techniques and procedures. Minor revisions, such as grammatical corrections and changes in terminology, were also made throughout the chapter but were not included in the revisions listed below:

AM Sections

1301.15 (a) Deletes the phrase "in an unrestricted random sampling." In statistical sampling, all items in the population have an equal or known chance for selection as a sample item.

1301.15 (d) Explains that statistical sampling will always result in an objective and defensible audit results. Deletes the statement, "the ability to estimate the required sample size in advance will help reduce the possibility of over sampling."

1302.25 (f) Explains that when it is not possible to remove credit invoices and credit/debit memos from the population, Method 2 allows for all available information on the sample items to be used in determining the taxable measure.

Explains that in order to remove credit invoices and credit/debit memos from the population to be sampled using Method 1, electronic records must be available.

1302.25 (g)(3) Deletes the procedure that allows an auditor to pull out 360 sample items and use the first 300 items for which documentation exists. This is not a current procedure for expanding the sample size. Auditors use a software program that is capable of extending a sample (when and if ever needed) without altering the original sample and the selection order. The process is documented and there is an audit trail.

1302.25 (i) Emphasizes that if a sample contains significant number of underpayments and overpayments, the likelihood of the sample evaluating is greatly reduced. Provides guidance on how to handle this situation.

1303.05 Explains that in determining the sample size, the auditor must consider the anticipated error rate and BOE requirements for sample projection in order to obtain statistically valid and defensible audit results. Inserts footnote regarding sample size for bad debt losses.

1303.25 (a) Explains that comparing the mean and standard deviation of the population to the mean and standard deviation of the selected sample is a simple and reliable method of ensuring that the sample includes a good cross section of items.

1303.25 (c) Explains that in statistical sampling, obtaining electronic data that includes all of the required fields will alleviate the necessity to pull all source documents.

1303.25 (d) Replaces the example of skewed population distribution with a graph (new Exhibit 4, *Skewed Sales Population Distribution).*

1304.10 Explains that segregating transactions into a test population and an actual basis population is a form of unrestricted sampling since only one sample is being selected. Also explains that unrestricted sampling is not efficient for large populations with a wide range of values.

1304.15 Explains that a test being done on a random selection basis may be stopped at any time if the samples are examined in the random order in which they were selected.

1304.20 Explains that any test being done on a systematic basis should be continued since the entire population has not been sampled and that an alternative when using systematic sampling would be to increase the skip interval.

AM Sections

1304.25 Clarifies that a minimum number of clusters be selected so that at least 300 items of interest are examined.

1304.35 (a)(1) Explains that the sample size should be adjusted for the removal of duplicates.

1305.15 Rearranges the order of the options the auditor should consider when the confidence interval of a sample is greater than 75%. Explains that option 4 (stratify) should be considered only if electronic data is available, and that the auditor should further analyze the sample prior to selecting option 5 (Accept the sample).

1305.20 Explains that the auditor must document through audit comments why the sample is being expanded and how the additional sample size was determined.

1306.20 Clarifies the calculation of the percentage of error.

1307.10 Adds to the minimum audit documentation a reconciliation and explanation of items removed or segregated from the original population.

1308.05 Incorporates detailed guidelines for handling samples or strata that do not have a minimum of three errors.

Exhibits

New:

- Exhibit 4, *Skewed Sales Population Distribution*
- Exhibit 7**,** *Combined Evaluation*

Revised:

- Exhibit 1, *Audit Sampling Plan*
  Form BOE-472, *Audit Sampling Plan*, was revised in October 2010. The previous version of this form is currently available at the BOE website, http://www.boe.ca.gov/pdf/fam-13.pdf (pages 47-51).
- Exhibit 2, *Statistical Sampling Audit Program*
  Deletes information that is already included in the narrative portion of Chapter 13. Adds "cluster sampling" and "determine method for selecting sample."

Deleted:

- *Z Table*
- *The T Distribution*
- *Sample Evaluation*
- *Sample Data Analysis: Stratified Population*
- *Projection Techniques and Stratification*
- *Sample Sizes for Variable Sampling at 80% Confidence Level*

The deleted exhibits are obsolete. These exhibits are not included in the pending revisions but are currently available at the BOE website, http://www.boe.ca.gov/pdf/fam-13.pdf. New and revised exhibits are attached.

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STATISTICAL SAMPLING 1300.00

INTRODUCTION 1301.00

GENERAL 1301.05

This chapter provides guidelines to follow when a statistical sample is used to perform a test in an audit. There is no intention to establish rigid rules; rather this chapter will set forth general goals for statistical sampling and will allow the auditor discretion in the implementation of various analytical procedures to develop an appropriate sampling plan.

Planning and evaluating audit samples is a critical part of the Board of Equalization's (BOE) mission, as stated in AM section 0101.03~~ of this manual~~. During the sample planning phase, the auditor gathers information about the taxpayer's accounting systems and tax issues. The auditor should take the opportunity to educate the taxpayer on the objectives of the sampling process and encourage the taxpayer to offer suggestions on designing the sampling plan. The taxpayer may be able to share specialized knowledge of the accounting system and sampling techniques that could result in a more effective and efficient audit. The auditor should work with the taxpayer to find the best procedures for the given situation. However, it is a general principle of auditing that the auditor is ultimately responsible for assuring that adequate tests are conducted to provide the auditor with assurance of the accuracy of the records. The auditor should refer to Chapter 4 for general audit procedures regarding tests of specific items.

The primary objective of a sales and use tax audit is to determine, with the least possible expenditure of time for both the taxpayer and staff, the accuracy of reported tax. To accomplish this, the auditor should take into account the possibility of both overpayments and underpayments in analyzing the sampling plans necessary to accurately ~~measure~~determine ~~variances from~~ the proper amount of tax due. All such ~~variances~~ differences should be taken into account by the auditor when assessing the net overpayment or underpayment resulting from the audit. A sample or an audit may result in a net refund if the dollar value of tax overpayment errors exceeds the value of tax underpayment errors. As stated in AM section 101.20~~ of this manual~~, ~~the Board~~BOE is just as willing to recommend a refund of an overpayment as we are to propose a deficiency determination.

~~The information and guidelines presented are designed for use by tax auditors and should be used in conjunction with material received in the statistical sampling class. Auditors receive a brief introduction to statistical sampling in their initial audit training class, and with the help of their supervisor or a more experienced auditor, they should use the information in this chapter to conduct audits incorporating statistical sampling techniques.~~

AM ~~S~~section 1309.00 contains a glossary of terms ~~peculiar~~ relevant to testing by the statistical sampling method. ~~Board~~BOE ~~of Equalization tax~~ auditors are required to have a working knowledge of these terms. It is suggested the auditor be familiar with these terms prior to reading this chapter.

TESTING WITH STATISTICAL SAMPLES 1301.10

Publications of the AICPA (American Institute of Certified Public Accountants) and its committees have ~~increasingly~~ recognized the importance of statistical sampling in financial audits~~modern accounting and auditing~~. Statistical sampling is ~~now~~ used widely in private industry and by certified public accounting firms. There are also well established statistical sampling programs used by the Internal Revenue Service and other states in their tax audits.

Certified Public Accountants perform many different types of audits, including tax audits. In financial statement audits, the auditor's primary objective is to reach a conclusion about whether or not there is sufficient evidence to conclude that the financial statements are fair representations of the entity's condition. Financial auditors perform both attribute and variable sampling, but their final conclusion is either "yes" or "no." Tax auditors have a more difficult task — to estimate the difference between the taxpayer's reported tax and the tax due as estimated from the audit evidence. It is important to understand the difference in the two approaches in order to be able to successfully discuss the audit results with taxpayers and their representatives.

~~The Board~~BOE encourages ~~testing with~~ the use of statistical sampling techniques whenever feasible. ~~The Board's~~ BOE auditors must develop and use recognized testing methods that will be accepted with confidence by taxpayers and their accountants.

ADVANTAGES OF THE STATISTICAL SAMPLE 1301.15

A statistical sample ~~has~~ provides for ~~two important characteristics — the estimation of the required sample size and the~~ objective projection and evaluation of the sample results. When a sample is obtained by this method, it is possible to state with a desired level of confidence that the sample result is no further away than some calculable amount from the result attainable from a complete examination of all items. This provides a number of advantages which are explained as follows:

a. Sample Result Is Objective and Defensible

One important feature of statistical sampling is that~~, in an unstratified random sampling plan,~~ all items in the population have an equal or known chance for selection as a sample item. This random selection process eliminates bias, and ~~would~~ produces an objective and defensible result. ~~reduce any possible argument that the sample is not representative. The sample is not only objective but defensible before the taxpayer, one's supervisor, and a court of law, one's supervisors, or even more important, before one's own conscience.~~

b. Method Provides for Advance Estimation of Sample Size

An advance estimation of the ~~necessary~~ sample size can be computed based upon statistical principles. The advance estimation provides both a defense for the reasonableness of the sample size and a justification for the expenditure involved. However, determination of sample size is not purely mechanical, but calls for good analytical skills and decisions by the auditor. Other factors, such as BOE policies on minimum errors (AM

section 1308.05), as well as minimum evaluation requirements (AM section 1305.15) should also be considered.

c. Method Provides an Estimate of the Sampling Error

When a judgmental (non-statistical) sample is performed, there is no way to evaluate the reliability or accuracy of the results. When a probability (statistical) sample is used, the results ~~may~~ can be evaluated in terms of how far the sample projection might deviate from the value that could be obtained by a 100 percent examination of the population.

d. Statistical Sampling May Save Time and Money

~~With~~ When the ~~ability~~ information is available to calculate an advance estimate of the required sample size, ~~t~~~~The~~~~this~~a statistical ~~sampling~~ approach may result in a smaller sample size than might be arrived at ~~used~~using ~~on the basis of~~ a judgmental approach. Although the statistical ~~sampling~~ approach will not always produce smaller sample sizes, statistical sampling will always result in an objective and defensible audit result.~~, the ability to estimate the required sample size in advance will help to reduce the possibility of over sampling.~~

e. Multiple Samples May Be Combined and Evaluated

When the entire test ~~operation~~ has an objective and scientific basis, it is possible for different auditors to participate independently in the same test and for the results to be combined as though the test was accomplished by one auditor. For instance, in an audit covering a number of locations, the audit can be accomplished independently and separately at the different locations and the results combined for an overall evaluation, if statistical sample techniques were applied.

f. Objective Evaluation of Test Results Is Possible

The results of a judgmental sample can be projected to the population, but there is no way of objectively evaluating the reliability or accuracy of the test. If the statistical method is used, the audit test result can be projected, given a stated confidence level, to be within not more than a known interval from the result that would have been obtained if the population had been examined on an actual basis.

SAMPLING PLANS 1301.20

Attribute~~s~~ sampling provides a **qualitative** measure which estimates the proportion of items in a population containing an attribute of interest. In attribute~~s~~ sampling, the value of each data item is one of a few discrete qualitative categories:

a. missing or non-missing;

b. underpaid, correctly paid, or overpaid;

c. valid or invalid supporting documents

The objective of attribute~~s~~ sampling in auditing financial records is to reach a conclusion about whether or not there is sufficient evidence to conclude that the frequency of errors exceeds a tolerable level. For example, does the rate of missing documentation exceed one percent or not? Attribute~~s~~ sampling is widely

used in internal auditing and financial statement auditing, but is not frequently used in tax auditing. Attribute~~s~~ sampling ~~could~~ can be used to determine if a managed compliance program ~~is performing~~performs within an acceptable deviation rate.

Variable~~s~~ sampling, in auditing financial records, provides a **quantitative** measure which is used to estimate an average or total dollar value of a given population. In variable~~s~~ sampling the value of each data item is a quantity drawn from a continuous range, such as dollars, percentage, or number of pieces. The objective of variable~~s~~ sampling is to estimate a quantity. For example, what is the dollar amount of adjustment in taxable sales? Or, what is the percentage of sales excluded on the tax return for which no valid exemptions documentation exists? Tax auditors are nearly always doing variable~~s~~ sampling.

Another way to define the difference between attribute~~s~~ sampling and variable~~s~~ sampling is that attribute~~s~~ sampling is concerned with the frequency of an attribute, while variable~~s~~ sampling is concerned with the value of a variable.

~~Certified Public Accountants do many different types of audits, including tax audits. In financial statement audits, the auditor's primary objective is to reach a conclusion about whether or not there is sufficient evidence to conclude that the financial statements are fair representations of the entity's condition. Financial auditors do both attributes and variables sampling, but their final conclusion is either "yes" or "no". Tax auditors have a more difficult task — to estimate the difference between the taxpayer's reported tax and the tax due as estimated from the audit evidence. It is important to understand the difference in the two approaches in order to be able to successfully discuss the audit results with taxpayers and their accountants.~~

SETTING UP THE TEST 1302.00

GENERAL 1302.05

Prior to determining the type of testing to be used in a given audit situation or if statistical sampling is appropriate, the auditor must make a thorough examination of the business operation during the period under audit. This examination should include a review of source documents, changes in business activity, and changes in accounting procedures and key personnel.

Form BOE–472, ~~"~~*Audit Sampling Plan*,~~"~~ (Exhibit 1) will facilitate the use of sampling by assisting the auditor and taxpayer in documenting their sampling plan, and setting the criteria by which the sample results will be evaluated. In addition, the form covers many common situations that might arise in sampling, such as:

- The possibility that stratification or expansion of a sample may be~~come~~ necessary
- The potential of overpayments (e.g., over-accruals of tax on payables)

This form is to be used as a tool to gather information in conducting samples, as well as to make the taxpayer aware of important considerations that might impact the audit. This form should be completed with the assistance and input from the taxpayer, prior to the actual selection of the sample. The information and methods documented in this form are not binding on either the taxpayer or ~~Board staff~~the auditor. The sampling plan can and should be continually evaluated (and changed, if necessary) based upon information obtained during the audit process. However, if any deviation from this sampling plan is required, the deviations will be fully explained and discussed with the taxpayer.

The purpose of ~~the~~ Form BOE–472 is to establish the most effective and efficient means of developing a sampling plan. *This form must be used in all large audits (defined here as any audit with a cell designation of 1D through 4D) or any time sampling is performed.* This plan will provide much of the information that will later be needed to complete the working paper documentation and audit comments. All versions of t~~T~~he Audit Sampling Plan should be included in the audit working papers as supporting~~a~~ ~~memo~~ schedules to the sample items selected.

~~While the BOE–472 includes many situations that might arise in sampling, it cannot include them all. As such, the form should be modified (in Section 11, "Other") to address any situations not included in previous sections of the form. Once the information has been evaluated, the auditor is in a position to determine the best method of testing. See Exhibit 1 for an example of the different types of information that might be included in some sections of the Audit Sampling Plan.~~

Once the decision has been made to test using available statistical sampling methods, the development of an audit sampling program that documents the information available and the anticipated course of action will provide the auditor with an organized plan. This plan can be modified as work progresses; however, changes to the plan should be explained and discussed with the taxpayer. See Exhibit 2 for an illustration of a statistical sampling audit program.

DEFINE THE OBJECTIVE OF THE TEST 1302.10

Each test should have a specific, stated objective; subsequent statistical techniques are selected on the basis of that objective. The usefulness of any sampling test depends on a clear recognition of the relationship between the test objective and the corresponding audit objective.

For example: Is our objective to test sales for resale or to test all claimed deductions? The sample selection technique used might vary depending on ~~what~~ the true objective of the test ~~is~~.

DEFINE AND LIMIT THE POPULATION 1302.15

The population must be defined to ensure that all items about which the auditor wishes to draw a conclusion have an equal or known chance of being selected in the sample. The population should be defined and limited to the area(s) of audit interest. For instance, if the auditor is testing sales for resale~~s~~ (resales), the population should be limited to resales. In an accounts payable test, the auditor should limit the population to the accounts that are of audit interest. In a typical accounts payable population, only five to ten percent of the invoices may be in general ledger accounts of audit interest relative to possible overpayments or underpayments. Based on this, an auditor would require a ~~sample~~ population ~~size~~ of at least 3,000 invoices (300 ~~/~~ 10%) in order to obtain a sample size of 300 invoices from the areas of audit interest (see AM section 1303.05 for minimum sample size requirements). Additionally, an auditor needs to consider that the population distribution could impact the sample size requirement and cause it to rise to 15,000 or more units, unless the population is well defined and appropriate statistical sampling techniques (i.e., stratification) are used. Therefore, it is best to have a population defined by the specific general ledger accounts that the auditor has identified as areas of audit concern and employ stratification techniques.

Although the majority of errors encountered by auditors relate to underpayments, audit staff should also be aware of, and discuss with the taxpayer, the potential of overpayments. Examples of general ledger accounts relevant to overpayment errors may include special inventory accounts, expense accounts that may include materials held for resale, printing expense (exempt printed sales messages), non-recurring engineering accounts (exempt prototypes), and software (custom or transferred via modem). Examples of general ledger accounts relevant to underpayment errors may include fixed assets, expensed inventories, research and development engineering, tooling, dues and subscriptions, and expense accounts that clearly relate to tangible personal property. Service-related accounts that may relate to assembly or fabrication of taxable property include engineering services, installation and assembly accounts, and lab expenses.

The auditor may want to consider using statistical sampling for examinations of areas other than ~~an~~ accounts payable or sales examination. Depending upon the taxpayer's record keeping system, statistical sampling may be warranted for the fixed asset, journal voucher, or even debits to the tax accrual account (the auditor would still be required to reconcile the accrual account). When using statistical sampling for examinations of these other areas, it is important to work with the taxpayer to determine how the population will be defined and how stratification levels will be selected. Again, this discussion and information should be

documented on ~~the~~ Form BOE–472.

It is recommended that all tests include samples taken from the entire audit period whenever possible. In some instances, results from a statistical sample are projected to areas outside the defined population. This might occur if only one or two years of documentation are available in a three-year audit period. Generally, a minimum period of two years (unless an audit period is shorter) should be available in which to perform a statistical sample. On a rare occasion, fewer than two years but no less than one year may be used, but the reasons for using this short of a period must be well documented in the audit. However, it must be emphasized that no statistical inferences can be made regarding projection of results outside the tested population. The projection of these results to periods outside the tested population should be discussed with the taxpayer and the taxpayer's written agreement should be obtained prior to commencing the sample(s).

A clear audit trail of the population should be included in the working papers. *The auditor must clearly describe the choices, assumptions, and methodologies used in the statistical sample, specifically relating to the definition of the population so that an adequate trail is developed to permit subsequent evaluation of the auditor's work by the taxpayer.*

DEFINE THE CHARACTERISTIC BEING MEASURED 1302.20

The auditor should carefully define the sampling unit ~~quantity characteristic being measured~~ and determine a means of measuring it. For example, in a test of resales, the quantity of measure may be the differences between audited and claimed resales, a ratio of audited resales to claimed resales, or the audited total resale amounts.

SPECIAL CONSIDERATIONS 1302.25

A number of special factors must be considered whenever a statistical sampling plan is being developed. These factors should be discussed with the taxpayer when developing the sampling plan (Form BOE–472), so that the auditor and taxpayer can reach an agreement as to how these factors ~~should~~ will be handled if they are encountered during the test. These factors include:

a. **Multiple Locations —** When a taxpayer has multiple locations, the auditor must ~~take care~~carefully ~~to~~ determine how the records are maintained and whether internal controls are adequate. It is necessary to determine whether the record keeping is centralized at one location or whether each location maintains its own records.

b. **Arrangement of Source Documents —** Documents may be maintained or processed by the taxpayer in a number of ways such as numeric, periodic, cyclical, alphabetical, or batch processed, etc. In most cases, the taxpayer's method of maintaining documents will not preclude the use of statistical sampling techniques.

c. **Non-Response —** Occasionally the taxpayer will not be able to obtain a response to a confirmation request, e.g., XYZ letter, in spite of sending a second and maybe even a third request. The use of statistical sampling techniques should not change the auditor's reasoning in determining whether to accept or disallow a transaction. The auditor should still

determine whether the transaction questioned can be supported by alternative means.

XYZ non-responses should not automatically be considered errors or non-errors. When XYZ responses are not returned, audit staff should make every effort~~, if not already done,~~ to determine the taxability of the questioned sale by alternative methods. Such methods could include, but are not limited to:

- Examine the customer's seller's permit registration to determine whether or not the purchaser had a permit at the time of purchase, the type of business, reported sales, etc.
- ~~Review the quantity and type of items sold —~~ Determine whether the sales in question were most likely for resale or consumption, based on the quantity and type of items sold.
- Review a subsequent resale certificate (prior to the start of the audit) but for similar purchases.
- Examine other types of items sold to the customer.
- Contact the customer by telephone to determine the true nature of the sale. If the customer indicates that the sale was for resale, a copy of the XYZ request letter should be faxed to the customer for immediate response. This XYZ response will be subject to the same verification as any other XYZ response.
- Accept or deny the transaction based on personal knowledge ~~of~~ the auditor gained from prior audits or other sources.

There are occasions when the taxpayer is unable to obtain an XYZ letter response because the customer is no longer in business~~ due to a bankruptcy or other reason~~. In this situation only (not where there is just a change in ownership, such as a change in partners or a change from a sole proprietorship to partnership/corporation in which the previous owner continues the business under the new ownership), the sale will be considered a sale for resale if the property purchased by the customer is consistent with the type of sales the business makes. The auditor must verify ~~file~~ information contained in the taxpayer's file regarding the close-out or bankruptcy of the business, as well as the type of business operations of the customer to ensure that the situation meets these specific requirements.

In all other situations, if the sale appears to be of a type that could be consumed, the taxpayer is unable to obtain a proper XYZ letter response, and the auditor is unable to determine the exempt status of the sale by alternative means, the non-response should be considered an error.

d. Timing — The auditor must ~~take care to~~ be aware of timing differences between the date of a transaction and the date it is recorded by the taxpayer. For example, paid bills are frequently recorded when paid rather than on the date of the invoice.

In addition, the auditor must take special care when a sample item is found to involve an installment contract. Not only must the auditor determine whether or not the sample item constitutes a difference, the

auditor must also ~~carefully~~ determine the taxable measure of that difference. For example:

ABC Company, an unpermitized out-of-state vendor, enters into an installment contract with XYZ Corporation to furnish and deliver a piece of manufacturing equipment for $1,000,000. The contract specifies the following progress payments:

Payment 1	$200,000	Contract signing
Payment 2	$200,000	Design approval
Payment 3	$200,000	Completion of manufacture
Payment 4	$200,000	Delivery
Payment 5	$200,000	Completion of installation and testing

The contract specifies that title and possession of the equipment transfer from ABC Company to XYZ Corporation upon delivery, when the fourth installment payment becomes due and payable.

In this example, Payments 1, 2, 3, or 5 would not constitute differences for sampling purposes because they do not represent a "sale." On the other hand, Payment 4 would be a taxable transaction ~~and it would have~~with a measure of $1,000,000,~~.~~ even if ~~The fact that~~ the statute of limitations has expired on one or more of the earlier progress payments or ~~that~~ Payment 5 is not yet due~~ and payable would not alter this~~.

Care should be taken to determine whether or not XYZ Corporation reported tax on the earlier progress payments. If it did, then the $1,000,000 taxable measure should be reduced accordingly.

e. Voids — The ~~initial problem is to~~auditor must first determine whether voids (canceled or unused invoices) are included in big "N" — the total population. If so, the auditor can leave the voids in the sample and consider each as a "zero" or non-error or take all voids out of the sample and the population. ~~If voids are not included in the population, the auditor can disregard voids as they are not part of the population.~~

f. Credit Invoices, Credit Memos, and Debit Memos — Credit invoices, credit memos, or debit memos reduce or totally offset a previously issued invoice; they can also affect the taxable or exempt status of an original invoice. In general, the auditor should ~~correct way of dealing with these items would be to~~ evaluate all ~~of the~~ information available for the sample unit selected, ~~i.e., follow the event (transaction) through its life,~~ as shown in Method 1 and Method 2 described below. For example:

1. If a claimed resale is determined in a test to be taxable, the auditor would make certain that only the net amount due is projected in the test.
2. Questioned transactions subject to a discount, returned merchandise, or is written off as a bad debt would be considered and adjusted in calculating the net amount of error.
3. Only net amounts paid to vendors would be projected in a paid bills test.
4. For any item questioned in a sample, in general, the auditor would look at prior and subsequent events that might affect the net amount due on

that sample item.

In order to conduct a valid statistical sample when credit invoices and credit/debit memos are included in the population from which sample units are selected, use either Method 2 or Method 3 described below. When it is not possible to remove these items from the population, Method 2 allows for all available information on the sample items to be used in determining the taxable measure. When using Method 2, the credit invoices, credit memos and debit memos that are actually selected as sample items are deemed to be non-errors, i.e., they have a taxable measure of zero. To do otherwise, i.e., to analyze both the credit invoices and credit/debit memos that are selected as sample items under Method 2, as well as credit invoices and credit/debit memos related to sample items would mean that credit invoices and credit/debit memos in the population would have more than one chance of being selected for examination. This would bias[1] the sample and render statistical evaluation of the sample results invalid.

When using Method 3, the credit memos and debit memos selected in the sample are analyzed to determine the taxable measure as described below, but information from credit invoices, credit memos and debit memos related to sample items selected cannot be used when determining the taxable measure for sample items.

Given the above information, following are descriptions of the three methods that can be used to handle credit invoices, credit memos, and debit memos:

Method 1

One statistical method of handling credit invoices, credit memos, and debit memos is to remove them from the population to be sampled. If a Computer Audit Specialist (CAS) is involved in the examination or if the taxpayer has the technological resources (computerized system or information systems department that can separate these types of transactions from the rest of the population), it is fairly easy to stratify these credit transactions from the population to be sampled. Some audit staff also have the technological knowledge and expertise to separate these types of transactions from the population to be sampled. Electronic records must be available ~~for this method to be utilized~~ in order to remove credit invoices, credit memos, and debit memos from the population to be sampled.

By removing the credit invoices, credit memos, and debit memos from the population to be sampled, allowable credit transactions can be examined and offset (without affecting the statistical nature of the sample) as events that might affect the net amount due for items selected in the sample. This method also permits allowable bad debts or tax paid purchases resold to either be offset against sample items or to be tested and adjusted separately.

[1] Bias does not mean that the sample is inferior, inaccurate, or undesirable. It means that non-probability methods were used to select, examine, or treat sample items; therefore, the laws of probability do not apply and the evaluation of the sample results would be unsound and irrelevant.

~~However, in order to use this method, staff must have access to electronic records in order to be able to remove the credit invoices, credit memos, and debit memos from the population to be sampled.~~

Method 2

Oftentimes, it is not possible or feasible to separate credit invoices, credit memos, and debit memos from the population to be sampled. When it is not possible to segregate these types of transactions from the population, they should not be ignored or removed from the sample base.

Under this method, if selected as a sample item, the credit invoice, credit memo, or debit memo would be considered to have a zero measure of tax. Note that the credit invoice~~,~~ or credit memo ~~or debit memo~~ is left in the sample base as a credit transaction.

Questioned original sales or purchases (debit transactions) selected as sample items would take into account, when determining the appropriate measure of tax for the sample item, all available information including prior and subsequent events. Therefore, other related invoices, tax only invoices, credit invoices, credit memos, and debit memos may be examined for information that would help determine the proper measure of tax due on the sample item. This method also permits allowable bad debts or tax paid purchases resold to either be offset against sample items or to be tested and adjusted separately.

Method 3

If credit invoices or credit memos in a sales examination (or debit memos in a purchases examination) are included in the population being tested, then these negative transactions should be included in the sample selected and handled in the same manner as the positive transactions in the test. They should be reviewed carefully and, if properly supported, should be included in the test results. Under no circumstances should they be ignored or deleted from the sample if they are included in the population being tested. Credit invoices, credit memos, or debit memos resulting in errors in the sample should be included as errors when computing the estimated ratio (percentage of error) if they are included in the population being tested.

If credit invoices, credit memos, and debit memos cannot or will not be removed from the population to be tested and the taxpayer is concerned with the statistical validity of the sample, the test can be conducted in such a manner as to maintain the statistical nature of the test, only if the following procedures are used (assuming that the sample units are selected using random/chance/probability methods):

1. Debit transactions selected as sample items would be examined, as in any other test, to determine the taxable nature of the transaction. Debit transactions determined to be in error would be assessed in the test as debit errors. Offsetting credit transactions~~, whether or~~ that are not selected as a sample item~~,~~ would not be examined or offset against the debit transaction.
2. Credit transactions selected as sample items would have to be analyzed. In order to determine the disposition of the credit transaction, the original transaction would have to be reviewed:

- In a test of **total sales** — If the original transaction was claimed as an exempt sale but was actually a taxable sale (i.e., if the original transaction would have been assessed as a debit error if it had been selected as a sample item), the credit transaction would result in a credit error. If the original transaction was a taxable sale or a supported exempt sale, the credit transaction would result in a zero measure of tax. The credit item itself remains in the sample as a credit transaction.
- In a test of **exempt sales** — If the original transaction was claimed as an exempt sale but was actually a taxable sale (i.e., if the original transaction would have been assessed as a debit error if it had been selected as a sample item), the credit transaction selected as a sample item would result in a credit error. If the original transaction was a taxable sale or a supported exempt sale, the credit transaction would result in a zero measure of tax. The credit item itself remains in the sample as a credit transaction.
- In a test of **paid bills** — If the original transaction would have been assessed as a debit error if it had been selected as a sample item, the credit transaction selected as a sample item would result in a credit error. If the original transaction was a purchase that was not part of the population being tested, a purchase not subject to tax, or a purchase exempt from tax, the credit transaction would result in a zero measure of tax. The credit item itself remains in the sample as a credit transaction.

3. In order to maintain the integrity of the test, each individual sample item must be examined and evaluated independently, without examining any related transactions. As such, debit or credit transactions not selected as sample items would not be examined or offset against any sample items. Also, bad debt deductions would not be offset against any sample items. Under this method, bad debt deductions would need to be examined and adjusted separately.

Using the above methods, following are examples of how credit items in a sales test, or debit memos in a paid-bills test, should be handled. These examples are illustrative, but not exhaustive, of the possible types of credit invoices, credit memos, and debit memos that might be encountered. The disposition of credit invoices, credit memos, and debit memos, as well as bad debts and tax paid purchases resold, is dependent upon the method used, as described above.

Before the test is conducted, audit staff and the taxpayer should discuss each of these methods and come to an agreement on the method to be used. *The ~~M~~method to be used should be clearly identified in the comments on~~The agreed-upon method to be used to~~ handling~~e~~ credit invoices, credit memos, ~~and~~ debit memos, ~~and~~ bad debts and tax paid purchases resold ~~should be documented~~ on ~~the~~ Form BOE–472, Audit Sampling Plan.*

Sales Test — Sample Transaction Examples

#	Sample Item	Sample Item Amount	Subsequent Event	Subsequent Event Amount	Prior Event	Prior Event Amount	Taxable Measure of Sample Item Method 1	Taxable Measure of Sample Item Method 2	Taxable Measure of Sample Item Method 3
1	Sales invoice 111 (Sale booked as exempt, taxable sale)	10,000	CREDIT MEMO 222	– 10,000	—	—	0	0	10,000
2	Sales invoice 333	5,000	Return memo 444 (½ of the items returned)	– 2,500	—	—	2,500	2,500	5,000
3	Sales invoice 555 (Sale booked as exempt, taxable sale)	7,000	Credit memo 655 (CM to clear worthless account, written off as required by R1642)	– 7,000	—	—	0	0	7,000
4	Sales invoice 777	1,200	A/R Adjustment 132 (JE to write off worthless account, written off as required by R1642)	– 1,200	—	—	0	0	1,200
5	Credit memo 444	– 2,500	—	—	Sales invoice 333 (Sale booked as exempt, taxable sale)	5,000	N/A (No credit memos in population/ sample)	0	– 2,500
6	Credit memo 777	– 4,000	—	—	Sales invoice 888 (Supported sale for resale)	4,000	N/A (No credit memos in population/ sample)	0	0
7	Credit memo 999	– 4,320	—	—	Sales invoice 123	4,000 (tax) 320 4,320	N/A (No credit memos in population/ sample)	0	0
8	Credit memo 1125 (Items returned)	– 20,000	—	—	Sales invoice 682 (Sale booked as exempt, taxable sale)	20,000	N/A (No credit memos in population/ sample)	0	– 20,000
9	Sales invoice 825 for sales tax on prior invoice 545	350	The $350 sales tax was accrued and remitted to the State on the next return filed.		Sales invoice 545 (No tax charged, but should have been)	4,375	0	0	0
10	Credit memo for tax on invoice 898 (Seller claimed credit on his return. Customer sent a timely R/C and/or corrected PO to "for resale" and PO meets other requirements of R/C)	-80	—	—	Sales invoice 898 (Customer's PO marked "taxable" in error)	1,000 (tax) 80 1,080	N/A (No credit memos in population/ sample)	0	0
11	Sales invoice 952 (Sale booked as exempt, taxable sale)	1,600	JE to reflect volume discount allowed on invoice 952; A/R adjustment, credit memo issued	– 400	—	—	1,200	1,200	1,600
12	Sales invoice 1032 (Sale booked as exempt, taxable sale)	300	Cash discount taken (5% 10 days, net 30)	– 15	—	—	285	285	285
13	Credit Memo (Cash discount not taken, full amount paid within discount period, credit for cash discount)	– 2,800			Sales invoice 1455 (Sale booked as exempt, taxable sale)	28,000	N/A (No credit memos in population/ sample)	0	– 2,800

Paid Bills/Purchases — Sample Transaction Examples

#	Sample Item	Sample Item Amount	Subsequent Event	Subsequent Event Amount	Prior Event	Prior Event Amount	Taxable Measure of Sample Item Method 1	Taxable Measure of Sample Item Method 2	Taxable Measure of Sample Item Method 3
A	Use tax purchase, no tax accrued	15,000	Item returned, credit issued	- 15,000	—	—	0	0	15,000
B	Use tax purchase, no tax accrued	25,000	Only 3/5 of the billed items received, debit memo for items not received	- 10,000	—	—	15,000	15,000	25,000
C	Taxable purchase	3,000	Purchased item resold prior to making any use; qualifies as tax paid purchase resold; no TPPR credit claimed at time of sale	—	—	—	0[1]	0[1]	0[2]
D	Taxable purchase; use tax accrued and paid to State	2,000 160	Purchased item resold prior to use; qualified as tax paid purchase resold; no TPPR credit claimed at time of sale	—	—	—	- 2,000[1]	- 2,000[1]	- 2,000
E	Use tax purchase, no tax accrued	2,500	Out of state vendor assessed use tax in audit of same or similar items per ABC letter	—	—	—	0	0	0
F	Debit memo; item returned to vendor	- 6,000	—	—	Use tax purchase; no use tax accrued	6,000	N/A (No credit items in population/ sample)	0	- 6,000
G	Debit memo; tax not reversed but should have been	- 7,000	—	—	Use tax purchase;use tax accrued @ 8% and paid to State	7,000 560	N/A (No credit items in population/ sample)	0	- 7,000
H	"Tax only" entry[3] This is an AP entry that was made to reverse tax that should have been reversed when the $10,000 debit memo was entered	- 800	—	—	Original transaction: Use tax purchase Use tax accrued and paid to State (8%) Debit memo (Tax not reversed)	10,000 800 - 10,000	N/A (No credit items in population/ sample)	0	0

1 Assumes tax paid purchases resold are not being separately examined and adjusted.
2 Assumes purchase subject to use tax. If purchase subject to sales tax, taxable measure would be zero.
3. "Tax only" sample items should not be extrapolated, whether negative or positive. Assuming these sample items are actual invoices, the measure should be zero; journal entries will generally not be included in the population of a paid bills test.

Paid Bills/Purchases — Sample Transaction Examples (cont.)

#	Sample Item	Sample Item Amount	Subsequent Event	Subsequent Event Amount	Prior Event	Prior Event Amount	Taxable Measure of Sample Item Method 1	Taxable Measure of Sample Item Method 2	Taxable Measure of Sample Item Method 3
I	"Tax only" entry[3] This is the tax that AP accrued on a nontaxable purchase because the PO was marked "taxable" in error	640	—	—	Non-taxable purchase	8,000	0	0	0
J	Non-taxable purchase; use tax accrued in error @8% and paid to State	8,000 640	—	—	—	—	-8,000	-8,000	-8,000
K	Use tax purchase; no tax accrued or paid when invoice paid	10,000	Tax accrued and paid to State on subsequent return in the audit period, not as a result of the audit[4]	800	—	—	0	0	0
L	Use tax purchase; no tax accrued or paid when invoice paid	100,000	Tax accrued and paid to State on subsequent return as a result of contact with audit staff to schedule the upcoming audit[5]	8,000	—	—	100,000	100,000	100,000
M	Use tax purchase; No tax charged by vendor or accrued by purchaser when purchased	20,000	Use tax later billed by vendor registered with the Board and paid by purchaser	1,600	—	—	0	0	0
N	Charge for nontaxable repair labor from out of state vendor;use tax @ 8% paid to out of state vendor, who is registered to collect use tax[6]	3,000 240	—	—	—	—	-3,000	-3,000	-3,000
O	Charge for nontaxable repair labor; Sales tax @ 8% charged by California vendor	2,000 160	—	—	—	—	0[7]	0[7]	0[7]

3 "Tax only" sample items should not be extrapolated, whether negative or positive. Assuming these sample items are actual invoices, the measure should be zero; journal entries will generally not be included in the population of a paid bills test.

4 The above examples provide general guidance as to how credit invoices, credit memos, and debit memos should be handled. As mentioned previously, these examples are not exhaustive of the types of situations that could be encountered and care should be taken when applying these examples to different situations. For example: Assume fixed asset purchases were examined on an actual basis. The taxpayer purchased, during the audit period, a piece of equipment that cost a significant amount. The taxpayer reported this purchase during the audit period, but two years after the date of purchase. In this situation, an adjustment would have to be made in the audit to correctly assess the measure of tax due at the time of purchase, with a corresponding credit for the measure of tax reported two years later.

5 This item would be assessed as an error in the test. A separate adjustment outside the test would have to be made to give the taxpayer credit for the measure of tax already paid.

6 Staff would need to verify that vendor has not filed a claim for refund.

7 The purchaser will have to seek a refund of the sales tax paid in error from the California vendor. No adjustment in the paid bills test is warranted.

g. Missing Documents — If during the course of a statistical test a document cannot be located, normal auditing procedure requires the auditor to ascertain the reason for the missing or incomplete documents. When the investigation fails to reveal any specific reason, the auditor may first determine whether there is any acceptable alternative evidence. Fortunately, as more and more companies are converting to true paperless systems, it is generally not difficult to obtain a considerable amount of data about a missing invoice. The only statistical requirement is that an audited value be established for each and every sampling unit.

Statistical evaluation involves both estimating the extent of missing or incomplete documents and determining the possible effects that this might have on the auditor's decision. If missing invoices would create a material error and the taxpayer objects to the sample, the auditor may want to discuss possible alternatives with his or her supervisor or CAS.

Based upon the facts of the situation and guidelines presented in this ~~manual~~chapter, the auditor and the taxpayer together shall discuss whether to consider missing or incomplete documents as incorrect (in error), correct (no error), or whether to substitute another sample unit, or whether they should be removed from the sample base and projection.

Alternative procedures that can be considered, if appropriate, when missing documents are encountered include:

1. The taxpayer and/or auditor can contact the vendor or customer for a copy of the missing or unreadable documentation.
2. Allow the taxpayer to produce additional documentation on similar transactions for the same customer or vendor. The auditor can decide whether or not the taxability of the transaction(s) with missing documentation is similar to the transactions for which documentation is provided
3. Expand the initial sample size. When necessary, the auditor should extend the sample without altering the original sample and the selection order. See AM section 1305.20 for additional information.~~For example, if the sample size for a stratum is 300, then pull an initial sample of 360 items. The auditor's sample would consist of the first 300 items from the items pulled for which documentation exists. This method results in a relatively small incremental up-front cost to pull additional invoices, and avoids lengthy disputes over missing documents that may occur later in the audit.~~
4. Remove the missing item from the sample base and projection.
5. Only in rare or unusual circumstances should substitute sample units be considered.

h. Taxpayer Request for CAS Involvement — If there is a disagreement between the taxpayer and the auditor regarding the procedures to be used, the auditor can enlist the assistance of the ~~Computer Audit Specialist~~CAS (see AM section 1304.40). If the taxpayer asks to consult directly with the CAS, he or she should be directed to the auditor's supervisor, who will analyze the situation to determine whether CAS or Headquarters

assistance is warranted or whether the situation can be resolved without their involvement. This type of situation should be resolved prior to conducting the sample in order to avoid the possibility of having to conduct another sample or having a non-concurred audit before any testing has even begun.

i. Tax Overpayments in Sample Plans — During the course of a statistical sample, the auditor may detect both underpayments and overpayments. It is very important that the underpayments and overpayments be treated equally. Therefore, both overpayments (in certain situations) and underpayments need to be taken into account and treated the same when examining sample items, when analyzing the sample results, and when projecting the resulting errors to the population being tested. For example:

1. Purchase examination: Any sample items that are identified and verified as overpayments of use tax to vendors, overpayments of tax accrued and paid directly to ~~the Board~~BOE by the purchaser, or "tax paid purchases resold" should be tested in the same manner as underpayments. ~~Reimbursement for s~~Sales tax reimbursement paid to a ~~vendor~~ retailer in error ~~must come from the vendor~~cannot be used to offset understatements from other sample items, as ~~the incidence of~~sales tax ~~actually falls~~is imposed on the retailer.
2. Sales examination: Any sample items that are identified and verified as overpayments of sales or use tax reported by the retailer should be tested in the same manner as underpayments, provided that the retailer has not collected tax reimbursement from the customer. (If tax reimbursement is collected, these sample item overpayments cannot be used to offset underpayments from other sample items.)

There is no objection to projecting the results of a test that includes both overpayments and underpayments, as long as the test evaluates according to ~~Board~~ BOE standards (AM sections 1305.15, 1308.05). The criteria for evaluating, accepting, and projecting samples resulting in overpayments or underpayments are the same; however it should be noted that if a sample contains a significant number of underpayments and overpayments the likelihood of the sample evaluating is greatly reduced. Consideration should be given to identifying and testing overpayments and underpayments from separate populations when it is feasible. It should also be noted that taking larger samples is unlikely to result in a better evaluation. Using more strata may result in a better evaluation but will not reduce variability as much as creating separate populations.

DETERMINING SAMPLE SIZE 1303.00

GENERAL 1303.05

The sample size must be large enough to provide meaningful results, but not so large as to cause excessive work. In judgmental sampling, you can arbitrarily select a sample size, but the question of whether it is adequate to meet your objective is not measurable and is therefore based on subjective judgment. Statistical sampling techniques provide mathematically verifiable quantitative aids for estimating the sample size needed to achieve the desired precision and reliability. The adequacy of the sample size in meeting those specifications, however, can only be determined after all the sample items are examined and the results evaluated mathematically. Therefore the auditor must also consider the anticipated error rate and BOE requirements for sample projection in order to obtain statistically valid and defensible audit results.

A minimum sample size of **at least** 300 items of interest is to be used ~~for~~ in all tests, ~~unless~~ except where the auditor can support a smaller sample size and it evaluates well.[1] This means that in the case of a sample of sales for resale, within the context of a total sample of total sales, the sample size should be large enough to provide a minimum of 300 invoices that were claimed/netted as sales for resale (at least 300 items of interest). In unstratified populations, 300 sample units will rarely be an adequate sample size. However, stratified samples with multiple strata (three or more) may have a sample size of less than 300 per stratum, but the combined test will normally contain at least 300 items of interest.

This 300 minimum sample size relates to individual transactions and not cluster or batch sampling. The sample size when cluster or batch sampling is used will depend upon the volume of transactions in each cluster or batch and will often result in a significantly smaller sample size than if cluster or batch sampling is not used.

While statistical techniques define and quantify the decisions to be made, the auditor must nevertheless evaluate the situation and identify what he or she may want to achieve in applying sampling techniques. The method used to determine the sample size is decided by the auditor based upon the circumstances or information available at the time, including the auditor's knowledge of the business, review of internal controls, discussion with the taxpayer, and application of the guidelines discussed in this chapter.

SAMPLE SIZE FORMULA 1303.10

In order to use the formula for sample size, the auditor must be able to determine values to enter in the formula. These values can be obtained from a number of different sources. The auditor can compute the necessary statistics from the differences found in a prior audit even if the test was a block sample. The errors found in a prior block sample may be used to estimate the needed values required by the formula.

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[1] With respect to bad debt losses only, auditors may use a sample size of less than 300 sampled items provided a minimum of 10% of the population is sampled. The sample must be determined by the auditor and not selected by the taxpayer.

It is also feasible to compute the values from the cursory examination of a small number of current transactions — e.g., one day's invoices, a page or two from the sales journal, etc. Once these evaluations have been made, the sample size can be computed by the following formula:

$$\text{Sample Size} = n = \left(\frac{s \bullet z}{I}\right)^2$$

See Exhibit ~~11~~ 3 for an example of how to use the sample size formula.

If the sample size formula will be used to estimate the initial sample size, the auditor should provide the details of the statistical sample size formula to the taxpayer during the planning phase of the audit. The planned confidence and precision should be clearly stated on ~~the~~ Form BOE–472.

After a sample has been pulled, the results can be used to prepare a sample size matrix to provide an overview of additional samples necessary to achieve a desired confidence and interval level. The auditor and taxpayer should discuss the feasibility of expanding the sample if the planned confidence or precision is not achieved. This discussion should be documented by comments on the Form BOE–472.

PILOT SAMPLES 1303.15

A pilot sample may be necessary if no other information is available to compute the needed values. The main disadvantage of using a pilot sample is that usually it will require expansion, which means a second pass through the population. This added step can be time consuming and may meet with resistance from the taxpayer. As a result, it is not recommended when other means are available.

A more efficient approach is to estimate the sample size that would produce an acceptable audit result. Then, if during the examination of the sample detail it becomes apparent that the test is not productive (not producing errors), some consideration can be given to shortening the examination.

~~A test being done on a random selection basis may be stopped at any time if the samples are examined in the random order in which they were selected, since samples were randomly selected from the entire population. However, any test being done on a systematic basis should be continued since the entire population has not been sampled. An alternative when using systematic sampling would be to increase the skip interval. This would produce fewer samples, but the entire population will have been sampled. Caution should be exercised if errors are discovered with the increased skip interval. If this occurs, the test should be restored to the original plan and completed as originally started.~~

Estimated sample sizes can be developed using the auditor's analysis and evaluation of the audit situation and may involve the following factors:

a. Auditor's knowledge of the industry
b. Cursory exam of a handful of documents, or a short period of transactions, to estimate the expected error rate
c. Review of the prior audit
d. Discussion with the taxpayer

SAMPLE SIZE TABLES 1303.20

Statistical tables are available to estimate sample size based upon a number of factors including population, desired confidence level and expected rate of occurrence. These tables are found in statistical sampling textbooks and should be available in the reference area of each district office. ~~Exhibit 12, *Sample Sizes for Variable Sampling*, is a condensed form of one of these tables and could be useful in estimating needed sample sizes.~~

Most tables used by auditors are based upon infinite population sizes. It is possible to take the population size into account in determining the computed upper precision limit by making an adjustment called the finite population correction factor.

$$\text{FINITE POPULATION CORRECTION FACTOR} = \sqrt{\frac{(N-n)}{(N-1)}}$$

This has the effect of reducing the required sample size somewhat. It should not be used unless the sample size equals 5% or more of the population. The finite population correction factor may also be used in computing the standard error as shown in AM section 1305.10.

FACTORS AFFECTING SAMPLE SIZE 1303.25

a. Population — statistical theory proves that in most types of populations where statistical sampling applies, the population size is only a minor consideration. This is because representativeness is ensured by the random selection process. Once an adequate sample size is obtained that includes a good cross-section of items, additional items are not needed regardless of population size. Comparing the mean and standard deviation of the population to the mean and standard deviation of the selected sample is a simple and reliable method of ensuring that a good cross section was obtained.

b. Confidence level/interval — an increase in the desired confidence level or decrease in the confidence interval will both result in an increase in the necessary sample size.

For example:

An increase of the confidence level from 80% to 90% would increase the required sample size by approximately 65%, or

A decrease in the confidence interval will increase the required sample size proportionally.

c. Cost benefit ratio — before beginning the test, consideration should be given to the cost and time needed to conduct a test using statistical sampling techniques. The use of the random method for selecting a sample may impose an additional time requirement in the audit. This can be alleviated, in part, if the taxpayer assists in pulling the items selected for examination. In addition, obtaining electronic data that includes all of the required fields will alleviate the necessity to pull all source documents.

A key consideration should be materiality. A test should not be conducted just for the sake of testing. Also in audits of smaller taxpayers, it is

frequently faster to examine all transactions on an actual basis.

The use of prior audit percentages of error should be considered when the taxpayer meets the specific criteria of AM section 0405.33~~ of this Audit Manual~~.

d. Standard deviation of the population — the standard deviation is used to indicate the level of variance in the population and is the key criteria in determining sample size in ~~the Board's~~ BOE's formula. Understanding the population distribution in a test is important in selecting a sample size and statistical method to be used. Accounting populations generally do not have a normal distribution (normal bell-shaped curve); rather, they normally have a skewed distribution. For example, a positively skewed distribution is comprised of a large number of invoices with low dollar values and a small number of invoices with high dollar values. ~~Unfortunately, determining the population distribution is complicated by the fact that the distribution is hidden from view.~~ See Exhibit 4, *Skewed Sales Population Distribution.*~~An example of a skewed population distribution and a sample selected is as follows:~~

~~Population = 20,000 Dollar Range = $1 – $100,000~~

~~10,000 invoices = $400 or less~~

~~9,400 invoices = $401 to $29,999~~

~~600 invoices = $30,000 or more~~

~~Sample Size = 300~~

~~150 invoices = $400 or less~~

~~141 invoices = $401 to $29,999~~

~~9 invoices = $30,000 or more~~

When an auditor is unaware that a population is skewed, the low-dollar transactions are normally over sampled and the high-dollar transactions are under sampled. This will generally lead to an inaccurate and unrepresentative sample with a high interval. For these types of situations, stratification is an appropriate and time-saving remedy (AM section 1304.15).

e. Stratification — an auditor may make a decision to test more heavily from among items of greater value or importance or to test multiple locations or categories of transactions independently. This requires a sound analysis of the population in order to subdivide the population properly. Stratification also increases the efficiency of sampling when extreme values are found in a population. For example, the auditor may determine that the objectives of the audit can be achieved more effectively by examining 100 percent of high dollar value items with multiple tests of lower dollar value items. In many situations, four or five strata will be required for greater accuracy and efficiency. Stratification is not limited to dollar amounts, but may involve stratification by product line, customer types, sales locations, or some other criterion. The auditor should consider the possibility of stratifying in tests of sales, consumables, or assets. The basic considerations for stratification apply equally in all of these areas. (See AM section 1304.15.)

SAMPLE SELECTION TECHNIQUES 1304.00

GENERAL 1304.05

The key element common to all tests to be evaluated statistically is that the items to be included in the test must be selected~~chosen~~ at random with an equal or known probability of being chosen. There are several acceptable methods for selecting a probability or random sample, with those most common to ~~the Board~~BOE~~'s~~ auditing explained in the following sections.

Questions regarding sampling approaches should be discussed with the supervisor and CAS who will provide suggestions or assistance.

UNRESTRICTED RANDOM SAMPLING 1304.10

The unrestricted random sample is obtained by the use of a random number table or computer generated random numbers. This method is used to draw individual sample items from the entire population without segregating or separating any portion of the population. By this method, each and every item in the population has an equal chance of being selected as a sample unit. It should be noted that segregating transactions into a test population and an actual basis population is still a form of unrestricted sampling since only one sample is being selected. As such, a combined evaluation of the results should not be made. ~~This~~ Unrestricted sampling ~~is one of the most commonly used sample selection techniques.~~ is not efficient for large populations with a wide range of values.

STRATIFIED RANDOM SAMPLING 1304.15

An essential concept to understand is that accounting populations are not typically evenly distributed; rather, accounting populations normally have a skewed distribution. It is also important to understand that the purpose of an audit is to cover as much of the population dollars as possible in an efficient manner, not necessarily a certain percentage of the population invoices. Stratification is the methodology that allows this goal to be achieved and is the key to effectively and efficiently conducting an examination.

Stratified sampling is where all items in the population are divided into groups~~sub-populations~~, ideally according to similar types of characteristics (homogeneous groups); for example, periods, product lines, customer types, sales locations, dollar ranges, etc. Each group or stratum~~sub-population~~ is then sampled independently. After the results of the individual samples have been completed, they are generally combined into one overall population ~~estimate~~ evaluation in terms of a confidence interval and confidence level. ~~*Audit staff must contact their local Computer Audit Specialist for assistance in computing a combined evaluation of the population tested.*~~

Stratification is used to reduce the effect of extreme values in measured variables (errors). By reducing the variability of the population within each stratum, stratification often reduces the sample size needed to achieve a desired level of precision and reliability. With stratified sampling, an auditor can cover 35–80% of the total population dollars while examining the same or fewer invoices than without stratification. Another benefit of stratifying the population is that the combined computed precision level for each stratum will normally reduce the overall confidence interval, resulting in a much better sample evaluation.

Unless the population is very homogeneous, stratified sampling is the preferred method to be used~~, especially where difference estimation is employed~~. In many situations, four or five strata will be required for greater accuracy and efficiency (e.g., $0–$400; $401–$5,000; $5,001–$25,000; >$25,000). For example, accounts payable populations would normally need to be stratified into multiple strata due to the variances in the population. At the lower end, almost all accounts payable populations have similar characteristics; such as, approximately 30%–50% of the invoices are between $200–$400, which represents only 1%–2% of the population dollars. Therefore, without stratifying the accounts payable population into multiple strata, an auditor may not achieve a representative sample of all the population dollars.

It should be noted that once the population has been divided into several strata, unrestricted random sampling procedures would be used on each of the resulting strata. ~~See Exhibits 9 and 10.~~

A test being done on a random selection basis may be stopped at any time if the samples are examined in the random order in which they were selected, since samples were randomly selected from the entire population.

SYSTEMATIC SAMPLING 1304.20

Systematic sampling involves selecting samples at a given interval after establishing a random starting place. The random start is essential to ensure each unit in the population has an equal chance to be included in the sample. This method of sampling can be the most efficient if the documents in the population are not numbered. For instance, invoices can be selected by physical count rather than by invoice number.

Systematic sampling is the selection of every "nth" item following a random start. In this type of sample, the size of the interval directly affects the size of the sample. As a result, the population and required sample size should be estimated in order to determine the interval necessary. (Population ÷ sample size = interval).

Although this method is indeed a simple method of selecting samples, the method must be used with caution since bias can be introduced into the sample. In general, if there is any periodic or cyclic arrangement of the items in the population, a bias can result. Further, it may not be apparent from the sample that the bias exists.

There will be some situations in which, for purely practical reasons, systematic sampling would seem to be the only viable approach. In these instances, if the auditor has reasonable assurance that no cyclical pattern exists in the filing arrangement, such an approach can be used.

Any test being done on a systematic basis should be continued since the entire population has not been sampled. An alternative when using systematic sampling would be to increase the skip interval. This would produce fewer samples, but the entire population will have been sampled. Caution should be exercised if errors are discovered with the increased skip interval. If this occurs, the test should be restored to the original plan and completed as originally started.

CLUSTER SAMPLING 1304.25

Cluster sampling is a special form of sampling using either the random or systematic approach. However, instead of selecting a single sample unit, a group of sample items is selected. For instance, a group of ten consecutive invoices may be selected as a group or cluster. The group or cluster then becomes one sample unit.

Cluster sampling may be the only feasible method of sampling when there is a very high cost to retrieving items randomly selected across the entire population. ~~This method can save time in accumulating the sample since fewer points in the file are sought.~~ However, since each cluster represents one sample unit, some sampling efficiency may be lost. It is generally recommended that a minimum number of ~~20~~ clusters be ~~included in a test~~selected so that at least 300 items of interest are examined.

In cluster sampling, an auditor must first divide the population into non-overlapping groups (clusters). The sampling units within each group may exhibit considerable differences. The clusters, however, are chosen to be as nearly alike as possible. Next, a random sample of the clusters is performed. If all units in a cluster are sampled, a **single stage cluster sample** has been performed. However, an auditor may also perform a **two-stage cluster sample**-selecting a random sample of the clusters and then taking a random sample of the sampling units within the chosen clusters.

Batch sampling is a form of cluster sampling. In a situation where a taxpayer has filed documents in batches, it may be very difficult and time consuming to select individual invoices and trace them to their location. Selecting a batch as a sample unit will quite frequently reduce the time required to select the sample. This can be a very efficient form of cluster sampling.

COMBINATION 1304.30

It is possible to combine different selection techniques — for example, a random sampling of days may be selected with transactions on those days tested on a systematic basis.

There are a wide variety of ways to select a sample other than those already discussed, and it will be up to the auditor to determine the most effective means based upon his or her review. The sample may be selected by pages, lines on a page, months, days, vouchers, etc.

METHODS OF SELECTING A SAMPLE 1304.35

The following paragraphs illustrate a number of aids available to assist the auditor in the use and selection of a statistical sample:

a. **Use of Computers**

   The use of a computer to select the sample provides a number of advantages including significant time saving, elimination of incorrect number selection and automatic documentation in the form of printed reports. *Audit staff should be aware that it is not only preferable, but also Department policy, to conduct an audit using computerized records, if available.*

1. ~~**Board's**~~ **BOE's** **Computer Program** — The use of the "Random Number Generator" program allows the auditor to select items with replacement to be tested from one or a number of sequences at random in a matter of minutes. The program will provide the items selected in numerical or random sequence. Duplicate sample units should be anticipated and sample sizes should be adjusted for the removal of duplicates. See Exhibit 5, *Random Number Generator.*

2. **Taxpayer's Computer** — Prior to conducting any tests, the auditor must make a thorough examination of the business operations, including a review of source documents and the taxpayer's accounting system. Form BOE–472, *Audit Sampling Plan*, is a tool to be used by both the auditor and taxpayer to gather information prior to conducting a sample, so that the most effective and efficient sampling plan can be developed (see AM section 1302.15). This form, and the discussion with the taxpayer regarding the information on this form, shall be completed whenever sampling is done, whether testing is conducted using a computerized system or paper records. After the audit sampling plan has been agreed upon, the taxpayer should provide the records agreed upon in the plan.

   An important part of designing the sampling plan consists of defining and limiting the population, whenever possible, to only the areas of audit interest (i.e., relevant accounts). For example, in testing accounts payable, it is preferable to have the population defined by the specific general ledger accounts that the auditor and taxpayer have discussed and identified as areas of audit concern. It is also important to employ stratification techniques in order to increase the efficiency of the sample when extreme values are contained in a population, which is generally the case in accounting populations. The taxpayer's computer system or computerized data may be used to define and limit the population and employ stratification techniques.

   When the taxpayer maintains machine-sensible records, the auditor and taxpayer, or a representative from the taxpayer's information systems department, should discuss the use of this system for testing purposes. The auditor is encouraged to contact their local ~~Computer Audit Specialist~~CAS if any assistance is needed to determine the feasibility of using the taxpayer's system for testing purposes or for guidance in setting up tests (see AM section 1304.40). If a CAS will be contacted for assistance, it is preferable that he or she be contacted prior to this meeting with the taxpayer, so that the CAS can also attend.

   In discussing the use of the taxpayer's computerized records for testing purposes, the taxpayer may express concern regarding the confidentiality or proprietary nature of the information included in the taxpayer's electronic records. Taxpayers should be assured that confidential taxpayer information is required by both ~~Board~~ BOE policy and law to be safeguarded.

   Existing state and federal laws prohibit the disclosure, willful unauthorized inspection, or unwarranted disclosure or use of any information concerning any taxpayer by ~~the State Board of~~

~~Equalization~~BOE, except as specifically authorized by statute (i.e., public information — business address).

Also, if the taxpayer expresses concern with allowing data tapes to leave their premises, audit staff should work with the taxpayer to make arrangements to retrieve the data necessary for the test while at the taxpayer's site. The only data that will leave the taxpayer's site is the data necessary to the auditing process.

When records are maintained in an electronic or computerized system, but the taxpayer indicates that they will not allow access to these records, the auditor should follow the procedures outlined in AM section 0403.10 of this Audit Manual. The District Administrator should also contact the Chief of Field Operations for guidance on obtaining access to computerized records, as required by the ~~requirements of~~ Revenue and Taxation Code sections 7053, *Records*, and 7054, *Examination of Records;* and Regulation 1698, *Records*.

b. **Tables**

There are a number of tables available to assist the auditor in selecting the sample. They contain random numbers, random letters or random months. These tables can be used in combination with each other if, for example, the taxpayer uses both alpha and numeric combinations to identify documents.

It is important to remember that even with the use of these tables, the sample must have a random start.

The major disadvantage in using these tables is the time necessary to identify the items to be selected and then to reorganize the items in a usable format, such as numerical. See Exhibit 6*, Tables of Random Months, Weeks, Days Alphabet, Numbers*.

COMPUTER AUDIT SPECIALIST 1304.40

In response to the growing need to audit through sophisticated taxpayer computer systems, the Sales and Use Tax Department initiated a Computer Audit Program. The goal of the program is to provide technical support to auditors who conduct reviews of complex accounting systems, especially those consisting of machine-sensible records. The ~~Computer Audit Specialists (~~CAS~~)~~ can write specialized software programs to extract required accounting details, if necessary, to improve audit efficiency (reduce audit hours) and the accuracy of testing procedures. CAS are available to assist auditors from any district office. The CAS are also available to assist audit supervisors or District Principal Auditors if additional guidance is necessary. Refer to the ~~Board~~BOE Directory for the district office location and phone numbers of the CAS.

The current process is as follows:

1. *Currently, it is mandatory that the CAS be contacted when the prior audit expended 400 or more hours or the CAS was involved in the prior audit*. (See item 2 below for exception requests.)

   It is critical that the CAS be involved in the audit at the earliest possible stage. For this reason, at the time each mandatory CAS-contact audit is

assigned to an auditor, the lead auditor ***must*** contact his/her area's CAS to arrange a meeting to review the prior audit and determine if the services of the CAS would be beneficial. This meeting should be held **before** the initial audit discussion with the taxpayer is scheduled. While initial contact with the CAS is mandatory, it may be determined after meeting with the CAS that his/her involvement is not necessary.

2. *CAS must be contacted if stratified sampling is used or whenever data is downloaded from the taxpayer's records.*

   Stratified sampling involves critical decisions regarding proper stratification levels and also requires that a combined evaluation of all strata be computed. The downloading of data from the taxpayer's records requires analysis of the data and verification of the completeness of the data. These require the assistance of a CAS and the specialized resources they have at their disposal.

   Exception requests: Requests for exceptions to these requirements for CAS contact must be submitted to and approved by the Supervising Computer Audit Specialist ~~supervisor of the Field Support & Evaluation Unit,~~ (MIC ~~40~~44).

3. Audit staff are encouraged to contact the CAS (regardless of the size of the audit) whenever assistance is needed due to the volume of computerized records, or whenever the auditor needs assistance in setting up a test or has questions regarding statistical sampling procedures. Depending on district policy, the auditor's supervisor should be notified prior to contacting the CAS. Ideally, the CAS should be contacted prior to the first meeting with the taxpayer or as soon as a problem arises.

   Audit supervisors and District Principal Auditors can also contact the CAS for assistance or questions regarding statistical sampling or computerized auditing techniques. If a taxpayer requests consultation with a CAS, this request should be forwarded through the audit supervisor.

4. Typically, the ~~specialist~~ CAS will first verify whether the electronic data provided by the taxpayer contains all the necessary information. Control reports are then developed which list account balances by month and year. These totals allow the auditor to verify that the electronic data processing (EDP) records are complete.

5. After verifying the accuracy and completeness of the control reports, an interval and frequency report are produced. Both the auditor and taxpayer receive copies of these reports. A mutual agreement between the auditor and taxpayer is reached on stratification points and sample sizes.

6. The CAS provides the auditor with the sample selections in an Excel spreadsheet format or Access database. Upon request, the CAS can also provide a disk or documentation that supports the total population figure(s). This information should be provided to the taxpayer.

7. The auditor determines whether the selected sales/purchases are taxable and whether any errors have been made. Errors are noted, and statistical sample evaluations are compiled by the auditor.

EVALUATION OF SAMPLE RESULTS 1305.00

GENERAL 1305.05

The use of statistical sampling techniques enables the auditor to make generalizations and inferences about the total population by examining only a portion of that population.

After the auditor has located the selected items, he or she must examine each one and determine the cause and the audit significance of each exception. Doing so is much easier if the objective, the characteristic being tested, and the means of measuring it have been rigorously defined. ~~Likewise, t~~The auditor must ~~be careful~~ not ~~to let~~allow the significance of one characteristic ~~blind~~ cause bias against ~~him/her to~~ another. If an unanticipated characteristic should be found, it may be subject to adequate evaluation by means of the sampling technique in process, or a new sample and a different technique may be required. For example, if the only errors in a sample relate to one customer or vendor it might be preferable to examine those transactions on an actual basis.

STATISTICAL SAMPLING SYMBOLS, FORMULAS AND DEFINITIONS 1305.10

Symbol	Formulas	Definition
N		Number of items in the population, field or universe.
n		Sample size; number of items in the sample.
x		Individual values; units in the sample.
μ		True mean; mean of population, field, or universe.
Σ		Total of; sum.
$\bar{x}$	$\frac{\sum x}{n}$	Mean of sample.
x_d		Differences, errors.
$\bar{x}_d$	$\frac{\sum d}{n}$	Mean of the differences.
σ	$\sqrt{\frac{\sum (x-\bar{x})^2}{(n-1)}}$	Standard Deviation of the population, field, or universe.
S	$\sqrt{\frac{(n)(\sum d^2)-(\sum d)^2}{n(n-1)}}$	Standard Deviation of the Differences.
$S^{\bar{x}}$	$\frac{S}{\sqrt{n}}$	Standard Error.
$S^{\bar{x}}$	$\frac{S}{\sqrt{n}} \cdot \sqrt{\frac{N-n}{N-1}}$	Standard Error using the finite population correction factored (used only if the sample exceeds 5% of the population.)
Z Value		Confidence coefficient; value for area under the normal curve.

C.I.	$S_{\bar{x}} \cdot Z$	Confidence interval; precision. The maximum achieved confidence interval allowable is 75%.
C.L.		Confidence level; a confidence coefficient of 80% or more should be used. (Z value for 80% is 1.28). If the sample size is less than thirty, the T value for 80% at the specified sample size should be used. (See Exhibit 4.)

ANALYSIS OF DATA 1305.15

See Exhibit 7 for a sample combined evaluation worksheet schedule to be submitted with the completed audit. ~~(Auditors must contact their local Computer Audit Specialist for assistance in computing a combined evaluation of a stratified sample — see Section 1304.15.)~~

Although it will not be necessary for the auditor to show mathematical computations, ~~it is felt~~ each formula should include the basic figures used in the computation. This will ensure that anyone reviewing the audit can readily see how the auditor arrived at his/her conclusions.

Since the auditor is sampling for variables, the confidence levels used for analysis purposes will generally be less than the confidence levels used in attribute sampling. An 80% confidence level is used in the evaluation of statistical samples by audit staff. Increasing or decreasing the confidence level will affect the confidence interval. Some reasons for confidence interval variation are: variability within the sample units; differences in sample size; small vs. large errors or credit errors. The fact the confidence interval is wide (greater than 75%) will require the auditor to analyze the sample to determine why this has occurred. This analysis will generally show that the auditor needs to expand the sample size, stratify the population, or take other measures to ensure the sample results meet ~~the Board~~BOE standards. The following factors can be used to assist in the evaluation of the sample and to determine what measures to undertake to remedy the situation.

(a) Mean of sample vs. mean of population

(b) Range of values in sample vs. range of values in population

(c) ~~Substantial~~ Adequacy of sample size

(d) Auditor's analysis and evaluation of all the information available, based upon the guidelines presented in this chapter.

The confidence interval is a measure of the variability of the units included in the sample. It is not a measure of whether a sample is acceptable or unacceptable. However, a small interval is preferred because it indicates that the population is more homogeneous, contains less variability, and enhances the precision of the sample.

When a large interval (greater than 75%) is disclosed, the auditor must make a decision regarding the acceptability of the sample based upon the best information available. Some of the options to be considered in making this decision include:

1. Examine specific transactions on an actual basis.
2. Increase the sample size.
2. ~~Stratify (by dollar value, product line or type of error).~~
3. Drop the test and accept reported amounts in that area of the audit.
4. Stratify (by dollar value, product line or type of error). This option should only be attempted if electronic data was available and with the assistance of a CAS.~~Examine specific transactions on an actual basis.~~
5. Further analyze the sample and comment in the audit as to why the results are being accepted even though they deviate from acceptable ranges. Accept the test results only if it is agreed to by the taxpayer (explanation for acceptance and taxpayer's agreement should be contained in the working papers).

When a test results in zero errors the auditor must review the sample units and if they appear representative of the population, a no change report is appropriate.

A ~~Computer Audit Specialist~~CAS may develop some other tests to determine the acceptability of a particular audit sample.

A sample may result in a refund or credit if the dollar value of tax overpayment errors exceeds the dollar value of the tax underpayment errors in the sample. The auditor must review the sample results, and if they appear representative of the population and meet ~~Board~~ BOE standards (as noted above and in AM section 1308.05), compute the negative estimated ratio (negative percentage of error) and project it against the population being tested to derive the projected measure of tax overpayments in the population.

EXPANDING A SAMPLE 1305.20

After analyzing the original sample results, sample evaluation, and any additional factors, the auditor must decide whether to accept the sample or to expand it. If the decision is made to expand the sample, the auditor should discuss the need for selection of additional sample items with the taxpayer. Using a sample size matrix, the auditor and taxpayer should come to an agreement regarding the number of additional sample items to be selected.

Care must be taken in deciding if expansion is really necessary because this requires a second pass through the population and will increase the cost and time required, for both staff and the taxpayer, to conduct the audit. As a result, every attempt should be made to select an adequate sample size before conducting the test, rather than relying on the ability to expand the sample at a later date.

If the taxpayer requests that a sample be expanded and the auditor believes that expansion is not necessary, the auditor's supervisor should be contacted. The supervisor will analyze the situation to determine if expansion is warranted. The supervisor may want to consult with the CAS for assistance in making this decision.

If the auditor feels the test should be expanded or the sample is to be expanded at the request of the taxpayer, ~~it should be remembered that~~ the expanded sample will not replace the original but will rather extend it. The audit findings will then be based upon the combined results. If the same method is used to select the original and the expanded samples, they can be combined even if they are conducted by different auditors.

When expanding a sample at the taxpayer's request, the auditor should elicit as much assistance as possible from the taxpayer in order to minimize the additional time needed to complete the audit.

It is important to advise taxpayers, prior to the start of work on a second sample, that they cannot later accept the initial sample and disregard the expanded sample if the combined results prove to be unfavorable.

The auditor must document through audit comments why the sample is being expanded and how the additional sample size was determined.

ESTIMATION — PROJECTION TECHNIQUES 1306.00

GENERAL 1306.05

There are three basic methods used by ~~the Board~~BOE to project sample results: mean-per-unit estimation (simple projection), difference estimation, and ratio estimation (percentage of error). Until the results of the sample are known, a determination of which method of projection provides the best estimate cannot be made. An example of these estimation techniques is shown in Exhibit 8.

All errors in the test, both underpayments and overpayments, should be included in the evaluation and, if the results meet ~~Board~~ BOE standards, should be projected to the population tested.

MEAN-PER-UNIT ESTIMATION 1306.10

Estimates are made from the audited values in the sample. The average audited value of the sample items multiplied by the number of units in the population can be used to estimate the total value of the population. This type of estimation is generally not used because it almost always results in a larger standard deviation, which requires a larger sample. At times, it may be a useful statistical method in situations where no recorded book value is available for individual population items or the taxpayer has been using estimates.

DIFFERENCE ESTIMATION 1306.15

Estimates of the total error in the population are made from the sample differences by multiplying the average audited difference (sum of the differences ÷ sample size) by the number of units in the population. This method cannot be used unless there is both a recorded value and an audited value for each item in the sample.

This method almost always results in a smaller sample size than mean-per-unit estimation because the standard deviation of the difference is smaller than the standard deviation of the audited values.

Difference estimation should be used in situations where the errors discovered in the sample tend to be constant and have no relationship in size to the recorded

book value. An example of this type of error would be handling charges that are a flat amount regardless of the size of the transaction.

RATIO ESTIMATION (PERCENTAGE OF ERROR) 1306.20

The ratio is formed by dividing ~~the~~ a stratum's net sample difference by the stratum's recorded sample ~~total sample~~ value~~,~~. ~~when using unrestricted random sampling.~~ This ratio is then applied to the corresponding stratum population total to estimate the stratum error in the population being tested. A separate ratio is calculated for each stratum and applied accordingly.

This method also requires the use of smaller sample sizes than the mean-per-unit method. Like difference estimation, recorded values are also required for the population in order to use ratio estimation. This is the most efficient method when the differences have a consistent relationship to recorded book values.

This is the estimating technique used most frequently in audits conducted by ~~the Board~~BOE. It is recommended that this method be used to project sample results unless there is convincing evidence to the contrary.

WORKING PAPER TECHNIQUES 1307.00

GENERAL 1307.05

Statistical sampling techniques must be adequately documented in the working papers, not only to provide a means for review but, if necessary, to ~~justify~~ allow for replication and/or expansion of the sample. It is also necessary to support the validity of the technique used in the test.

MINIMUM DOCUMENTATION 1307.10

Minimum documentation should include:

a. *Audit Sampling Plan*, Form BOE–472. Form BOE–472 is required for all large audits (cell designation "D") or any time sampling is performed.

b. The original population total, its source and a reconciliation and explanation of items removed or segregated from the original population. Additionally, a reconciliation of strata totals to the population total, if several strata are involved.

c. The method of selecting sample items — for example, if a random number table is used, the documentation should include the name and source of the table, starting point, route through the table and the stopping point. If a random number generator was used, the random seed should be documented in the working papers. This information is essential in the event the sample is to be expanded.

d. A listing of the sample items and any differences noted. Whatever methods are used, proper referencing is essential to provide the proper audit trail.

   NOTE: Generally, unless a sample is relatively small, a separate schedule for differences or questioned items should be made for ease in the summary or analysis of the sample results. At a minimum, the schedule of questioned items should include the following, as applicable for the type of test:

1. Date
2. Invoice number
3. Vendor/Customer name
4. Vendor/Customer address
5. Shipped from/to
6. Complete description of the item(s) in question
7. Amount in question
8. If applicable, general ledger/cost center/department that AP purchase(s) charged to

e. Combined ~~E~~evaluation of sample ~~results~~ worksheets — ~~this is most frequently completed in a worksheet format.~~ A ~~sample~~ combined evaluation template, as illustrated in Exhibit 7, is included as part of the electronic audit package worksheets. In addition to numeric data, the evaluation may also include additional information pertinent to the sample or population that the auditor feels is necessary to properly evaluate the test.

f. The audit conclusion reached — this will be used as the basis for projecting the results of the sample to the total population.

STATISTICAL SAMPLING STANDARDS 1308.00

MINIMUM ERRORS AND EVALUATION STANDARDS 1308.05

The projection of a sample result to the population total is based upon the theory that the sample is ~~truly~~ representative of the population from which it was drawn. ~~At all times, it should be remembered that t~~The goal of a sample is not to find some minimum number of errors. The emphasis on a minimum number of errors can lead to inaccurate sampling. The goal is to draw a sample that provides a representative and reliable ~~picture~~ subset of the population.

When a sample produces only one or two errors, the auditor must evaluate whether these errors were ~~truly random~~representative, or whether it is possible that they indicate problems in certain areas that could be examined separately. Such a low error occurrence rate ~~would~~ could then leave doubt as to whether the sample is representative and should be projected. *Therefore, any population sampled, whether by an unrestricted random sample or a stratified sample, must have a minimum of three errors.* For an unrestricted random sample, a minimum of three ~~(3)~~ errors, exclusive of any actual basis examination, is required before the errors in the sample may be projected. For a stratified random sample, a minimum of three ~~(3)~~ errors per stratum is required before the errors in a sample may be projected.

~~If fewer than three errors are found,~~ Samples or strata that do not have three errors should be handled using the following guidelines:~~the auditor's analysis of the situation based on the guidelines in this chapter should be used to determine whether the sample should be expanded, a separate examination of a particular problem area should be made, or the sample should be considered to have shown too small an error rate to project.~~

1. If feasible, expand the sample or stratum (see AM section 1305.20).
2. Examine problem areas (specific customers, vendors, accounts, etc.) on an actual basis.

   The taxpayer may have electronic records that can be utilized to allow a more in-depth analysis of problem areas. The auditor and the CAS can work with the taxpayer's electronic records to audit the test or stratum on an actual basis assessing tax on all known errors in that test or stratum. These known errors would include:

   A. All transactions to the customers/vendors that are in error in the test/stratum.

   B. All transactions to customers/vendors that are errors in other tests, strata or actual basis examinations. Only transactions that fall within the test/strata in question should be assessed on an actual basis for the questioned test/strata. For example, assume there are only two errors in the stratum of transactions from $5,000 - $10,000. All other strata have a sufficient number of errors to project and there are errors in the actual basis examination. Using this procedure, look for transactions in the $5,000 - $10,000 range from customer/vendors identified as errors in the other strata and actual basis examination. Assuming these transactions are in error too, assess them on an actual basis for this stratum only.

   C. All transactions to customers/vendors identified on audit leads (BOE-1164, BOE-1032).

   D. All other errors known to the auditor.

3. Accept the taxpayer's reported/claimed amounts for that sample/stratum.

   Documentation in the audit must include comments that explain why reported/claimed amounts are being accepted, as well as why the sample results are representative and the known errors were not projected or assessed on an actual basis.

Auditors should inform taxpayers before testing starts that those samples/strata that do not meet BOE standards for minimum errors will be handled using the above guidelines. Auditors should include comments about minimum errors on the Form BOE-472, *Audit Sampling Plan.*

When an examination results in zero errors, a no change report would normally result for that portion of the audit. This would not necessarily be the case, however, if the results do not appear to be representative. A large number of BOE–1164's on hand would indicate that the results were not representative. In ~~a case such as~~ this case, the BOE–1164's would have to be analyzed to establish whether expansion of the *sample* would be warranted.

See AM section 1305.15, *Analysis of Data*, for guidelines when the sample does not evaluate to BOE standards,

GLOSSARY OF STATISTICAL TERMS 1309.00

Attribute

A qualitative characteristic which a unit of a population either possesses or does not possess.

Attribute~~s~~ Sampling

Used to estimate the proportion of items in a population containing a characteristic or attribute of interest. Attribute~~s~~ sampling is concerned with the frequency of an attribute. This is a qualitative measurement and is useful when the objective of the test is a yes or no answer.

Census

Examination of 100 percent of the population.

Cluster Sample

Sample method of systematically or randomly selecting equal groups of items at random.

Confidence Interval

Describes the limits of accuracy of an inference. This precision interval is a statistical measure of the inability to predict the true population error because the test is based on a sample, rather than a census.

Confidence Level

An inference from a sample that tells us the proportion of times a statement about the population is likely to be true in the long run.

Confidence Limits

The confidence interval expressed as a range between the lower and upper bound on the confidence interval.

Data

Factual information used as a basis for analysis.

Difference Estimation

Used to measure the estimated total error amount in a population when there is both a recorded value and an audited value for each item in the population and sample.

Finite Correction Factor

Adjustment to take the population size into account in determining the computed upper precision limit. It is used when sample size equals 5% or more of the population.

Mean

Arithmetic average of the sample.

Mean-Per-Unit Estimation

~~The point estimate is the a~~Average audited value of the sample items multiplied by the number of items in the population.

Non Sampling Error

Errors in sampling due to bias, fatigue, lack of experience, and other auditor errors.

Parameters

A set of physical properties that describes a population such as the mean, number of transactions in the population, standard deviation, etc. In this chapter, these parameters are symbolized as follows:

N	=	Number of items in population, field or universe
n	=	Number of items in sample
$\bar{x}$	=	Arithmetic mean of the sample
s	=	Standard deviation of the population
S	=	Standard deviation of the differences
$S_{\bar{x}}$	=	Standard error

Population

Any group of units with some characteristics in common. The total units from which the sample is drawn.

Precision

The range within which the universe average will lie, with the degree of certainty specified in the confidence level.

Random

An order of selection governed by chance.

Range

The highest and lowest values in the population.

Ratio Estimation

Projects the point estimate of the population on the basis of the net ratio of error in the sample times the recorded total dollar amount of the population.

Sample

The observations drawn from the entire group being sampled, any number of units drawn from a population. A JUDGMENT SAMPLE is a sample where the criteria for including a unit in the sample is decided in advance. A RANDOM SAMPLE is a sample where every unit still remaining in the population has an equal chance of selection on each draw.

Sampling Error

Error due to chance that the sample is not a miniature replica of the population.

Sampling Frame

The population from which the sample units will be selected, limited to the area of audit interest.

Standard Deviation

A measurement of the distance of all values from the arithmetic mean. The sample standard deviation is used as an estimate of the population

standard deviation.

Standard Error

The standard deviation of all possible sample means of a given size.

Statistic

Descriptive terms used to define or describe the sample.

Statistical Sample

One where the selection of the items to be included is independent of the sample, and which provides a means of establishing the sample size objectively and a means of objectively appraising the sample results.

Stratum

A statistical sub-population. Dividing a population into sub-populations. (Plural: Strata).

Stratification

Physical segregation of the population into more homogeneous groups with the expressed purpose of improving sample efficiency and/or sample reliability.

Systematic

Random systematic sampling is a sampling technique for selecting each sample item at a set interval (every "nth" item), with a randomly selected start.

T Value

Used instead of Z value in analyzing samples of fewer than 30 (thirty).

Unit

A member of a population. Each sale is a unit of the total sales population.

Universe

Population, field. The total units from which the sample is drawn.

Variable

Quantity or value, a property of a unit of a population which is measurable.

Variable~~s~~ Sampling

Method used to estimate the dollar value of a given population — provides a quantitative measurement.

Z Value

Confidence coefficient —used to determine the precision interval, represents the number of standard errors along the horizontal axis about the mean under the normal distribution.

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Use of Sampling in Auditing

The primary purpose behind the Board of Equalization's (BOE) audit program is to determine, with the least possible expenditure of time for both the taxpayer and the BOE, the accuracy of reported amounts. Sampling serves to accomplish this purpose.

Sampling is a process of drawing a conclusion about an entire body of information based on measurements of a representative sample of that information. Sales and use taxes are transaction taxes, meaning that tax is determined on a transaction-by-transaction basis. Therefore, verification must be done at the source document level. Since in many cases it is economically impractical to audit all transactions, the BOE encourages the use of sampling whenever feasible.

There are generally two methods of sampling: judgment sampling and statistical sampling. A judgment sample includes all samples obtained by non-statistical sampling methods. The most common type of judgment sample is the examination of a block period of time (for example, day, week, month, or quarter). A statistical or random sample is a sample in which each item in the population has an equal or known chance of being selected for examination. Examples of statistical or random sampling techniques include unrestricted sampling, stratified sampling, systematic sampling with random start, and cluster sampling.

While judgment samples are not necessarily less accurate than statistical samples, there is no way of objectively evaluating the accuracy or reliability of the test. The advantages of statistical sampling over non-statistical sampling are:

- It provides a selection process representative of the types of transactions involved and eliminates bias, since every item in the population has an equal or known chance of being selected.
- It provides an advance estimate of the sample size required for a given objective.
- The results can be objectively evaluated.
- Multiple samples may be combined and evaluated.
- Properly conducted statistical sampling can yield more reliable results than judgment sampling.
- It is a method approved and recommended by the American Institute of Certified Public Accountants (AICPA).

Other factors to be considered in determining the best type of sample to conduct are the format, condition, storage, and availability of business records. The auditor and taxpayer should discuss the most beneficial approach to examining source documents after the auditor has had an opportunity to review the business records but prior to the selection of the sample.

The attached BOE-472, *Audit Sampling Plan*, was developed to document the sampling plan and to set the criteria by which the sample results will be evaluated. The purpose of this form is to obtain information regarding the taxpayer's operations in order to establish the most effective and efficient means of developing a sampling plan. The form covers many common situations that might arise in sampling which should be discussed with the taxpayer. This form should be completed with the assistance of the taxpayer, prior to the selection of the sample.

The information and methods documented in this form are not binding for either the taxpayer or BOE staff. The sampling plan can, and should, be continually evaluated (and changed, if necessary) based upon information obtained during the auditing process. In addition, it is possible that stratification or expansion of this sample may be necessary depending on the results produced by this process. However, should any deviation to this plan be required, it will be fully discussed with the taxpayer and documented in the audit and on the sampling plan.

If you have any questions regarding this form and accompanying information, please contact your auditor.

BOE-472 REV. 5 (FRONT) (10-10)

AUDIT SAMPLING PLAN

TAXPAYER NAME	SCHEDULE NUMBER	
AUDIT PERIOD to	ACCOUNT NUMBER	CASE ID

PART A. SAMPLE SET UP

THE POPULATION AND PERIOD BEING TESTED

THE SPECIFIC TYPE OF RECORDS TO BE EXAMINED IN THE POPULATION

THE FILING METHOD FOR THE POPULATION *(for example, numerical, alphabetical, electronic)*

THE POPULATION WILL BE VALIDATED USING THE FOLLOWING METHOD

TYPE OF SAMPLES

☐ Statistical Sample ☐ Block Sample ☐ Other *(describe)*

THE SPECIFIC SAMPLING UNIT EXAMINED IN THE SAMPLE *(for example, invoice, purchase order, line items)*

THE METHOD OF SELECTING THE TEST PERIOD AND SAMPLING UNIT

TEST SELECTION PROCEDURES TO BE USED

☐ Computer Audit Specialist ☐ Random Number Generator ☐ Random Number Tables

☐ Other *(describe)*

PART B. SAMPLE PARAMETERS

TEST PERIOD OR STRATA BOUNDARIES	SAMPLE BASE (UNITS)	SAMPLE BASE (DOLLARS)	POPULATION BASE (UNITS)	POPULATION BASE (DOLLARS)
1.				
2.				
3.				
4.				
5.				

ADDITIONAL INFORMATION OR STRATA

PART C. SPECIFIC TESTING SITUATIONS

DUPLICATE SAMPLE UNITS

Sampling will be performed ☐ With replacement or ☐ Without replacement

MISSING SAMPLE UNITS

☐ Consider correct *(non-error)* ☐ Consider incorrect *(error)* ☐ Other *(describe)*

VOIDS OR CANCELLED TRANSACTIONS

- ☐ Leave voids and cancelled transactions in the population and treat as a non-error.
- ☐ Remove voids and cancelled transactions from the sample and population.
- ☐ Voids are not included in the population and will be disregarded.

SAMPLE UNIT IS A CREDIT INVOICE, CREDIT MEMO, OR DEBIT MEMO

- ☐ Method 1—Remove credits from population. Allowable credit transactions may be examined and offset as needed.
- ☐ Method 2—Credit transactions will remain in the sample and will be treated as non-errors.
- ☐ Method 3—Credit transactions will remain in the sample and will be treated in the same manner as positive transactions.

SAMPLE UNIT IS FOR "TAX" ONLY

- ☐ Consider correct *(non-error)*
- ☐ Remove from sample base and projection
- ☐ Consider incorrect *(error)*
- ☐ Other *(describe)*

The following situations will be handled according to the procedures set forth in section 1302.25 of the Audit Manual:

- *Sample unit is an error, but the transaction later resulted in a bad debt:* If a sample unit is an error, and is written off as required by Sales and Use Tax Regulation 1642, the sample unit will be considered a non-error.

- *Sample unit is an error, but the transaction is corrected at a later date:* If a sample unit is an error, but the transaction is corrected within the audit period, the sample unit will be considered a non-error. If a sample unit is an error, but the transaction is corrected outside of the audit period, or is corrected as a result of the audit investigation, the sample unit will be considered an error for projection of error purposes; however an offset credit should be allowed in the amount of the error.

- *Sample unit is a partial/down/installment or progress payment:* Partial, down, installment, or progress payments will not constitute differences for sampling purposes because they do not represent a sale. On the other hand, payments made in conjunction with an act that constitutes a sale will be considered a difference for sampling purposes and may be considered an error upon investigation.

PART D. PROJECTION OF ERROR

The BOE's minimum error policy is as follows:

- A minimum of three errors are required in a statistical sample or stratum before the errors may be projected.
- When fewer than three errors are found in a block sample, the auditor may project the error(s), but must justify the decision to project or not project the error(s) in the verification comments in the audit report.
- Cluster samples do not require a minimum number of errors to project.

IF ERRORS FROM A SAMPLE WILL BE PROJECTED, THEY WILL BE PROJECTED USING THE FOLLOWING METHOD *(for example, ratio method, percentage of error, etc.)*

If it is decided to not project the error(s), the auditor will use one of the alternatives listed below to handle the error(s) in that sample or stratum. The auditor, if necessary, will discuss the alternatives with the taxpayer after the sample results are known and then make a decision on the alternative to use:

- Assess or allow known errors on an actual basis for the audit period.
- If feasible, expand that sample or stratum.
- Examine specific customers, vendors, accounts, known errors, etc., on an actual basis for that sample or stratum.

PART E. TAXPAYER'S SIGNATURE FOR RECEIPT

This sampling plan is a collaborative effort by the auditor and taxpayer to determine the most efficient method of determining the accuracy of reported amounts and establishing an estimated percentage of error, if any, for the population being tested. The information and methods documented in this form are not binding on either the taxpayer or BOE staff. This sampling plan may be modified if new or additional data is encountered. Should any deviation to this plan be required, it will be fully discussed with the taxpayer.

AUDITOR'S SIGNATURE	DATE (copy of this sampling plan was provided to the taxpayer)
TAXPAYER'S SIGNATURE FOR RECEIPT OF COPY	DATE

When you decide to use variables sampling techniques for validation testing, you should carry out the following steps in designing, implementing, evaluating, and documenting your test:

1. Establish the Objective of the Test (Section 1302.10)

~~Each test should have a specific stated objective; subsequent statistical techniques are selected on the basis of that objective. The usefulness of any sampling test depends on a clear recognition of the relationship between the test objective and the corresponding audit objective. Usually the more precisely we can establish our objective, the better able we will be to tailor our sample to meet this objective.~~

~~*The most important step in the sampling process is defining the objective of the sample. If the objective is not precisely defined, the sample probably will not meet the objective.*~~

2. Define and Limit the Population (Section 1302.15)

~~The population must be defined to ensure that all items about which the auditor wishes to draw a conclusion have an equal or known chance of being selected in the sample. The population should be defined and limited to the area of audit interest. It is best to have a population defined by the general ledger accounts that the auditor has identified as areas of audit concern and employ stratification techniques.~~

~~Although the majority of errors encountered by auditors relate to underpayments, audit staff should also be aware of, and discuss with the taxpayer, the potential of overpayments. When examining underpayments and overpayments, the auditor should keep in mind that these types of transactions may not occur with the same frequency in a population. It is not uncommon for the transactions containing possible overpayment errors to occur much less frequently than underpayment errors. To obtain an accurate measure of these overpayment errors would require a much larger sample size in a combined sample than to establish two separate sampling frames (underpayments and overpayments) and sample the areas separately.~~

~~The auditor may want to consider using statistical sampling for examinations of areas other than an accounts payable or sales examination. Depending upon the taxpayer's record keeping system, statistical sampling may be warranted for the fixed asset, journal voucher, or even debits to the tax accrual account (the auditor would still be required to reconcile the accrual account).~~

~~A clear audit trail of the population should be included in the working papers. The auditor must clearly describe the choices, assumptions, and methodologies used in the statistical sample, specifically relating to the definition of the population so that an adequate trail is developed to permit subsequent evaluation of the auditor's work by the taxpayer.~~

3. Define the Characteristic Being Measured (Section 1302.2~~0~~5)

~~You should carefully define the quantity characteristic being measured and determine a means of measuring it. For example, in a test of resales, the quantity of measure may be the differences between audited and reported resales, a ratio of audited to reported, or the audited total resale amounts.~~

~~4. Identify the Sampling Unit~~

~~After defining the objective of the sample and the population of interest, we next need to define the sampling unit (i.e., invoice, paid bill, etc.). If we do not define the sampling unit accurately, our estimates may not be as precise as they could be.~~

~~5~~4. Select the Sampling Plan (Section 1304.00)

~~A random sample—defined as one selected in such a way that each item in the population has an equal or known chance of selection—generally achieves the desired representativeness. The first step in developing the plan is to determine what sampling method we are going to use. There are several acceptable methods for selecting a random sample, three of which are briefly explained below:~~

a. Unrestricted Random Sampling~~—sampling units are drawn from the entire population and each item has an equal chance of being selected. Numbers are drawn from a random number table and associated with items in the population.~~

b. Stratified Random Sampling

c. Systematic Sampling~~—drawing every nth item, where n is equal to population size divided by sample size, can be an alternative to unrestricted random sampling. It should be used only if you can determine that there is no periodic, cyclic, or other biased arrangement of the characteristic being tested. Modification of the nth item selection method, such as using multiple random starts, can reduce the possibility that the sample might be biased because of some unknown pattern existing in the population.~~

~~c. **Stratified Random Sampling**—involves dividing the population to be tested into separate segments and drawing samples, usually of different sizes, from each as if it were a separate population. Stratification often increases the efficiency of sampling where there are considerable differences among the amounts being measured, as is often the case in accounting transactions. Therefore, you should look for opportunities to stratify. For example, you may determine that you can achieve the objectives efficiently by auditing all items in a stratum of high dollar value items (census) and combining this 100% test with some sampling of strata containing lower dollar value items. You should compute a combined evaluation of the entire population.~~

~~Next, we need to determine how we are going to gather the data. Is the data already available in some tabular or computerized form? We also need to determine how to handle missing documentation and other items, such as invoices for progress payments or sales tax, and credit memos.~~d. Cluster Sampling

~~6~~5. Conduct a Pilot Study (Section 1303.15)

~~A pilot sample may be necessary if no other information is available to compute the needed values. The main disadvantage of using a pilot sample is that usually it will require expansion. This means a second pass through the population. This added step can be time consuming and may meet with resistance from the taxpayer. As a result, it is not recommended when other means (auditor's knowledge of the industry, cursory exam of a handful of~~

~~documents, or a prior audit) are available. However, a more efficient approach is to estimate the sample size that would produce an acceptable audit result.~~

~~7~~6. Estimate the Sample Size (Section 1303.00)

~~Sample size must be large enough to provide meaningful results, but not so large as to cause excessive work. In judgmental sampling you can arbitrarily select a sample size, but the question of whether it is adequate to meet your objectives is not measurable and is therefore based on subjective judgment. Statistical sampling techniques provide mathematically verifiable quantitative aids for estimating the sample size needed to achieve the desired precision and reliability. The adequacy of the sample size in meeting those specifications, however, can only be determined after all the sample items are examined and the results evaluated mathematically.~~

~~While statistical techniques define and quantify the decisions to be made, you must nevertheless evaluate the situation and identify what he or she may want to achieve in applying sampling techniques. In addition to the size of the population, the factors influencing the estimate of sample size are:~~

~~a. The desired reliability and confidence level~~

~~b. The desired sampling precision~~

~~c. The variability of the characteristic being measured (i.e. - the population "standard deviation").~~

~~Once these factors have been determined, the sample size may be estimated from tables in a recognized statistical text or by using formulas.~~

~~The relationships of the previously stated factors to sample size are as follows (in each case all other factors must be assumed to be held constant):~~

~~a. An increase of the confidence level from 80% to 90% would increase the required sample size by approximately 65%.~~

~~b. A decrease in the confidence interval will increase the required sample size proportionally.~~

~~c. An increase in population variability (standard deviation) will increase the required sample size.~~

7. Determine Method for Selecting Sample (1304.35)

~~8. Locate and Examine the Selected Items and Investigate Exceptions~~

~~After you have located the selected items, you must audit each one. Any errors made in examining the sample will be projected to the final results and could be magnified into an erroneous conclusion about the population. Such errors are generally known as "non-sampling errors" and they can occur regardless of the sampling method used.~~

~~You must determine the cause and the audit significance of each exception. Doing so is much easier if the objective, the characteristic being tested, and the means of measuring it have been rigorously defined. Likewise, you must be careful not to let the significance of one characteristic blind you to another. If an unanticipated characteristic should be found, it may be subject to adequate evaluation by means of the sampling technique in process, or a new sample and a different technique may be required.~~

~~9~~8. Evaluate the Sample Results (Section 1305.00)

~~You must statistically evaluate the test results to determine whether you have achieved your desired confidence level and interval. Stratified samples must have a combined evaluation. An 80% confidence level is recommended for use by audit staff in the analysis of statistical samples. The maximum confidence interval allowed is 75%. Increasing or decreasing the confidence level will affect The confidence interval. Some of the other reasons for confidence interval variation are:~~

- ~~Variability within the sample units~~
- ~~Differences in sample size~~
- ~~Small vs. large errors or credit errors~~

~~The fact that the confidence interval is wide (greater than 75%) will require the auditor to analyze the sample to determine why this has occurred. The confidence interval is a measure of the variability of the units included in the sample. It is not a measure of whether a sample is acceptable or unacceptable. However, a small interval is preferred because it indicates that the population is more homogeneous, contains less variability, and enhances the reliability of the sample.~~

~~When a large interval (greater than 75%) is disclosed, the auditor must make a decision regarding the acceptability of the sample based upon the best information available. The following factors can be used in the evaluation of the sample and to determine what measures to undertake to remedy the situation:~~

- ~~Mean of the sample vs. mean of the population~~
- ~~Range of values in the sample vs. range of values in the population~~
- ~~Substantial sample size~~
- ~~Auditor's analysis and evaluation of all the information available, based upon the guidelines presented in Chapter 13 of the Audit Manual~~

~~The auditor must make a decision regarding the acceptability of the sample based on the best information available. Some of the options to be considered when making this decision include:~~

- ~~Increase the sample size~~
- ~~Stratify (A large confidence interval is the result of a large standard deviation. A way to demonstrate that the sample standard deviation might actually be a close approximation of the population standard deviation, and the only way to improve the computed results, would be to stratify.)~~
- ~~Drop the test and accept reported amounts in that area of the audit~~
- ~~Examine specific transactions on an actual basis~~
- ~~Accept the test only if it agreed to by the taxpayer (explanation for acceptance and taxpayer's agreement should be contained in the working papers)~~

~~10~~9. Project the Sample Results (Section 1306.00)

The three most widely used techniques for projecting variables sampling results are:

a. Mean-per-Unit Estimation~~—the point estimate is the average audited value of the sample items multiplied by the number of items in the population.~~

b. Difference Estimation—the point estimate of the difference is equal to the average of the differences multiplied by the number of items in the population, and the point estimate of the actual total amount is the taxpayer's recorded amount plus the point estimate of the difference. The average difference may be either positive or negative.

c. Ratio Estimation—the point estimate is calculated by multiplying the taxpayer's total value by the ratio of the aggregate audited value of sample items to their aggregate book values.

Ratio estimation is the technique used most frequently in audits conducted by the Board. It is recommended that this method be used to project sample results unless there is convincing evidence to the contrary.

1~~1~~0. Document (Section 1307.00)

Statistical sampling techniques must always be adequately documented in the working papers. Minimum documentation should include:

a. Audit Sampling Plan Form BOE-472. Form BOE-472, *Audit Sampling Plan*. is required for all large audits (cell designation "D") or any time sampling is performed.

b. The population total, its source and a reconciliation, if several strata are involved.

c. The method of selecting sample items.— for example, if a random number table is used, the documentation should include the name and source of the table, starting point, route through the table and the stopping point. If a random number generator was used, the random seed should be documented in the working papers. This information is essential in the event the sample is to be expanded.

d. A listing of the sample items and any differences noted.Whatever methods are used, proper referencing is essential to provide the proper audit trail.

NOTE: Generally, unless a sample is relatively small, a separate schedule for differences or questioned items should be made for ease in the summary or analysis of the sample results. At a minimum, the schedule of questioned items should include the following, as applicable for the type of test:

1. Date
2. Invoice number
3. Vendor/Customer name
4. Vendor/Customer address
5. Shipped from/to
6. Complete description of the item(s) in question
7. Amount in question
8. The general ledger/cost center/department that AP purchase(s) charged to

e. Evaluation of sample results.—this is most frequently completed in a worksheet format. A sample evaluation template is included as part of the electronic audit package worksheets. In addition to numeric data, the evaluation may also include additional information pertinent to the

~~sample or population that the auditor feels is necessary to properly evaluate the test.~~

f. The audit conclusion reached.~~—this will be used as the basis of projecting the results of the sample to the total population~~

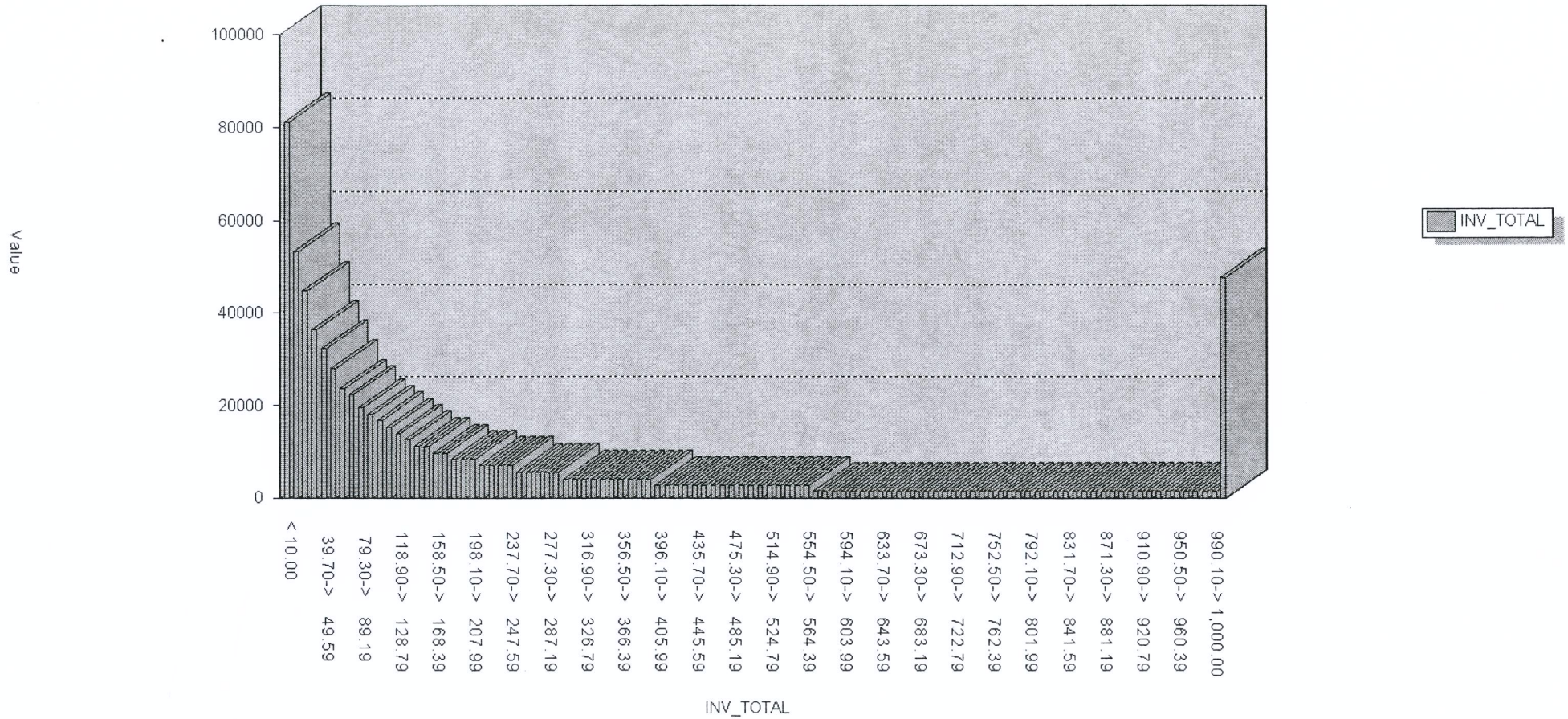
Important Notes:

1. Steps 1-5, 8, and 10 ~~and 11~~ are used in non-statistical ("block") samples conducted by Board auditors. Step 6 is also used, in part. However, without Steps 7 and 9, one cannot scientifically measure (evaluate) the sample size or reliability.

2. Taxpayers are encouraged to participate in determining the sampling method, setting up the sampling plan and compiling the sample items, as this will provide a better understanding of the testing procedures and sampling process. Taxpayers are also requested, at times, to select the random starting point of a test.

SKEWED SALES POPULATION DISTRIBUTION

EXHIBIT 4



COMPUTED OPTIMUM STRATIFICATION - RECORDED EXEMPT SALES - CUSTOMERS WITH PERMIT NUMBERS
ABC COMPANY

A	B	C	D	E	F	G	H	I	J	K				
LOWER BOUND	UPPER BOUND	TRANS COUNT	% OF COUNT	% OF AMOUNT	SALES AMOUNT	RANGE WIDTH	G x C	SQRT of H	CUMM SQRT (CS)	CS/FACTOR	**STRATA PARAMETERS**			
CREDIT TRANSACTIONS:		2,322	7.65%	-13.70%	(718,227.45)									
0	99.99	17,574	57.92%	12.68%	664,536.05	99.99	1,757,224.26	1,325.60	1,325.60	0.5231875	**23,892**	**N**	**85.27%**	STRATA1
100	199.99	4,325	14.25%	11.86%	621,813.59	99.99	432,456.75	657.61	1,983.22	0.7827339	**1,773,453.39**	**$**	**29.75%**	
200	299.99	1,993	6.57%	9.29%	487,103.75	99.99	199,280.07	446.41	2,429.63	0.9589217				
300	399.99	1,113	3.67%	7.35%	385,159.86	99.99	111,288.87	333.60	2,763.23	1.0905864	**3,879**	**N**	**13.84%**	STRATA2
400	499.99	691	2.28%	5.90%	309,246.46	99.99	69,093.09	262.86	3,026.08	1.19433	**2,978,428.18**	**$**	**49.96%**	
500	599.99	433	1.43%	4.52%	237,056.10	99.99	43,295.67	208.08	3,234.16	1.2764532				
600	699.99	261	0.86%	3.22%	168,807.39	99.99	26,097.39	161.55	3,395.70	1.3402123				
700	799.99	196	0.65%	2.80%	146,772.01	99.99	19,598.04	139.99	3,535.70	1.3954646				
800	899.99	182	0.60%	2.95%	154,687.64	99.99	18,198.18	134.90	3,670.60	1.448707				
900	999.99	145	0.48%	2.63%	138,119.19	99.99	14,498.55	120.41	3,791.01	1.4962302				
1,000.00	1,999.99	617	2.03%	16.04%	840,978.06	999.99	616,993.83	785.49	4,576.50	1.8062463				
2,000.00	2,999.99	241	0.79%	11.40%	597,601.47	999.99	240,997.59	490.92	5,067.41	2				
3,000.00	3,999.99	129	0.43%	8.51%	445,915.48						**249**	**N**	**0.89%**	STRATA3
4,000.00	4,999.99	51	0.17%	4.30%	225,671.71						**1,209,185.46**	**$**	**20.28%**	
5,000.00	5,999.99	17	0.06%	1.78%	93,465.90									
6,000.00	6,999.99	11	0.04%	1.34%	70,345.72									
7,000.00	7,999.99	16	0.05%	2.29%	120,304.05									
8,000.00	8,999.99	9	0.03%	1.43%	75,212.90									
9,000.00	9,999.99	2	0.01%	0.38%	19,745.40									
10,000.00	19,999.99	14	0.05%	3.02%	158,524.30									
TOTALS:		30,342			5,242,839.58			FACTOR : (5,067.41 / 2)		2,533.71				

To be audited 100%

COMPUTED OPTIMUM STRATIFICATION - RECORDED EXEMPT SALES - NON PERMIT CUSTOMERS
ABC COMPANY

A	B	C	D	E	F	G	H	I	J	K				
LOWER BOUND	UPPER BOUND	TRANS COUNT	% OF COUNT	% OF AMOUNT	SALES AMOUNT	RANGE WIDTH	G x C	SQRT of H	CUMM SQRT (CS)	CS/FACTOR	**STRATA PARAMETERS**			
CREDIT TRANSACTIONS:		2973	11.62%	-20.73%	(897,495.39)									
0	99.99	14877	58.14%	12.66%	548,078.61	99.99	1,487,551.23	1,219.65	1,219.65	0.5403698	**19,452**	**N**	**86.01%**	STRATA4
100	199.99	3262	12.75%	10.74%	465,151.02	99.99	326,167.38	571.11	1,790.76	0.7934017	**1,334,811.51**	**$**	**25.53%**	
200	299.99	1313	5.13%	7.43%	321,581.88	99.99	131,286.87	362.34	2,153.10	0.9539352				
300	399.99	736	2.88%	5.87%	254,275.26	99.99	73,592.64	271.28	2,424.38	1.0741263	**2,956**	**N**	**13.07%**	STRATA5
400	499.99	463	1.81%	4.77%	206,499.90	99.99	46,295.37	215.16	2,639.54	1.1694551	**2,392,312.50**	**$**	**45.76%**	
500	599.99	307	1.20%	3.87%	167,783.71	99.99	30,696.93	175.21	2,814.75	1.2470802				
600	699.99	238	0.93%	3.57%	154,472.36	99.99	23,797.62	154.26	2,969.01	1.3154276				
700	799.99	170	0.66%	2.94%	127,127.74	99.99	16,998.30	130.38	3,099.39	1.3731917				
800	899.99	132	0.52%	2.59%	112,319.34	99.99	13,198.68	114.89	3,214.27	1.424092				
900	999.99	166	0.65%	3.64%	157,604.99	99.99	16,598.34	128.83	3,343.11	1.4811725				
1,000.00	1,999.99	572	2.24%	18.50%	801,110.93	999.99	571,994.28	756.30	4,099.41	1.8162543				
2,000.00	2,999.99	172	0.67%	9.49%	411,118.27	999.99	171,998.28	414.73	4,514.14	2				
3,000.00	3,999.99	76	0.30%	6.07%	262,818.63						**207**	**N**	**0.92%**	STRATA6
4,000.00	4,999.99	28	0.11%	2.85%	123,255.25						**1,500,527.43**	**$**	**28.70%**	
5,000.00	5,999.99	22	0.09%	2.77%	119,758.29									
6,000.00	6,999.99	20	0.08%	3.01%	130,184.57									
7,000.00	7,999.99	11	0.04%	1.92%	83,056.72									
8,000.00	8,999.99	5	0.02%	1.01%	43,842.63									
9,000.00	9,999.99	6	0.02%	1.33%	57,405.98									
10,000.00	19,999.99	26	0.10%	8.05%	348,565.20									
20,000.00	29,999.99	11	0.04%	6.16%	266,523.33									
30,000.00	40,000.00	2	0.01%	1.50%	65,116.83									
TOTALS:		25,588			4,330,156.05			FACTOR : (4,514.14 / 2)		2,257.07				

To be audited 100%

Statistical Sample
EXMPT SLS
Stratum and Sample Information Worksheet

SCHEDULE	
PERMIT	
AUDITOR	
DATE	

	A	B	C	D	E	F	G	H
REF	**Sample Information**		**Sample EXMPT SLS Stratum 1 w Permit 0.00 to 299.99**	**Sample EXMPT SLS Stratum 2 w Permit 300.00 to 2,999.99**	**Sample EXMPT SLS Stratum 3 w Permit >= 3,000.00**	**Sample EXMPT SLS Stratum 4 wo Permit 0.00 to 299.99**	**Sample EXMPT SLS Stratum 5 wo Permit 300.00 to 2,999.99**	**Sample EXMPT SLS Stratum 6 wo Permit >= 3,000.00**
1	Sample Units	n	400	450	249	400	400	207
2	Sample Dollars		29,867.05	300,596.44	1,209,185.46	26,992.67	337,707.08	1,500,527.43
3	Sample Mean	(L2/L1)	74.67	667.99	4,856.17	67.48	844.27	7,248.92
4	Sample Random Seed		165389	459231		784765	276485	
5	**Stratum Population Information**							
6	Stratum Population Units	N	23,892	3,879	249	19,452	2,956	207
7	Stratum Population Dollars		1,773,453.39	2,978,428.18	1,209,185.46	1,334,811.51	2,392,312.50	1,500,527.43
8	Stratum Population Mean	(L7/L6)	74.23	767.83	4,856.17	68.62	809.31	7,248.92
9	**Stratum Population and Sample Comparisons**							
10	% of Units Sampled	(L1/L6)	1.67%	11.60%	100.00%	2.06%	13.53%	100.00%
11	% of Dollars Sampled	(L2/L7)	1.68%	10.09%	100.00%	2.02%	14.12%	100.00%
12	Comparison of Sample Mean and Population Mean	(L3/L8)	100.59%	87.00%	100.00%	98.34%	104.32%	100.00%

Evaluation of Sample Results
Sample EXMPT SLS
Stratum 1

SCHEDULE	
PERMIT	
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DATE	

(Stratum Info)

REF	A Stratum Information	B REF	C Number	D	E Errors	F Errors Squared
1	Population Units:	Stratum Info	23,892.00		216.55	46,893.90
2	Population Dollars:		1,773,453.39		249.85	62,425.02
3	Population Mean:		74.23		298.08	88,851.69
4	Sample Units:		400.00			
5	Sample Dollars:		29,867.05	Total:	764.48	198,170.61
6	Sample Mean:		74.67			
7	Stratum Calculations					
8	Finite Population Correction Factor Used:		No			
9	Sum of Errors Squared:		584,430			
10	Sum of Squared Errors:		198,171			
11	Mean Error:		1.91120000			
12	Percentage of Error:		0.02559600			
13	Standard Deviation:		22.20374700			
14	Standard Error:		1.11018700			
15	Number Of Errors In Stratum		3			
16						
17						
18						
19						
20						

Evaluation of Sample Results
Sample EXMPT SLS
Stratum 2

SCHEDULE	
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DATE	

	A	B	C	D	E	F
			(Stratum Info)			
REF	Stratum Information	REF	Number		Errors	Errors Squared
1	Population Units:	Stratum Info	3,879.00		359.85	129,492.02
2	Population Dollars:		2,978,428.18		789.59	623,452.37
3	Population Mean:		767.83		1,055.85	1,114,819.22
4	Sample Units:		450.00			
5	Sample Dollars:		300,596.44	Total:	2,205.29	1,867,763.61
6	Sample Mean:		667.99			
7	Stratum Calculations					
8	Finite Population Correction Factor Used:		Yes			
9	Sum of Errors Squared:		4,863,304			
10	Sum of Squared Errors:		1,867,764			
11	Mean Error:		4.90064400			
12	Percentage of Error:		0.00733600			
13	Standard Deviation:		64.30987500			
14	Standard Error:		2.85069800			
15	Number Of Errors In Stratum		3			
16						
17						
18						
19						
20						

Evaluation of Sample Results
Sample EXMPT SLS
Stratum 3

SCHEDULE	
PERMIT	
AUDITOR	
DATE	

	A	B	C	D	E	F
			(Stratum Info)			
REF	**Stratum Information**	**REF**	**Number**		**Errors**	**Errors Squared**
1	Population Units:	Stratum Info	249.00		3,980.88	15,847,405.57
2	Population Dollars:		1,209,185.46		15,225.85	231,826,508.22
3	Population Mean:		4,856.17		20,441.85	417,869,231.42
4	Sample Units:		249.00			
5	Sample Dollars:		1,209,185.46	Total:	39,648.58	665,543,145.22
6	Sample Mean:		4,856.17			
7	Stratum Calculations					
8	Finite Population Correction Factor Used:		Yes			
9	Sum of Errors Squared:		1,572,009,896			
10	Sum of Squared Errors:		665,543,145			
11	Mean Error:		159.23124500			
12	Percentage of Error:		0.03278900			
13	Standard Deviation:		1630.39409000			
14	Standard Error:		0.00000000			
15	Number Of Errors In Stratum		3			
16						
17						
18						
19						
20						

Evaluation of Sample Results
Sample EXMPT SLS
Stratum 4

SCHEDULE	
PERMIT	
AUDITOR	
DATE	

	A	B	C	D	E	F
			(Stratum Info)			
REF	Stratum Information	REF	Number		Errors	Errors Squared
1	Population Units:	Stratum Info	19,452.00		25.58	654.34
2	Population Dollars:		1,334,811.51		189.91	36,065.81
3	Population Mean:		68.62		190.00	36,100.00
4	Sample Units:		400.00			
5	Sample Dollars:		26,992.67	Total:	405.49	72,820.14
6	Sample Mean:		67.48			
7	Stratum Calculations					
8	Finite Population Correction Factor Used:		No			
9	Sum of Errors Squared:		164,422			
10	Sum of Squared Errors:		72,820			
11	Mean Error:		1.01372500			
12	Percentage of Error:		0.01502200			
13	Standard Deviation:		13.47131800			
14	Standard Error:		0.67356600			
15	Number Of Errors In Stratum		3			
16						
17						
18						
19						
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Evaluation of Sample Results
Sample EXMPT SLS
Stratum 5

SCHEDULE	
PERMIT	
AUDITOR	
DATE	

	A	B	C	D	E	F
			(Stratum Info)			
REF	**Stratum Information**	**REF**	**Number**		**Errors**	**Errors Squared**
1	Population Units:	Stratum Info	2,956.00		852.44	726,653.95
2	Population Dollars:		2,392,312.50		1,001.88	1,003,763.53
3	Population Mean:		809.31		2,505.98	6,279,935.76
4	Sample Units:		400.00			
5	Sample Dollars:		337,707.08	Total:	4,360.30	8,010,353.25
6	Sample Mean:		844.27			
7	Stratum Calculations					
8	Finite Population Correction Factor Used:		Yes			
9	Sum of Errors Squared:		19,012,216			
10	Sum of Squared Errors:		8,010,353			
11	Mean Error:		10.90075000			
12	Percentage of Error:		0.01291100			
13	Standard Deviation:		141.26906600			
14	Standard Error:		6.56929500			
15	Number Of Errors In Stratum		3			
16						
17						
18						
19						
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Evaluation of Sample Results
Sample EXMPT SLS
Stratum 6

SCHEDULE	
PERMIT	
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DATE	

	A	B	C	D	E	F
			(Stratum Info)			
REF	**Stratum Information**	**REF**	**Number**		**Errors**	**Errors Squared**
1	Population Units:	Stratum Info	207.00		3,609.75	13,030,295.06
2	Population Dollars:		1,500,527.43		4,558.89	20,783,478.03
3	Population Mean:		7,248.92		5,909.01	34,916,399.18
4	Sample Units:		207.00		6,657.79	44,326,167.68
5	Sample Dollars:		1,500,527.43		12,028.09	144,674,949.05
6	Sample Mean:		7,248.92			
7	Stratum Calculations			Total:	32,763.53	257,731,289.01
8	Finite Population Correction Factor Used:		Yes			
9	Sum of Errors Squared:		1,073,448,898			
10	Sum of Squared Errors:		257,731,289			
11	Mean Error:		158.27792300			
12	Percentage of Error:		0.02183500			
13	Standard Deviation:		1107.22592600			
14	Standard Error:		0.00000000			
15	Number Of Errors In Stratum		5			
16						
17						
18						
19						
20						

Evaluation Of Stratifed Random Sample

SCHEDULE	
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DATE	

	A	B	C	D	E	
	(N)	(Stratum N Wks)	(Stratum N Wks)	(B * C)	(D * D)	
REF	**Stratum**	**Standard Error Per Transaction**	**Stratum Population Count = N**	**Standard Stratum Error**	**Standard Stratum Error Squared**	
1	mple EXMPT SLS: Stratum 1	1.1102	23,892	26,524.59	703,553,758	
2	mple EXMPT SLS: Stratum 2	2.8507	3,879	11,057.86	122,276,213	
3	mple EXMPT SLS: Stratum 3	0.0000	249	-	0	
4	mple EXMPT SLS: Stratum 4	0.6736	19,452	13,102.21	171,667,798	
5	mple EXMPT SLS: Stratum 5	6.5693	2,956	19,418.84	377,091,192	
6	mple EXMPT SLS: Stratum 6	0.0000	207	-	0	
7						
8	SUM			(Sum(E1:E6))	1,374,588,961.63	
9	SQRT			(SQRT(E8))	37,075.45	
10	CPI Computed Precision Interval of Population			(E9* 1.28)	47,456.58	80%
11				(E9* 1.64)	60,803.74	90%
12						

13	**Stratum**	**Mean Error**	**Stratum Population Count = N**	**Total Error**
14	mple EXMPT SLS: Stratum 1	1.91	23,892	45,662
15	mple EXMPT SLS: Stratum 2	4.90	3,879	19,010
16	mple EXMPT SLS: Stratum 3	159.23	249	39,649
17	mple EXMPT SLS: Stratum 4	1.01	19,452	19,719
18	mple EXMPT SLS: Stratum 5	10.90	2,956	32,223
19	mple EXMPT SLS: Stratum 6	158.28	207	32,764
20				
21	SUM		(sum(D14:D19))	189,025.69
22				
23		(E10/D21)	(E11/D21)	
24	**Combined Results**	***Confidence Interval @ 80% Confidence Level For Combined Evaluation***	Confidence Interval @90% Confidence Level For Combined Evaluation	
25		*25.1059%*	32.1669%	

FORM BOE-472 Information

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	A	B	C	D	E	F	G	H
			(Stratum Worksheets)					
REF	**Stratum Number**	**# of Errors in Sample**	**Dollar Amount of Errors**	**Dollar Amount of Sample Base**	**Sample Size**			
1	Sample EXMPT SLS: Stratu	3	764.48	29,867.05	400			
2	Sample EXMPT SLS: Stratu	3	2,205.29	300,596.44	450			
3	Sample EXMPT SLS: Stratu	3	39,648.58	1,209,185.46	249			
4	Sample EXMPT SLS: Stratu	3	405.49	26,992.67	400			
5	Sample EXMPT SLS: Stratu	3	4,360.30	337,707.08	400			
6	Sample EXMPT SLS: Stratu	5	32,763.53	1,500,527.43	207			
	Total - Enter on BOE 1151	20	80,147.67	3,404,876.13	2,106			

Projected Measure for the sample should be the State measure for this sample from BOE-414-A