



New York State Department of Taxation & Finance



Computer-Assisted Audits

Guidelines and Procedures for Sales Tax Audits

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Introduction

One of the Tax Department's goals is to conduct audits in the least intrusive manner possible. It is for this reason that the department has prepared this comprehensive publication, *Computer-Assisted Audits – Guidelines and Procedures for Sales Tax Audits*.

This publication discusses three computer-assisted audit techniques: computer-assisted detail (CAD) audit, computer-assisted statistical sample (STAT) audit, and sales data analysis.

The often tedious retrieval and review of numerous hard copy documents during an audit has, in many cases, been replaced by more technologically advanced methods. Some of these new methods, such as statistical sampling and computer-assisted detail auditing using our new ACL (Audit Command Language) software, will be discussed in more detail in the sections that follow. The acceptance and use of electronic data as source documentation in the audit process has allowed audits to be conducted with less disruption to normal business activities. In this age of computers and electronic data capability, many more businesses are asking for the use of these new methods during audits. They are more accurate and more efficient than older manual methods while offering the added benefit of being less intrusive to the taxpayer's business activities.

In an effort to limit the disruption of business activities, the department's field audit staff will try to perform computer-assisted audits whenever possible. As always, the responsibility and control of each audit resides with the district office auditor and team leader. The department's Electronic Data Processing (EDP) Field Audit Services Section provides all technical assistance required to conduct audits using a taxpayer's electronic records. Electronic records can include magnetic tapes, discs, and any other machine-sensible media used for recording, consolidating, and summarizing accounting transactions.

The use of computer-assisted audit techniques, using ACL or statistical sampling, or both, provides taxpayers with a more efficient way of determining their proper sales and use tax liability. When a taxpayer has complete books and records, the taxpayer has the right to have its books and records audited in detail. Taxpayers should be aware that some forms of computer-assisted audits are in fact tests, and not in-detail audits, of their books and records. If a taxpayer has complete books and records, the department must obtain the taxpayer's consent prior to any tax assessments being issued based on an audit that is not done in detail.

Questions regarding individual audit issues should be discussed with the field auditor in charge of the audit. General questions related to computer-assisted audits should be directed to:

**CLIENT SERVICES DIVISION
EDP FIELD AUDIT SERVICES SECTION MANAGER
NYS TAX DEPARTMENT
BUILDING 8 ROOM 357
W A HARRIMAN CAMPUS
ALBANY NY 12227
Phone (518) 457-3403**

The computer-assisted audit process

Information gathering

At the beginning of the audit process, we ask taxpayers to complete a *Sales & Use Tax Examination Questionnaire* and a *Computer Audit Feasibility Questionnaire*. These forms are used to obtain basic information about the business and determine whether computerized records can be used to complete the audit in a more efficient manner.

A business is a good candidate for a computer-assisted audit if it has:

- computerized records
- a large volume of sale and/or purchase transactions
- no invoices such as for EDI (electronic data interchange) users
- invoices that are difficult or expensive to retrieve
- sales to many jurisdictions
- multiple locations
- many types of transactions

The first face-to-face meeting with the sales tax auditor assigned to conduct the audit will probably be at an “initial taxpayer conference.” This meeting gives the auditor a chance to get acquainted with the taxpayer and to obtain some general information about the business. Many questions can be expected at this initial taxpayer conference. Taxpayers are encouraged to ask questions as well. This conference is an opportunity to discuss a computer-assisted audit. Computer-assisted audit techniques can be used on some or all areas of the audit (sales, expense purchases, capital assets). For example, a computer-assisted detail audit of capital assets may be combined with a statistical sample audit of expenses. There are other techniques available for sales that will verify exempt sales and proper jurisdictional reporting. With input from the taxpayer or the taxpayer’s representative, the auditor will determine which method, or methods, is most appropriate for the audit. A computer-assisted audit requires the retrieval of fewer, or no, invoices. This saves the time and expense of the taxpayer handling paper and requires less on-site presence by the auditor. This minimizes the disruption to the business and reduces the time the taxpayer (and his or her employees) must devote to the audit.

Computer-assisted audit techniques

Computer-assisted detail (CAD) audit

This audit technique lets the auditor review all of the books and records electronically in detail and then compute any liability or refund without using estimates or projections. The auditor will use descriptions contained in the electronic records as much as possible to determine taxability, instead of requesting and reviewing source documents. If the auditor can make an initial determination using only the description in the electronic record, the

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source document may not need to be pulled. This theory hinges on the quantity and quality of the description maintained within the taxpayer's computer records. The more detailed the descriptions, the greater the auditor's ability to determine taxability with a minimum of inconvenience for the taxpayer.

The auditor will also do a review for credits, areas where tax was paid on goods or services that were not subject to tax or tax was overpaid. Credits may result in a refund or offset against any other tax due.

Keep these important descriptions in the electronic records:

- written descriptions from purchase requisitions of items or services ordered
- description of department making the purchase
- supplier's description, from purchase invoices, of items or services received
- descriptions from sales invoices of items sold or services rendered
- explanation of the general ledger account charged for the sale or purchase
- descriptions from table files of various codes used

For the auditor to make a determination regarding taxability on a transaction, the description must indicate what an item is, how it is used, and where it is used. The auditor will produce a report of items on which he or she feels additional tax or credit is due, and items for which he or she requires additional information. Taxpayers will be asked to review these reports and provide the auditor with any additional electronic or hard copy documentation pertaining to the items listed. After reviewing the additional documentation provided, the auditor will then make a final tax determination regarding the taxability of the items in question taking into consideration all documentation provided by the taxpayer. If the taxpayer fails to provide additional documentation for questionable items, the auditor will rely on whatever electronic or hard copy documentation was originally made available to determine taxability.

Advantages of a computer-assisted detail audit

- uses all of the books and records with no estimates or projections
- allows for the detailed review of credits
- allows for less on-site presence by the auditor and less business disruption
- reduces the document retrieval needed saving the taxpayer time and money
- reduces problems with missing invoices
- applies to all audit areas (capital assets, expenses, and sales)

Computer-assisted statistical sample (STAT) audit

This audit method is generally used for audits of expense purchases but may be used for capital assets or other areas. The auditor's first step is to determine which general ledger accounts will be included in the group of invoices (universe) to be sampled. Then the universe is broken down into dollar ranges (strata). Next, the department's statistical sampling software is used to select a random sample of invoices from each strata. A random sample means that every invoice in the group has an equal chance of being selected without bias. The taxpayer is provided with a list of the transactions randomly selected from each strata and asked to pull the corresponding invoices for review by the auditor. Again, statistical sampling requires pulling fewer invoices than

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in a manual audit and saves the taxpayer time and money. After the taxpayer and auditor review the list of items and make taxability determinations (tax due and credits), the result from the statistical sample is projected using the statistical sampling software to calculate tax or credit due from the entire universe.

Advantages of a computer-assisted statistical sample

- ability to handle a large number of transactions
- efficient use of time for both the department and the taxpayer
- fewer invoices to pull
- less on-site presence by auditor
- less business disruption

Sales data analysis

The department's EDP Field Audit Services Section has developed programs that identify potential jurisdictional reporting errors and avoid the need to review the actual sales invoices on an item-by-item basis. The programs also segregate and list exempt customers and the dollar value of sales to each exempt customer. Reports can be generated by the programs to analyze exempt sales and potential jurisdictional errors. The reports can be used to perform a detailed review (for the entire audit period) or generated for a shorter period should the taxpayer agree to some type of test period methodology. The auditor would then provide the reports to the taxpayer and ask for an explanation of the rate charged or an exemption document to justify the exempt sale. These reports are produced off-site to reduce the amount of time the auditor spends at the business location.

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The EDP conference

If a taxpayer's records are computerized, the auditor will schedule an Electronic Data Processing (EDP) conference to determine what information is available to use in the audit. This conference may be attended by the auditor, the auditor's supervisor, representative(s) from the department's EDP Field Audit Services Section, and possibly a CAD (computer-assisted detail) audit specialist. The taxpayer should bring the person(s) in charge of the audit who has the authority to make decisions, thoroughly understands the accounting system, and is knowledgeable about the computer system/computerized records. The taxpayer is encouraged to bring anyone else who has knowledge and expertise to add to the meeting. The EDP conference is extremely important because it lays the groundwork for the entire audit and can save time in conducting the entire audit.

During the EDP conference the auditors will need to:

- understand the accounting system and sales/purchasing processes
- identify information (files) that are maintained on the computer
- determine relationships between files and any fields that link them together
- determine which fields in those files contain the needed information
- observe a system walk through (A systems walk through is an opportunity for the auditor to watch someone enter a sales or purchase invoice and obtain a screen print of what information is captured in the taxpayer's computer records. The more an auditor learns about the taxpayer's record keeping system, the smoother the audit process will be.)

The taxpayer and auditors work together at the EDP conference to determine which fields (in which files) contain the information that will be needed. The information is usually in several files and may be on a mainframe, network, or PC. The taxpayer's computer staff will be asked to create one *composite file*. (A *composite file* is one file containing all of the fields needed to complete the audit.) Composite files make the audit process go faster with fewer data problems.

We may ask the taxpayer to provide table files that contain descriptions of codes or an electronic chart of accounts. These files may be kept on a PC in a word processing, spreadsheet, or database program. We ask taxpayers to provide the data that is needed in whatever format is most convenient for them as long as the data can be properly handled by the department's EDP staff. The department's EDP Field Audit Services Section will accept data in many common formats being used today. (Please refer to the Appendix C for the various options available.)

While the department does not prescribe the specific technology or technical specifications applicable to retaining or otherwise managing electronic records, in order to properly perform a computer assisted audit, the department must be able to access and handle the electronic data presented to it by taxpayers.

After reviewing and checking the data supplied for accuracy and adequacy, the auditor will begin to review the electronic data to perform the audit. The taxpayer may be contacted to obtain answers to any questions that may arise. If the auditor is doing a computer assisted detail audit, as previously discussed, he/she will prepare a list of items that appear to be errors for the taxpayer to review. If the auditor is doing a statistical sample audit, he/she will provide a list of invoices to pull. The auditor will then review the invoices to determine taxability and prepare a report of the exceptions for the taxpayer to review.

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Confidentiality of Taxpayer Information

Taxpayer data is safe with the Department of Taxation and Finance. We have secure buildings. There are guards on duty at all times, employees must wear badges for identification, and visitors must sign in and be escorted. There is additional security in the tape library as well. The library can only be accessed by employees who have the proper clearance and have been given a code to unlock the door. Access to any data is further controlled by logon ID's and passwords. Access is limited to the EDP staff and auditors assigned to the audit. All department employees are subject to the secrecy provisions of the NYS Tax Law. Violators are subject to fines, dismissal, or imprisonment.

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Computer-assisted audit requirements

Basic data processing concepts

A computer **file** is a repository for all records of a given type, such as an accounts payable file containing all distribution records for purchase transactions. The **record** is made up of all the associated **fields**, such as vendor name, date, account, and amount, that are part of one individual transaction. A **character** is an individual component of a field, such as the individual digits that make up a number or the individual letters that make up a word.

To read the data from a computer file, we need a record layout (also known as a file description). The **record layout** is the road map that details what information is contained in the file and where it is located. On the record layout, the taxpayer indicates which fields are included in the data, the start and end position for each field, the field length, the field name, the field description, and the type of data for each field (such as, alpha, numeric, date, etc.).

Field name	Start position	End position	Field length	Data type
Account number	1	5	5	Pic 9(5)
Invoice date	6	13	8	MMDDYYYY
Posting date	14	21	8	MMDDYYYY
Distribution amount	22	32	11	Pic S9(9)V99
Vendor name	33	52	20	Pic X(20)
Cost center	53	55	3	Pic 9(3)
Invoice number	56	60	5	Pic 9(5)

Below are five records from a file that shows what the data would look like using the record layout from the previous table. As you can see, the distribution amount field has no decimal to indicate the cents. In this particular example, the amount field has two implied decimal places as indicated by the data type field above. The distribution amount field for the first record below would be translated as 5,424.79.

```
50368081719990902199900000542479JOHN DOE ENTERPRISES01012379
35271042619990524199900000023848ABC COMPANY          01245875
744920213199903101999000002561039MY COMPANY INC      12163715
55189111219981215199800000004599XYZ INC              54877934
69487060119980705199800000015763EXAMPLE COMPANY     22499147
```

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Data requirements for a use tax statistical sample or CAD audit

It is important to ensure that the data file provided by a taxpayer has sufficient detail to enable the auditor to identify and retrieve individual transactions. Additional information, such as item descriptions and tax paid or accrued, is useful for the auditor in making tax determinations directly from the electronic data. This can be a tremendous time saver for both the taxpayer and auditor.

Accounts payable suggested fields (request is not limited to the following fields nor will all the following fields apply to each audit -- determination of exact fields is dependent on file descriptions provided by taxpayer)

**** signifies minimum fields required for any computer-assisted statistical sample A/P audit**

***** signifies additional fields necessary for CAD audit using ACL**

Data element	Data element definition
Account charged **	Identifies the account(s) to which the cost of the goods and/or services are being distributed (i.e., from a chart of accounts)
Batch number	A unique control number that has been assigned to a group of invoices in preparation of the data being keyed into a computer
Cash discount	The amount of price reduction given by a manufacturer or wholesaler when the invoice was paid within a specified discount period
Check number	The unique control number that is generally “press-numbered” onto all checks
Cost center **	Identifies where the costs of the goods and/or services have been/should be distributed (Also, see <i>Department</i> on page 9.)

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Data element	Data element definition
Date of invoice * *	The date the vendor created the invoice
Date paid	The date a check was remitted to a vendor for payment of an associated invoice
Department	The department from which the purchase was made or in which a job the goods and/or services were performed (Also, see <i>Cost center</i> on page 8.)
Distribution amount **	Detail line amount distributed to the G/L account above
Invoice amount	The total amount of the invoice (Includes all amounts such as merchandise amount, freight, tax, etc.)
Invoice number **	A control number attached to the invoice that is assigned by the supplier
Job description ***	A description of the job for which the materials and/or services are being used
Job number/work order number	A unique number assigned to the “job” number for which the materials and/or services are being used
Location **	Identifies the location where goods or services were used
Product description ***	The invoice description of the goods being purchased or services being provided
Purchase order number	A serial number printed on the purchase order sent by the purchasing department of a business to a supplier or vendor for ordering material or services

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Data element	Data element definition
Purchase order description ***	A purchase order description of the goods or services desired
Shipping & handling	The amount on the invoice representing the cost incurred to handle and transport/deliver the goods
Vendor number **	A unique number or value assigned to a vendor
Vendor name **	Name of vendor providing the services, supplies, or materials associated with a given invoice
Tax paid amount ***	An amount on the invoice depicting the tax charged and paid on the goods and/or services purchased
Tax accrued ***	Value of entry made in taxpayer's records depicting the tax due the department
Transaction date **	The date on which the transaction was posted onto the system. This date will reconcile T/P General Ledger to one-month summary produced by NYS using T/P electronic records
Voucher number	A control number attached to a voucher that is assigned by the purchaser

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Data requirements for sales data analysis

Sales suggested fields (request is not limited to the following fields nor will all the following fields apply to each audit -- determination of exact fields is dependent on file descriptions provided by taxpayer)

**** signifies minimum fields required for any computer-assisted sales audit**

Data element	Data element definition
Purchase order number	Serial number on the purchase order sent by a customer
Purchase order description	Description on purchase order of goods/services ordered
Batch number	Number assigned to a group of invoices for processing
Invoice number **	Control number on a invoice assigned by the taxpayer
Date of invoice **	The date the taxpayer created the invoice. This should be the date used by the taxpayer to create tax returns.
Customer name ** (bill-to & ship-to) and/or	Name of customer making purchase
Customer number ** (bill-to & ship-to)	Unique number assigned to a customer
Customer location ** (ship-to address)	Address where goods/services were delivered/used (city, state & ZIP code)
Product description	Description of goods being sold
Product number	Bar code number which identifies the product
Job description	Description of services performed
Job number/work order number	Unique number assigned to a job

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Data element	Data element definition
Invoice amount **	Total cost (Is shipping, handling, or tax included?)
Cash discount	Price reductions given by taxpayer
Shipping and handling **	Amount on invoice for transportation costs
Tax charged amt. **	Amount on invoice indicating sales tax on goods/services
Tax rate	Actual tax rate charged or code
Taxability code	Code to identify exempt items/customers
State indicator	Code used to show taxpayer ship-to state
G/L account number	Identifies the account(s) to which certain associated charges are being distributed

Understanding computer-assisted statistical sampling

The use of the computer in tax auditing combined with statistical sampling procedures provides the auditor with the ability for making assertions about a great number of transactions or audit occurrences through analysis of only a portion of them. Computer techniques permit isolating the most important areas, segregating specific accounts, or identifying high-dollar transactions.

Statistical sampling in tax auditing is a method of sampling that permits the estimation and quantification of some population value based upon the results of a sample drawn from that population. It allows the auditor to objectively determine the precision of any estimate that is made and the confidence that may be placed in the result. Both sample *precision* and *confidence* have specific statistical definitions that are explained below. Audit judgment is certainly involved in planning a statistical sample. For example, the auditor decides which accounts to sample, what constitutes an error, selection techniques, and confidence and precision criteria. However, in describing the results of the sampling in terms of achieved precision for given confidence levels, this subjective judgment plays no part. The overall estimate is described only in objective statistical terms.

One of the most important aspects of the statistical sample, and one well suited to the application of computer techniques, is the necessity of obtaining a truly random selection of sample items. The term *random* has a precise statistical meaning. A sample is said to be random when every item in the population or subsection of the population (stratum) has the identical chance of being selected in relation to all other items in the population or subsection. The computer can assign a distinct number to all sample population items and allocate a random number from an internal table to these items. Therefore, the otherwise labor intensive manual approach of sample selection is done automatically and quickly, and the sample is easily generated. This is discussed in more detail below in relation to the computer programs that perform these procedures.

Once the sample is obtained randomly, it is possible to state with a specific level of confidence that the estimated population characteristic, based on the extrapolation of the sample result, is no further away from the true value of that characteristic than some calculable amount. This can be demonstrated and supported by the laws of probability.

The statistical sampling techniques applied to tax audits are estimation techniques relating to the sampling of variables. However, unlike most variable sampling described in the literature for tax audits, there is no **prior** determination of sample sizes. The extension of sample results to the population is based on the number, dollar value, and distribution of errors occurring on sample items. In order to know beforehand what the sample size should be to meet precision and confidence level criteria on any given audit, one would have to know what the population error characteristics actually were, or at least have a reasonable estimate. While the traditional recommended methods of using prior audit results either for a particular taxpayer or similar taxpayers may be appropriate, this information is not generally available. Even if it were, it may not be indicative of the error rates for the specific audit in question. The only practical method for determining the error rate is to conduct a preliminary sample. Since error rates for tax audits are generally low, large sample sizes are common. This, plus the fact that the preliminary sample items can be included into the final sample, often results in initial sample sizes of 250-350 units per stratum.

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For tax audits, it is the relative precision (the precision expressed as a percentage of the tax estimate) that is the primary determinant of a satisfactory sample size. Again, this cannot be known in advance; therefore, the initial sample size must be set using judgment. This does not mean that the results of the sampling are subjective, since the specification of the results in terms of precision and confidence are not subject to auditor or taxpayer discretion.

The terms *precision* and *confidence* are defined below:

Confidence

Generally expressed as a percentage, *confidence* refers to the probability that the dollar range from the lower precision limit to the upper limit as determined from the sample results includes the population value (the total amount of tax resulting from a 100% examination). For example, if the auditor states there was 90% confidence that the total, but unknown, additional tax was between \$500 and \$1000, this would indicate that 90 samples out of 100 with similar characteristics would be expected to contain the total tax value within the precision range.

Precision

Precision is the total range within which the population value would fall at a given confidence level. It can either be expressed in dollar value or as a percentage of additional tax. (Non-tax auditing applications often express precision as a percentage of the population dollar value.) It is a range boundary around a particular estimate expressed as “plus” or “minus” some percent or amount. For example, an estimate at a given confidence level might be \$1000 plus or minus \$100 or 10%.

Precision and confidence levels are generally used together in describing sample results and estimating population values. In fact, there is a direct relationship. Given two audits with identical sample and population characteristics, the one with the higher specified confidence level will also exhibit a wider precision range.

In statistical terms, it is the standard deviation that affects the final sample sizes. This measure of the dispersion of sample amounts is a prime variable in determining the precision limits. Since the calculation of this variable relates to the tax errors in the sample, it cannot easily be predetermined. However, all things being equal, a smaller standard deviation will result in smaller required sample sizes. The standard deviation will be tentatively determined from the preliminary sample; larger preliminary sample sizes generally provide better estimates of the standard deviation. This adds additional support for the use of relatively large preliminary samples on tax audits.

Mid-point assessment guideline used for statistical sampling

The department’s guideline regarding audit assessments determined through the use of statistical sampling is to assess any tax liability or provide a refund based upon the mid-point of the estimate. The sample would be considered valid as long as the precision of the estimate calculated at a 90% confidence interval based on a two-sided test is no greater than 25% of the estimate.

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The computer statistical audit package developed by the EDP Field Audit Services Section on is directly related to the statistical sampling consideration briefly highlighted above. This package offers several important capabilities:

- standardization and consistency of approach in performing sampling for each audit case
- ability to accurately and readily analyze large amounts of data
- ability to scan the entire audit period of data (vouchers, invoices, etc.) and display information not otherwise obtainable

For example:

Total population - The total items expressed in units (that is, invoices, vouchers or distributions) from which a sample is drawn.

Total population amount - The dollar value of all items in the population.

Median of population - A value which divides the population so that one-half of the items are the same or more than it and one-half of the items are the same as or less than it.

Mean of population - The sum of the population values divided by the number of items in the population, also known as the average.

Standard deviation of population - A statistical term used to describe a measure of the variability of a set of numbers. To obtain the standard deviation, one must calculate the difference between the value of each individual item in the population and the population mean, square these differences, add them, divide the sum by the total number of items, and, finally, extract the square root.

- ability to stratify the data, that is, divide the population into two or more segments (strata). (This, in effect, creates sub-populations allowing for sampling within each sub-population. The results of the separate strata may then be combined into an estimate for the total population, which provides greater sample precision and reduces the effects of extreme values, such as the segregation of high dollar items.)
- ability to determine optimal strata boundaries or allowing the auditor to set or adjust the strata as needed
- calculation of the same values for each stratum that are calculated for the population
- provides the set of required random numbers and then identifies the records corresponding to these random numbers
- prints the sample records in a manner that:
 - sorts the records to be pulled in an order that conforms to the taxpayer's filing system, saving the taxpayer time and expense, and
 - permits the output reports to be used by the auditor as work papers, saving time previously required to transcribe the data

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- determines precision and confidence by reference to appropriate statistical formulas included in the computer package

- generates standard output reports:
 - a summary of accounts indicating number and amounts
 - a summary of data by month
 - detail reports of accounts, as requested (such as, utilities)

- ability to select, sort, modify, calculate, and print any data that is available from the audit period

In summary, the auditor uses the computer to assist in defining all aspects of the sampling process. This includes:

- designing audit tests,
- defining the population to be sampled,
- deciding whether the sample results should be projected over the entire population,
- choosing an appropriate sampling plan,
- choosing a selection technique,
- selecting the sample, and
- evaluating the sample.

Stratum boundary determination

Of the various methods available to determine stratum boundaries, New York State has opted to use the *cumulative of the square root of the frequency* method. This method is one that is well documented in many statistics textbooks and one that is well suited for determining stratum boundaries for accounting populations. This method allows for greater efficiency in the sampling process compared with setting the boundaries using judgment only. Using judgment in setting up stratum boundaries is a perfectly acceptable method, but may not be the most efficient in many cases. The department is committed to performing audits using the most efficient and accurate methods available.

Calculation of stratum boundaries using the *cumulative of the square root of the frequency* method

The table below illustrates how stratum boundaries are determined using the *cumulative of the square root of the frequency* method.

- | | |
|--------|---|
| Step 1 | Evaluate the population and determine if transactions below a certain dollar level should be eliminated from being sampled based on the dollar significance of those transactions. In this example, no transactions under \$100 will be reviewed. This is a decision that is made using auditor judgment and has no statistical significance. |
| Step 2 | Evaluate the population and determine what the high dollar cutoff will be for detailed review. In this example (on page 18), all items in the amount of \$10,000 and up will be reviewed in detail. |
| Step 3 | Stratify the remaining transactions within the population of items to be sampled (\$100 - \$9999.99) using a set dollar interval between the strata (\$500). We use \$500 for the current example to limit the number of strata which need to be displayed. In actuality, \$100 intervals are used. |
| Step 4 | Determine the frequency $f(y)$ for each dollar range. This is nothing more than the number of transactions within each dollar range. |
| Step 5 | Calculate the square root of the frequency for the first sampled range (100 - 499.99), which calculates out to be 146.5. Now calculate the square root for the next sampled range (500 - 999.99), which calculates out to be 94.1. Since we are accumulating this column, each result gets added to the number before it. The cumulative of the first two stratum equals the $146.5 + 94.1$ which equals the 240.6. Continue this process for each of the sampled strata. |

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Step 6 Once the *cumulative square root of the frequency* for the last sampled strata (9500 - 9999.99 in this case) is calculated, the stratum can be determined. For the final result, 770.1 is divided by the number of sampled strata desired (6 in this case, but can vary between 3-9 sampled strata). This result is the test interval of 128.4.

Step 7 The first strata range is determined by comparing the test interval of 128.4 against the calculated cumulative square root of the frequency for each dollar range and selecting the range that is closest to this test interval amount. In the immediate instance, 128.4 is closest to the 146.5 for the first sampled strata (100 - 499.99). The second strata is determined by taking 2 X 128.4 and finding the closest range. Strata 2 will encompass the range of 500 - 999.99 since 240.6 is the closest interval to 256.8. The third strata is determined by taking 3 X 128.4 and finding the closest range. Strata 3 will encompass the range of 1000 - 2499.99 since 401 is the closest interval to 385.2. This process will continue until all 6 sampled strata are determined.

Dollar range	Number of items frequency $f(y)$	Cumulative square root of the frequency $\sum\sqrt{f(y)}$	Strata #	Strata range
0 - 99.99	20090			<i>Eliminated</i>
100 - 499.99	21472	146.5	1	100 - 499.99
500 - 999.99	8850	240.6	2	500 - 999.99
1000 - 1499.99	4149	305.0		
1500 - 1999.99	2637	356.4		
2000 - 2499.99	1990	401.0	3	1000 - 2499.99
2500 - 2999.99	1620	441.2		
3000 - 3499.99	1815	483.8		
3500 - 3999.99	1056	516.3	4	2500 - 3999.99
4000 - 4499.99	879	546.0		
4500 - 4999.99	627	571.0		
5000 - 5499.99	598	595.5		
5500 - 5999.99	520	618.3		
6000 - 6499.99	425	638.9	5	4000 - 6499.99
6500 - 6999.99	471	660.6		
7000 - 7499.99	458	682.0		
7500 - 7999.99	429	702.7		
8000 - 8499.99	358	721.6		
8500 - 8999.99	241	737.2		
9000 - 9499.99	275	753.7		
9500 - 9999.99	269	770.1	6	6500 - 9999.99
10000 and up	234		7	Detail

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The population profile below summarizes the results from using the *square root of the frequency* method to determine the stratum boundaries.

Population profile

Strata #	Strata range	Number of items	Population \$'s	Standard deviation
1	0 - 99.99	20,090	738,807	-
2	100 - 499.99	21,472	5,432,668	109.89
3	500 - 999.99	8,850	6,368,355	144.67
4	1000 - 2499.99	8,776	14,041,520	431.59
5	2500 - 3999.99	4,491	14,103,433	411.27
6	4000 - 6499.99	3,049	15,469,958	715.53
7	6500 - 9999.00	2,501	20,025,062	1010.26
8	10000 and up	234	6,319,170	-

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Sample allocation using Neyman allocation methodology

After the strata boundaries, the number of items per strata, and the standard deviation for each of the strata that will be sampled have been determined, we are ready to determine the total sample size and allocate sample sizes to the individual strata.

The determination to eliminate all items under \$100 and to review in detail all items \$10,000 and greater leaves 6 strata that will need to be statistically sampled. While statistical formulas exist to determine optimum sample sizes that will meet specific objectives such as precision and confidence levels, auditors usually do not know how many errors exist within the population they are sampling. The expected number of errors is a key piece of the formula used to calculate optimum sample sizes. An estimate of the number of errors occurring within the population is normally determined through the use of pre-samples, which can be as large as the sample sizes New York State auditors use as their final sample sizes. It is for this reason that the department has chosen not to pre-sample, but rather evaluate the sample results to ensure that they meet pre-defined limits. Sample sizes are instead set judgmentally using between 250 - 350 items times the number of strata to be sampled. The immediate example will use 250 items as the average number for the 6 sampled strata, resulting in 1499 (*n*) items being allocated among the 6 strata.

- Step 1 For each sampled strata, calculate the product (*C*) of the number of items in the strata (*A*) and the standard deviation for that strata (*B*).
- Step 2 Sum these products (*D*) for the 6 strata.
- Step 3 Calculate what percentage (*E*) each individual strata's product is of the sum.
- Step 4 Multiply the computed percentage by the total sample size for the 6 sampled strata (*n*), 1499 in this case. This result is the number of items to be sampled for each of the strata (*F*). If any strata has fewer than 100 items to be sampled, we will increase the sample size to equal 100.

Stratum	Population (<i>A</i>)	Standard deviation (<i>B</i>)	Product of population & standard deviation (<i>C</i>) = (<i>A</i> × <i>B</i>)	Sample allocation % (<i>E</i>) = (<i>C</i> / <i>D</i>)	Sample size (<i>F</i>) = (<i>E</i> × <i>n</i>)
1	20,090	-	-	-	0
2	21,472	109.89	2,359,558	.168746623	253
3	8,850	144.67	1,280,330	.091564298	137
4	8,776	431.59	3,787,634	.270877172	406
5	4,491	411.27	1,847,014	.132091388	198
6	3,049	715.53	2,181,651	.156023383	234
7	2,501	1,010.26	2,526,660	.180697136	271
8	234	-	-	-	234
TOTAL	69,463		13,982,846 (<i>D</i>)		1,733

New York State’s approach for inclusion of credit items in the sampling process

Introduction

Credit transactions found in most types of accounting populations need to be included in any sampling plan to properly reflect their impact on the overall audit results. The department has developed an approach, as outlined below, that reflects the proper weighting of the credit items in the sampling process.

Common sampling methods

- include negative transactions in total population, stratify \$’s, and select sample
- include negative transactions in total population, stratify \$’s based on absolute value, and select sample
- create separate populations for positive and negative transactions, stratify \$’s in each population independently of the other, select samples from each projecting the errors against each population independently

New York State’s sampling method

- create separate populations for positive and negative transactions
- stratify \$’s in the positive strata first
- stratify negative \$’s according to the same ranges used for the positive strata
- determine sample sizes for the positive strata and for each corresponding negative strata, select sample sizes in the same proportion as the positive strata
- combine both the positive and negative number of items, population \$’s, and sample sizes to create a new profile that can be used for projection purposes

New York State’s process detailed

Step 1 Segregate the positive and negative transactions that appear in the total population.

Population \$ value \$77,254,799 Population transactions 72,140

	Total \$’s	Total # of transactions
Positive	\$82,498,973	69,463
Negative	-\$5,244,174	2,677

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Step 2 Determine the stratum boundaries for the sampled positive values using the cumulative of the square root of the frequency method.

Strata #	Strata range	Number of items	Population \$'s
1	0 - 99.99	20,090	738,807
2	100 - 499.99	21,472	5,432,668
3	500 - 999.99	8,850	6,368,355
4	1000 - 2499.99	8,776	14,041,520
5	2500 - 3999.99	4,491	14,103,433
6	4000 - 6499.99	3,049	15,469,958
7	6500 - 9999.00	2,501	20,025,062
8	10000 and up	234	6,319,170

Step 3 Determine sample sizes (**B**) for each positive strata using Neyman allocation methodology.

Strata #	Strata range	Number of items	Population \$'s	Sample size
1	0 - 99.99	20,090	738,807	0
2	100 - 499.99	21,472	5,432,668	253
3	500 - 999.99	8,850	6,368,355	137
4	1000 - 2499.99	8,776	14,041,520	406
5	2500 - 3999.99	4,491	14,103,433	198
6	4000 - 6499.99	3,049	15,469,958	234
7	6500 - 9999.00	2,501	20,025,062	271
8	10000 and up	234	6,319,170	234

Step 4 Calculate the ratio (**C**) of the sample size (**B**) to the number of transactions (**A**) for each strata.

Strata #	Strata range	(A) Number of items	Population \$'s	(B) Sample Size	(C) = B/A Ratio
1	0 - 99.99	20,090	738,807	0	0
2	100 - 499.99	21,472	5,432,668	253	.011783
3	500 - 999.99	8,850	6,368,355	137	.015480
4	1000 - 2499.99	8,776	14,041,520	406	.046263
5	2500 - 3999.99	4,491	14,103,433	198	.044088
6	4000 - 6499.99	3,049	15,469,958	234	.076746
7	6500 - 9999.00	2,501	20,025,062	271	.108357
8	10000 and up	234	6,319,170	234	1.00

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Step 5 Stratify the negative transactions using the same strata ranges as used for the positive strata.

Strata #	Strata range	Number of items	Population \$'s
1	0 - (99.99)	563	-24,209
2	(100) - (499.99)	551	-171,912
3	(500) - (999.99)	442	-306,306
4	(1000) - (2499.99)	413	-695,905
5	(2500) - (3999.99)	271	-862,864
6	(4000) - (6499.99)	226	-1,184,014
7	(6500) - (9999.00)	193	-1,626,411
8	(10000) and less	18	-372,553

Step 6 Apply the previously determined ratio (*C*) from the positive strata against the number of negative items in each strata (*D*) to arrive at a properly weighted sample size (*E*) for the negative transactions. Using this method ensures that a properly weighted sample of negative transactions has been determined.

Strata #	Strata range	Number of items	Population \$'s	(D)	(C)	(E) = D x C
				Ratio	Sample size	
1	0 - (99.99)	563	-24,209	0	0	
2	(100) - (499.99)	551	-171,912	.011783	6	
3	(500) - (999.99)	442	-306,306	.015480	7	
4	(1000) - (2499.99)	413	-695,905	.046263	19	
5	(2500) - (3999.99)	271	-862,864	.044088	12	
6	(4000) - (6499.99)	226	-1,184,014	.076746	17	
7	(6500) - (9999.00)	193	-1,626,411	.108357	21	
8	(10000) and less	18	-372,553	1.0	18	

Step 7 Select the random samples from the positive and negative strata according to the sample sizes determined for each population in Step 3 and Step 6.

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Step 8 It is now possible to combine the number of items, the population \$'s, and the sample sizes for both positive and negative transactions to arrive at the combined population profile that will be used as the basis for any tax projection.

Combined positive and negative transaction profile

Strata #	Strata range	Number of items	Population \$'s	Sample size
1	0 - 99.99	20,653	714,598	0
2	100 - 499.99	22,023	5,260,756	259
3	500 - 999.99	9,292	6,062,049	144
4	1000 - 2499.99	9,189	13,345,615	425
5	2500 - 3999.99	4,762	13,240,569	210
6	4000 - 6499.99	3,275	14,285,944	251
7	6500 - 9999.00	2,694	18,398,651	292
8	10000 and up	252	5,946,617	252

Reasoning for using New York State's method

The use of this method in selecting the positive and negative transactions ensures that a proportionate number of the negative transactions are selected and reviewed, while also ensuring that the negative items offset any positive items prior to projection of the tax liability. If the positive and negative items are kept separate throughout the tax projection process, any negative item would not fully benefit the taxpayer, since there are far fewer negative items in most accounting populations than there are positive ones.

Handling of positive and negative transactions in a statistical sampling audit

Objective

In general, the use of statistical sampling does not change the standard audit procedures used by the Audit Division when reviewing taxpayer records. Taxpayer's electronic data frequently include records that contain both positive and negative amounts. It is important that the auditor uses a consistent procedure for determining the taxability of these records. The purpose of this section is to define the procedure auditors should follow when auditing these positive and negative records.

Overview

The theory applied in performing a statistical sampling audit is basically the same as performing a detailed audit. Every transaction reviewed in a statistical sampling audit should be treated as if it were part of a detailed audit. Since all invoices in the population are represented by the sample, the decision regarding the taxability of the invoice should stand alone, that is, it should not be dependent on actually examining another invoice in the population or sample. **While this statement is true most of the time, the review of certain types of credit transactions selected for review within the sample may need to be researched prior to making a tax determination (detailed discussion below).**

When an auditor reviews a negative transaction representing a merchandise return, while performing a statistical sampling audit, he/she must first decide how the associated positive transaction would have been treated, and do the exact opposite when dealing with the negative transaction. It is important to note that the positive transaction (original purchase) must have occurred during the period under audit and had an opportunity to actually be selected. If the original purchase did not occur during the period under audit and the credit for the purchase is selected in the sample, the auditor will treat this item as having no tax implication (non-error item). If a purchase of merchandise is made at the end of an audit period and it can be shown by the taxpayer that the merchandise was returned and actually not credited until sometime after the audit period, the department will treat the original purchase within the audit period as a non-error item. This is consistent with how the item would be handled in a detailed audit.

Assuming both the associated positive and negative items occur during the audit period, the following treatment of the sampled items would hold true:

If the positive transaction had resulted in crediting the taxpayer for an overpayment of tax, the entry for the negative transaction must assess the same amount of tax that would have been credited in the positive transaction.

If, upon audit, the negative item is one for which the auditor would determine an additional tax if it were a positive amount, a tax credit should be allowed.

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Assumptions

For purchases and returns

- The audit is a use tax audit.
- The sampling unit is a distribution to an account.
- The taxpayer has the capability to self-accrue tax.
- A positive amount is a purchase made by the taxpayer.
- A negative amount represents a return of merchandise to the vendor.
- Both the purchase and return occur within the audit period.
- On purchases, the taxpayer either accrued or paid the full amount of tax or did not accrue or pay any tax.
- On returns, the taxpayer either recovered the full amount of tax originally paid or did not recover any tax.

Positive invoice amounts - purchases

When auditing a purchase, the auditor must determine if the purchase is taxable, and if the taxpayer paid or accrued the correct tax on the purchase.

The decision matrix below identifies the auditing outcomes based on the answers to these questions.

Outcome #	Scenario	Transaction taxable	Transaction nontaxable
1	Taxpayer paid tax, no tax accrued	No change in tax	Negative change in tax equal to 1 X tax amount
2	Taxpayer accrued tax, did not pay tax	No change in tax	Negative change in tax equal to 1 X tax amount
3	Taxpayer paid tax and also accrued tax	Negative change in tax equal to 1 X tax amount	Negative change in tax equal to 2 X tax amount
4	Taxpayer did not pay tax, did not accrue tax	Positive change in tax equal to 1 X tax amount	No change in tax

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<i>Outcome #</i>	<i>Scenario</i>	<i>Transaction taxable</i>	<i>Transaction nontaxable</i>
<i>1</i>	<i>Taxpayer paid tax, no tax accrued</i>	<i>No change in tax</i>	<i>Negative change in tax equal to 1 X tax amount</i>

Illustrative example for outcome #1:

Taxable transaction:	
Item purchased:	Office supplies
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$0
On audit, this transaction is determined to have been properly handled. No adjustment needed.	

Nontaxable transaction:	
Item purchased:	Legal services
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$0
On audit, it is determined that tax should not have been paid on this transaction. The auditor would give an \$8.00 credit for the tax that was paid.	

<i>Outcome #</i>	<i>Scenario</i>	<i>Transaction taxable</i>	<i>Transaction nontaxable</i>
<i>2</i>	<i>Taxpayer accrued tax, did not pay tax</i>	<i>No change in tax</i>	<i>Negative change in tax equal to 1 X tax amount</i>

Illustrative example for outcome #2:

Taxable transaction:	
Item purchased:	Office supplies
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$0
Total invoice:	\$100.00
Tax accrued:	\$8.00
On audit, this transaction is determined to have been properly handled. No adjustment needed.	

Nontaxable transaction:	
Item purchased:	Legal services
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$0
Total invoice:	\$100.00
Tax accrued:	\$8.00
On audit, it is determined that tax should not have been accrued on this transaction. The auditor would give an \$8.00 credit for the tax that was accrued.	

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<i>Outcome #</i>	<i>Scenario</i>	<i>Transaction taxable</i>	<i>Transaction nontaxable</i>
3	<i>Taxpayer paid tax, and also accrued tax</i>	<i>Negative change in tax equal to 1 X tax amount</i>	<i>Negative change in tax equal to 2 X tax amount</i>

Illustrative example for outcome #3:

Taxable transaction:	
Item purchased:	Office supplies
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$8.00
<p>On audit, it is determined that tax was properly paid to the supplier but then improperly accrued. The auditor would give an \$8.00 credit for the tax that was accrued.</p>	

Nontaxable transaction:	
Item purchased:	Legal services
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$8.00
<p>On audit, it is determined that tax should not have been paid to the law firm nor accrued by the taxpayer on this transaction. The auditor would give an \$8.00 credit for the tax that was paid on the invoice and an additional \$8.00 credit for the tax that was improperly accrued.</p>	

<i>Outcome #</i>	<i>Scenario</i>	<i>Transaction taxable</i>	<i>Transaction nontaxable</i>
4	<i>Taxpayer did not pay tax, did not accrue tax</i>	<i>Positive change in tax equal to 1 X tax amount</i>	<i>No change in tax</i>

Illustrative example for outcome #4:

Taxable transaction:	
Item purchased:	Office supplies
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$0
Total invoice:	\$100.00
Tax accrued:	\$0
<p>On audit, this transaction is determined to have been improperly handled. The auditor would assess tax in the amount of \$8.00</p>	

Nontaxable transaction:	
Item purchased:	Legal services
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$0
Total invoice:	\$100.00
Tax accrued:	\$0
<p>On audit, this transaction is determined to have been properly handled. No adjustment needed.</p>	

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Negative invoice amounts - returns

When auditing a returned item, the auditor must determine if:

1. the original purchase was made within the audit period
2. the original purchase is taxable
3. the taxpayer recovered the tax on the purchase or reversed the accrual

The decision matrix below identifies the auditing outcomes based on the answers to these questions.

Outcome #	Scenario	Transaction taxable	Transaction nontaxable
1	Taxpayer recovered tax, no tax originally accrued	No change in tax	Positive change in tax equal to 1 X tax amount
2	Taxpayer did not recover tax, tax originally accrued now reversed	No change in tax	Positive change in tax equal to 1 X tax amount
3	Taxpayer did not recover tax, tax originally accrued never reversed	Negative change in tax equal to 1 X tax amount	No change in tax
4	Taxpayer recovered tax and tax originally accrued now reversed	Positive change in tax equal to 1 X tax amount	Positive change in tax equal to 2 X tax amount
5	Taxpayer recovered tax, tax originally accrued never reversed	No change in tax	Positive change in tax equal to 1 X tax amount
6	Taxpayer did not recover tax, no tax originally accrued	Negative change in tax equal to 1 X tax amount	No change in tax

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For the following examples, remember that the negative transaction representing a return of merchandise or credit for services rendered needs to be handled in such a way that it would offset how the original purchase would have been handled upon audit. The explanations below will discuss how the positive transaction was handled to assist in understanding how the negative transaction needs to be handled.

<i>Outcome #</i>	<i>Scenario</i>	<i>Transaction taxable</i>	<i>Transaction nontaxable</i>
<i>1</i>	<i>Taxpayer recovered tax from supplier, no tax originally accrued</i>	<i>No change in tax</i>	<i>Positive change in tax equal to 1 X tax amount</i>

Illustrative example for outcome #1:

Taxable transaction:	
Item purchased:	Office supplies
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$0
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$8.00)
Total credit:	(\$108.00)
Tax accrued:	(\$0)
<p>On audit, this transaction is determined to have been improperly handled. The tax amount of \$8.00 on the original purchase has been properly credited. No adjustment needed.</p>	

Nontaxable transaction:	
Item purchased:	Legal services
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$0
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$8.00)
Total credit:	(\$108.00)
Tax accrued:	(\$0)
<p>On audit, it is determined that tax should not have been paid on the original transaction. The auditor would have given an \$8.00 credit for the tax that was paid on the original purchase. Since the invoice is being credited back to the taxpayer with the tax, the auditor must now assess tax in the amount of \$8.00 to balance the tax credit that he/she would have given for the original purchase.</p>	

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<i>Outcome #</i>	<i>Scenario</i>	<i>Transaction taxable</i>	<i>Transaction nontaxable</i>
2	<i>Taxpayer did not recover tax from supplier, tax originally accrued now reversed</i>	<i>No change in tax</i>	<i>Positive change in tax equal to 1 X tax amount</i>

Illustrative example for outcome #2:

Taxable transaction:	
Item purchased:	Office supplies
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$0
Total invoice:	\$100.00
Tax accrued:	\$8.00
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$0)
Total credit:	(\$100.00)
Tax accrued:	(\$8.00)
<p>On audit, this transaction is determined to have been improperly handled. The tax accrued of \$8.00 on the original purchase has been properly credited reversing the original accrual. No adjustment needed.</p>	

Nontaxable transaction:	
Item purchased:	Legal services
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$0
Total invoice:	\$100.00
Tax accrued:	\$8.00
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$0)
Total credit:	(\$100.00)
Tax accrued:	(\$8.00)
<p>On audit, it is determined that tax should not have been accrued on the original transaction. The auditor would have given an \$8.00 credit for the tax that was accrued on the original purchase. Since the invoice is being credited back to the taxpayer, the auditor must now assess tax in the amount of \$8.00 to balance the tax credit that he/she would have given for the original purchase.</p>	

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<i>Outcome #</i>	<i>Scenario</i>	<i>Transaction taxable</i>	<i>Transaction nontaxable</i>
3	<i>Taxpayer did not recover tax from supplier, tax originally accrued now reversed</i>	<i>Negative change in tax equal to 1 X tax amount</i>	<i>No change in tax</i>

Illustrative example for outcome #3:

Taxable transaction:	
Item purchased:	Office supplies
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$8.00
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$0)
Total credit:	(\$100.00)
Tax accrued:	(\$0)
<p>On audit, it is determined that tax was properly paid to the supplier but then improperly accrued. The auditor would have given an \$8.00 credit for the tax that was accrued on the original purchase. Because the supplier in this instance only issued a credit for the actual merchandise without the tax, the auditor must now credit \$8.00 for the tax that was originally paid but never credited.</p>	

Nontaxable transaction:	
Item purchased:	Legal services
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$8.00
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$0)
Total credit:	(\$100.00)
Tax accrued:	(\$0)
<p>On audit, it is determined that tax should not have been paid to the law firm nor accrued by the taxpayer on this transaction. The auditor would give an \$8.00 credit for the tax that was paid on the invoice and an additional \$8.00 credit for the tax that was improperly accrued. Since the invoice is being credited back to the taxpayer, the auditor has no adjustment to be made for the credit invoice. The credit invoice did not contain a tax credit and the taxpayer made no adjustment to the tax accrual account maintaining the balance that would have been created by the auditor when he/she would have given the original \$16.00 credit.</p>	

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<i>Outcome #</i>	<i>Scenario</i>	<i>Transaction taxable</i>	<i>Transaction nontaxable</i>
<i>4</i>	<i>Taxpayer recovered tax from supplier and tax originally accrued now reversed</i>	<i>Positive change in tax equal to 1 X tax amount</i>	<i>Positive change in tax equal to 2 X tax amount</i>

Illustrative example for outcome #4:

Taxable transaction:	
Item purchased:	Office supplies
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$8.00
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$8.00)
Total credit:	-\$108.00)
Tax accrued:	(\$8.00)
<p>On audit, it is determined that tax was properly paid to the supplier, then improperly accrued. The auditor would have given an \$8.00 credit for the tax that was accrued on the original purchase. Since the taxpayer properly received the credit for the tax from the supplier and properly reversed the original entry in the tax accrual account, the auditor must assess \$8.00 in tax to offset the original \$8.00 in tax that was credited when the original purchase invoice would have been examined.</p>	

Nontaxable transaction:	
Item purchased:	Legal services
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$8.00
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$8.00)
Total credit:	(\$108.00)
Tax accrued:	(\$8.00)
<p>On audit, it is determined that tax should not have been paid to the law firm nor accrued by the taxpayer on this transaction. The auditor would give an \$8.00 credit for the tax that was paid on the invoice and an additional \$8.00 credit for the tax that was improperly accrued. Since the credit invoice reflects an \$8.00 tax credit and the accrual account is being credited for the \$8.00 in tax erroneously accrued, the auditor must now assess \$16.00 in tax to offset the original \$16.00 in tax credits he/she allowed when the original purchase was examined.</p>	

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<i>Outcome #</i>	<i>Scenario</i>	<i>Transaction taxable</i>	<i>Transaction nontaxable</i>
5	<i>Taxpayer recovered tax from supplier, tax originally accrued never reversed</i>	<i>No change in tax</i>	<i>Positive change in tax equal to 1 X tax amount</i>

Illustrative example for outcome #5:

Taxable transaction:	
Item purchased:	Office supplies
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$8.00
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$8.00)
Total credit:	(\$108.00)
Tax accrued:	(\$0)
<p>On audit, it is determined that tax was properly paid to the supplier but then improperly accrued. The auditor would have given an \$8.00 credit for the tax that was accrued on the original purchase. Since the taxpayer properly received the credit for the tax from the supplier and then failed to reverse the original entry in the tax accrual account, the auditor needs to make no adjustment since the original credit of \$8.00 allowed by the auditor had the effect of bringing the accrual account back into balance.</p>	

Nontaxable transaction:	
Item purchased:	Legal services
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$8.00
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$8.00)
Total credit:	(\$108.00)
Tax accrued:	(\$0)
<p>On audit, it is determined that tax should not have been paid to the law firm nor accrued by the taxpayer on this transaction. The auditor would give an \$8.00 credit for the tax that was paid on the invoice and an additional \$8.00 credit for the tax that was improperly accrued. Since the credit invoice reflects an \$8.00 tax credit and the accrual account is not being adjusted for the \$8.00 in tax erroneously accrued, the auditor must now assess only the \$8.00 in tax representing the tax charged by the supplier to offset the original \$8.00 in tax credits he/she allowed when the original purchase was examined. The auditor's tax credit of \$8.00 originally allowed on the purchase transaction had the effect of bringing the accrual account back into balance.</p>	

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<i>Outcome #</i>	<i>Scenario</i>	<i>Transaction taxable</i>	<i>Transaction nontaxable</i>
6	<i>Taxpayer did not recover tax from supplier, no tax originally accrued</i>	<i>Negative change in tax equal to 1 X tax amount</i>	<i>No change in tax</i>

Illustrative example for outcome #6:

Taxable transaction:	
Item purchased:	Office supplies
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$0
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$0)
Total credit:	(\$100.00)
Tax accrued:	(\$0)
<p>On audit, it is determined that tax was properly paid to the supplier with no tax being correctly accrued. The auditor would have made no adjustment on the original purchase since tax was properly paid to the supplier. Since the taxpayer did not properly received the credit for the tax from the supplier on the credit invoice, the auditor will allow a tax credit in the amount of \$8.00.</p>	

Nontaxable transaction:	
Item purchased:	Legal services
Amount of purchase:	\$100.00
Tax rate:	8%
Tax charged:	\$8.00
Total invoice:	\$108.00
Tax accrued:	\$0
Credit invoice:	
Merchandise:	(\$100.00)
Tax:	(\$0)
Total credit:	(\$100.00)
Tax accrued:	(\$0)
<p>On audit, it is determined that tax should not have been paid to the law firm billed on the invoice for this transaction. The auditor would give an \$8.00 credit for the tax that was paid on the invoice. Since the credit invoice does not reflect an \$8.00 tax credit for this credit invoice, the auditor does not need to make any adjustment. The prior \$8.00 credit given by the auditor on the original purchase had the effect of bringing the tax into balance.</p>	

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Journal entries/reclassifications

An auditor may also have to contend with a positive or negative item that did not represent returned merchandise but rather represented a reclassification from one account to another. These can be reclassifications to an account that were included in the population that was sampled as well as accounts that were not included in the population being sampled. If the item went to an account included in the population, there would most likely exist two positive items and one negative item, all with an equal chance to be selected. If the item went to an account that was not included in the population, then there would most likely exist one positive and one negative item with an equal chance to be selected.

Reclassification from one selected account to another selected account

If you have a reclassification from a selected account to another selected account in the population, the item would be handled the way a normal returned item is handled. However, the department handles these types of transactions in a manner that could not possibly skew the results and potentially over-assess the taxpayer. If only one of the positive reclassification entries is chosen as part of the sample, the auditor would tax it if tax were underpaid or give a tax credit if tax were overpaid. If the sample has two selected positive transactions representing the same transaction, and that transaction is an error (underpayment of tax or overpayment of tax), the auditor should choose only the one positive item that represents the re-class entry as the actual error. The remaining positive item representing the original charge to the incorrect account only represents an accounting entry that should have no tax impact. In either of these instances, if the negative item associated with this re-class is selected in the sample, the auditor should ignore the negative transaction.

Reclassification from a selected account to a nonselected account

If you are reclassifying a transaction from a selected account in the population to a nonselected account that is outside the population, the item would be handled the way a normal returned item is handled. However, the department handles these transactions in a manner that could not possibly skew the results by over-assessing the taxpayer. If this type of transaction is selected in the sample and found to be an error, it is our procedure to treat this item (either positive or negative) as a non-error transaction. The transaction now may be selected for review outside of the statistical sample, if the auditor chooses to review any non-selected accounts either by a separate statistical sample or by a detailed review.

If the population of transactions contains many reclassification types of entries, the auditor should discuss possible alternatives with a member of the EDP Field Audit Services Section to ensure that the audit results are not skewed.

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Tax-Only invoice

When an auditor encounters a tax-only invoice in the sample, meaning that a supplier did not originally bill tax when the purchase was made, the auditor must first determine if the original purchase was made during the period under audit. If that was the case, then the auditor must credit the taxpayer for the full amount of the tax being billed on the invoice even though this original purchase invoice was not selected as part of the sample. That's because the auditor would have taxed the original invoice had he/she seen it, thus creating a situation in which the taxpayer would have been taxed twice for the merchandise. If the original purchase was made prior to the beginning of the audit period, then there is no tax implication for the tax-only invoice since the auditor would have no opportunity to view the original purchase transaction. If the original purchase was made during the audit period but the tax was billed separately after the audit period, the auditor treats the original purchase as a non-error item. This is consistent with how this transaction would be handled in a detailed audit.

If the auditor becomes aware that a tax-only invoice exists during the audit period, but was not selected as part of the sample for a purchase transaction that appears in the sample, tax still needs to be assessed on the original purchase transaction. The specific tax-only invoice in question had an opportunity to be selected as part of the sample, but was not, while another tax-only invoice may have been selected as part of the sample with its corresponding purchase invoice not selected. This is important for consistency in the handling of these types of errors. If it were possible to match up all transactions that fall into this category and upon review not tax the original purchase or give tax credit for the tax-only invoice, this would be deemed an acceptable way to handle these types of transactions. You must avoid using a combination of different methods when all such transactions cannot be positively identified. Consistency in the handling of each specific type of transaction is essential in obtaining accurate results. If an auditor is unsure how to handle specific types of transactions, he/she should contact the EDP Audit Section for clarification.

Installment/progress billings

When reviewing invoices that represent installment or progress billings, the auditor should refer to the original contract related to those billings. This contract should specify how taxes will be handled. The auditor should not tax any invoices that fall into this category if the contract specifically outlines that taxes will be billed either up-front or at the end of the contract. The auditor should confirm that taxes are actually being billed according to the contract.

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Appendix A

Glossary of statistical terms
basic theory, concepts, and terms

The **audit population** is the total set of units or elements from which the sample is to be drawn. In statistics books, the audit population would be referred to as the sampling frame. For a use tax audit, the population is usually the total set of invoices or vouchers from which the sample is to be drawn. The **sampling unit** is the individual unit or element that is to be sampled. For a use tax audit, the sampling unit may be an invoice, a voucher, a line item from an invoice, or an account distribution from an invoice. The standard sample unit used by NYS auditors is the account distribution since this unit easily allows auditors the ability to select the accounts that will make up the audit population.

The **sample** is the set of units selected from the population that will be audited. A **random sample** is a method of sampling in which each member of the population has an equal chance of being selected. A **statistical sample** is a randomly selected sample.

A **parameter** is the population value or characteristic that the auditor is estimating. In a use tax audit, the parameter that the auditor is usually estimating is the total change in the taxpayer's tax liability.

A **statistic** is the value or characteristic derived from a sample such as a mean-error invoice. The statistic is used to estimate a population parameter.

The sample **mean** is a measure of central tendency obtained by summing the values of all the invoices in the sample and dividing by the number of invoices in the sample. The **point estimate** is the estimated value of the population parameter and represents what the auditor is attempting to estimate in a use tax audit.

The **variance** is a measure of the dispersion of the values of a set of data about the mean. The **standard deviation** is the square root of the variance. A large standard deviation relative to the mean is an indication that there is a lot of variability of the data. The **standard error of the mean** is the standard deviation of a sampling distribution.

A **normal probability distribution** is a bell curve. Approximately 68% of the area of a normal distribution lies within one standard deviation of the mean, 95% within two standard deviations of the mean, and almost all of the area within three standard deviations of the mean.

Confidence levels are the degree of confidence, expressed in terms of probability, that the estimated population parameter will fall within an interval or range of values. The department uses a **90% confidence level** in estimating a change in the taxpayer's liability while using a 25% threshold for the precision allowance. **Precision** represents the total range within which the population value would fall at a given confidence level.

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Stratification is the process of dividing the population of sampling units (account distributions) into segments (strata) based upon some characteristic such as the dollar amount of the sampling unit. Stratification usually increases **sampling efficiency**, enabling the department to draw a smaller sample. A **stratum** (plural, strata) is a section, layer, or division within a population. For example, if the population is stratified on the dollar amount of the account distribution, then a stratum might be the account distributions greater than or equal to \$100 and less than \$500. In a **stratified random sample**, the population is divided into strata and independent random samples are drawn from each stratum.

Statistical formulas used by New York State

The **arithmetic mean of differences** found on audit for each individual strata is equal to the dollar value of differences found on audit divided by the sample size. This value represents the per transaction error found for the sampled stratum.

The arithmetic mean of differences for all strata combined is computed using the population size for each individual stratum as a weighting factor. The following formula is used to compute this value:

$$\sum_{i=1}^{Last} \frac{(N_i \bar{X}_i)}{N_T}$$

Σ = Sum of

N_i = i th stratum population size

\bar{X}_i = i th stratum arithmetic mean of audit differences

N_T = total population size for all strata being combined

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The *standard deviation of differences* found on audit measures the variability of the audit differences. The following formulas are used to calculate the standard deviation, either for each stratum individually or for multi-strata:

(A) Each individual stratum:

$$\sqrt{\frac{\sum_{i=1}^{Last} [(D^2)] - n(\bar{D})^2}{n - 1}}$$

- $\sqrt{\quad}$ = Square root
- Σ = Sum of
- D^2 = each individual audit difference squared =
- n = stratum sample size
- \bar{D} = stratum mean audit difference

(B) Multi-strata:

$$\sqrt{\sum_{i=1}^{Last} \left(\frac{N_i}{N_T} \right)^2 (S_i)^2}$$

- $\sqrt{\quad}$ = Square root
- Σ = Sum of
- D_i = i th stratum population size
- N_T = total population size for all sample strata
- S_i = i th stratum individual stratum standard deviation as calculated in part (A)

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The *sampling error or precision* represents the dollar value from the point estimate within which we are 90% certain that the actual dollar amount of additional tax due would fall if 100% of the population had been examined. The formula used to calculate precision is as follows:

$$\sqrt{\frac{\sum_{i=1}^{Last} (N_i)^2 \left(\frac{(S_i)^2}{n_i} \left(1 - \frac{n_i}{N_i} \right) (t_i)^2 \right)}{(N_T)^2}} (N_T)$$

$\sqrt{\quad}$ = Square root

Σ = Sum of

N_i = i th stratum population size

S_i = i th stratum individual stratum standard deviation

n_i = i th stratum sample size

t_i = student's t-table factor for i th stratum, degrees of freedom = stratum sample size - 1

N_T = total population size for all sampled strata

Note: The formula for the overall-sampling error (precision) is applied only to individual strata that were sampled. Strata that were examined in detail (sample size = population size) or strata from which no items were examined (sample size = 0) are not factored into this calculation because there is no element of variability in the values calculated for detailed strata and there are no values calculated for zero sample size strata.

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Appendix B

Authority to request computerized records

The department's authority to require a taxpayer to provide records stored in machine-sensible form is outlined in the NYS Sales and Use Tax Regulations section 533.2(a)(2). The section states in part:

(2) Upon audit by the department, or at such other times as the department requests, the vendor or user must present all the records described in this Part, kept in a manner suitable to determine the correct amount of tax due, together with such documentation, summaries and schedules, including any New York State or federal tax returns or schedules as the department may request. The vendor or user may elect to retain records as hard-copy records, electronic records, or both. Such vendor or user must provide the auditors of the department with suitable facilities for conducting their audit or examination. In those instances where the vendor or user maintains or processes records on an electronic data processing system, the department reserves the right to have such records presented on machine-sensible form, and the vendor or user must furnish access to such equipment or records as is necessary for the department to carry out its standard audit procedures. See Part 2402 of this Title for *Taxpayer Record Retention Formats*. See, also, paragraph (f)(4) of this section for specific provisions that supplement Part 2402.

533.2(f)(4)

Records prepared by automated data processing system. All punched cards, magnetic tapes, discs, and other machine-sensible data media used for recording, consolidating and summarizing accounting transactions related to the taxpayer's automatic data processing system are records within the meaning of section 1142(5) of the Tax Law and must be retained for as long as the contents may become material in determining the accuracy of any tax return required by Article 28 or pursuant to the authority of Article 29 of the Tax Law. However, if this information is duplicated in a hard-copy format or electronic format (See Part 2402 of this Title for *Taxpayer Record Retention Formats*), such punched cards, magnetic tapes, discs, or other machine-sensible records need not be retained.

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Appendix C

Data transfer options

File specifications:

EBCDIC	- Fixed block, Fixed length records, Flat Sequential, Packed fields allowed
ASCII	- Fixed length or delimited (i.e., comma), NO packed fields allowed
DBF	- Lowest version available ; Please designate version used
Compression	- IBM/DOS compatible, Self-Extracting Files, i.e. using ZIP2EXE.EXE
Other	- NO proprietary software (i.e., Colorado Backup, BackupExec) - Binary fields of any type are <u>not</u> allowed

Media capabilities:

Reel	- 3420 which is 6250 BPI (mainframe copy command only – no backup)
Cartridge	- 3480, 3490, 3490E or 3590
3 ½" or 5 1/4" diskette	- Double/High Density -ASCII format
8" diskette	- Density 800 or 3200 - Must use <i>SAVE/RESTORE</i> command
4 millimeter	- DDS - Uncompressed - DDSDC - Compressed - DDS2, DDS2DC and DDS3
8 millimeter	- All types currently compatible
Quarter-inch cartridge	- Density QIC 24, 120, 150, 525, 1GB, 1.35GB, 2GB & 2.5GB
Any media where the hardware and software is provided	- i.e. JAZZ Drives that attached to the parallel or serial port of a PC

Internet address: “firstname”_“lastname”@Tax.State.NY.US

- No size limits - No packed fields - Can ZIP - As an attachment
- Need control totals - Need encryption keys if used

CD-ROM

- No proprietary software - Can ZIP

DLT

- 2.6GB, 6GB, 10/15GB, 20GB & 35GB

Iomega 100MB Zip Disks

Other requirements based on system type:

Digital systems	- TK-50, 70, 85, 86, 87 & 89 Tape Cartridges
Unix systems	- Tape Archive (TAR) or CPIO Format Tape - Also the “DD” save command - Unable to handle multiple files - each file must be on a separate tape
DEC VMS System	- VMS back-up tapes
Digital VMS System	- Use <i>RESTORE</i> facility to create tape
AS400 or System 36’s	- Use <i>COPY</i> or <i>SAVEOBJ</i> command to create tapes - Do <u>not</u> use <i>SAVE</i> command

Documentation required:

* Item count per file	* Record length
* Dump of one block for each file	* Block size (maximum of 32,760 characters)
* File description for each file	* Explanation of all codes on the file needed to process data
* Control totals	

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Cochran, William G. *Sampling Techniques*. John Wiley & Sons, 1977, 3rd Edition.

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Tennessee Department of Revenue, Audit Division. *Statistical Sampling for Sales and Use Tax Audits*. January 1999.

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