1967

Auditor's Approach to Statistical Sampling, Volume 2 (Supplementary Section) Sampling for Attributes

American Institute of Certified Public Accountants. Professional Development Division. Individual Study Program

(Supplementary Section) 2

AN AUDITOR'S APPROACH TO STATISTICAL SAMPLING

SAMPLING FOR ATTRIBUTES

Individual Study Program
Professional Development Division
American Institute of Certified Public Accountants

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SAMPLING FOR ATTRIBUTES

SUPPLEMENTARY SECTION

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APPENDIX I

"RANDOM SYSTEMATIC" SAMPLING

1. In pure random sampling, the selection of each sample element is independent of the selection of any other element and each element always has an equal chance of selection. Systematic samples, however, are typically drawn by selecting elements at equal intervals throughout the population. For example, in a systematic sampling plan which called for selecting every 43rd element and the first element drawn is the fourth record, we would draw the 4th, 47th, 90th records, etc. Which two records would follow number 90 in our sample? _____ and _____

14. To select intervals at random which will have an average equal to our calculated average interval, we select random numbers between 1 and 2 times the average interval. Thus, for a sample of 200 elements from a population of 8000, we would select random numbers between 1 and 2 times 40. The minimum interval selected would be 1 and the maximum would be _____.

Note: This procedure is based upon sampling without replacement. If the sample were drawn with replacement, the selection of numbers would be between 0 and 2 times the average interval.

27. Determine which population elements should be the fifth, sixth, and seventh sample elements. Enter your answers in lines 5, 6, and 7 of Worksheet 5, Sheet 3.

133 (90 + 43)

176 (133 + 43)

2. The value, i, which determines the interval between sample elements was 43 in our previous example. This value is usually established by dividing the population size by the size of the sample to be drawn. If a sample of 250 items is to be selected from a population of 10,000 records, what is the value of the interval, i? _____

80

15. For each of the following examples, determine the average interval (N ÷ n) and the maximum interval (2 x average interval)

	N	n	Average	Maximum
1.	10,000	100	100	200
2.	5,000	100	___	___
3.	6,000	300	___	___

5. 177 (123 + 54)

6. 196 (177 + 19)

7. 247 (196 + 51)

28. The auditor completes his sample by drawing successive two digit numbers equal to or less than 80, until he has gone through the entire population. On Worksheet 5, Sheet 3, the last record shown would be element number 21 in the sample which is element number 822 in the population. Would this be part of the sample? (YES/NO) Why?

_____

_____

40 (10,000 ÷ 250)

3. Determine the value of the interval, i, for the population sizes, N, and corresponding sample sizes, n, shown below.

N	n	N ÷ n
100	5	____
1000	100	____

	Average	Maximum
2.	50	100
3.	20	40

16. Turn to Worksheet 5 (Page S-30). For the problem of the Western Business School, calculate the average and maximum intervals.

Average _____

Maximum _____

NO. No 822nd element exists.

29. There will be occasions when the auditor will find slightly more or slightly fewer sample elements within the confines of the population than his sample requires. In these cases, he will either add or eliminate, by random selection, the appropriate number of sample elements so that his final sample is consistent with the pre-determined sample size.

(No answer required)

$\frac{N \div n}{}$ 20 10	4. When the interval, i, has been determined, the first element (starting point) is generally selected at random. For an interval of 40 and starting point of 13 the first 5 elements of the sample would be as follows: 1) 13 2) 53 3) 93 4) __ 5) __
$\frac{40}{}$ (800÷20) $\frac{80}{}$ (2 x 40)	17. As in conventional random sampling, the auditor must establish correspondence. Thus, he calls the first voucher 001 and the 800th voucher 800. The second voucher in the population would be _____.
No answer required	30. On Worksheet 6, Sheet 1 (Page S-33). we will select the first 10 sample elements by random systematic sampling. First calculate the average and maximum intervals for the sample size, 30, and the population size, 900. Average _____ Maximum _____

133 173	5. Systematic sampling is often less time consuming than pure random sampling. However, systematic sampling is equivalent to random sampling only when the population is in random sequence with respect to the characteristic being sampled. In a random sample, every element in the population must have an equal chance of being selected in the sample. Thus, in a population of 8,000 vouchers, each voucher has 1 chance in _____ of being selected each time a sample element is drawn.
002	18. Next, the auditor must determine a route and random starting point following the procedure used in Volume I. With a blind stab, he will select one random number, of which the first three digits will represent the row, the fourth digit will represent the column, and the fifth digit will determine the starting digit within the column. (No answer required)
Average 30 Maximum 60	31. Beginning in line 166, Column 4, of the random number table reproduced as Worksheet 6, Sheet 2, select the last two digits of the random numbers as the intervals. Thus, the first record selected would be _____ which occurs at the starting point 14549.

8,000	6. If a sample of 200 elements is drawn from a population of 8000, each element in the population initially has a total of _____ chance(s) in 8000 of being selected at some point in the sample and _____ chance(s) in 8000 of being selected as each element is drawn.
No answer required	19. The auditor's blind stab strikes the random number 10181. Therefore, his starting point will be row 101, Column 8, and he will use the first two digits of the random numbers along his route. The sheet on which this random number appears has been reproduced as Sheet 2 of Worksheet 5. The random number at this location is _____.
49	32. The next three intervals would be ____, ____, and ____ from the random numbers 16043, 30518, and 15339.

200

1

7. In a systematic sample, each element initially has the same chance of being selected. However, once the interval is calculated and the first item selected, the chances of selection for all remaining elements are immediately established. Thus, in a sample of 200 elements from a population of 8000, each element initially has _____ chances in 8000 of being selected.

22878

20. The auditor has decided his route will be to proceed down the column from the starting point to the bottom of the column and begin again at the top of the next column on the right.

(No answer required)

43

18

39

33. For each sample element shown below, calculate the corresponding population element.

Sample	Population
2.	_____
3.	_____
4.	_____

200	8. When the first of the 200 elements has been selected, the chances of all the elements to be selected are established. For an interval of 40 and a starting poing of 10, indicate with a "W" those elements which <u>will</u> be selected and, with an "N," those elements which will <u>not</u> be selected. ___ 20 ___ 50 ___ 177
No answer required	21. Using the <u>first</u> <u>two</u> digits of each random number on his route, the first sample element will correspond to the first such two digit number he encounters between 0 and 80. The first such two digit number is ____ and occurs at his starting point 22878. He would, therefore, select the _____ voucher in the population as his first sample element.
<u>92</u> (49 + 43) <u>110</u> (92 + 18) <u>149</u> (110 + 39)	34. Complete the table for sample elements 4 through 10.

N 20 W 50 N 177	9. Through the use of a "Random Systematic" sample, the conveniences of systematic sample selection are retained, while a condition more closely approximating random selection is introduced. By the name, you would conclude that a random systematic sample is not complete ly random, nor completely _____, but some combination of the two approaches.
22 twenty-second	22. Proceeding along his route, he will then select the first two digits of all random numbers where those first two digits are less than or equal to his maximum interval which is _____. Thus, his average interval will be approximately _____.
Your answer appears on Worksheet 6, Sheet 3.	35. In selecting our sample, we divided the population size by the required sample size. Does this mean that the population size must be known to determine the required sample size in attribute sampling? a. YES (Go to Frame 36) b. NO (Go to Frame 37)

systematic	10. In systematic sampling, a uniform interval is established between all elements of the population to be selected whereas random systematic sampling utilizes a random interval. For our example of 200 elements systematically drawn from a population of 8000, we used a _____ interval of 40 between sample elements. In a random systematic sample, we would use a _____ interval.
80 40	23. As each interval is selected, he will enter the interval on Sheet 3 of Worksheet 5 as shown. The next three two-digit numbers less than or equal to 80 along his route are: 17 (17564) 57 (57484) __ (27186)
	36. Your answer: a. YES Incorrect. The sample size as we saw earlier is unaffected by population size for the tables used in this book. The fact that this procedure requires that population size must be known to draw the individual sample elements does not imply that population size is a factor in determination of sample size.

uniform

random

11. To draw a random systematic sample of 200 elements from a population of 8000, the interval between sample elements would be random. However, since we will be drawing one out of every 40 elements in the population, the average size of the interval must be approximately _____.

27

24. Why did he bypass the first two digits of the random number, 83287?

_____

_____

_____

37. Your answer: b. NO

Correct. Sample size is determined without the use of population size. The only factors required to select the correct sample size are the specified reliability, estimated occurrence rate, and specified upper precision limit.

40	12. Just as the interval in systematic sampling was calculated by dividing N, the population size, by n, the sample size, the <u>average</u> <u>interval</u> in random systematic sampling is calculated by dividing N by n. Thus, for a sample of 200 elements in a population of 8000, the _____ interval would be approximately 40.
The first two digits, 83, comprise a number greater than 80, his maximum interval.	25. The auditor has now established 17 as the interval between the first and second elements in his sample. Since the 22nd element in his population is the first drawn for his sample, the second element in his sample will be the 39th (22 + 17) element in the population. The third sample element will be the 96th (39 + 57) element in his population. The fourth sample element will be the ____<u>rd</u> population element.

average	13. In a random systematic sample, the interval between elements of the population selected for the sample is (RANDOM/UNIFORM).
123	26. The last interval we selected was 27 (from 27186). Select the next three intervals. Enter your answers in lines 5, 6, and 7 of Worksheet 5, Sheet 3.

RANDOM	NOW TURN BACK TO PAGE S-1 AND BEGIN THE SECOND ROW.
5. 54 6. 19 7. 51	NOW TURN BACK TO PAGE S-1 AND BEGIN THE THIRD ROW.

TABLE 1-A

Determination of Sample Size

Percentage of Occurrences in Sample

Reliability (Confidence Level): 99%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
50									0	0	0	2.0	4.0	4.0	6.0	10.0	14.0	18.0	22.0	26.0	32.0
60								0	0	0	1.7	3.3	5.0	5.0	6.7	11.7	15.0	20.0	23.3	28.3	33.3
70							0	0	0	1.4	2.9	4.3	5.7	7.1	8.6	12.9	15.7	20.0	25.7	30.0	34.3
80						0	0	0	1.2			5.0	6.2	7.5	8.8		17.5	21.2	26.2	31.2	36.2
90					0	0	0	1.1		2.2	3.3	5.6	6.7	7.8	10.0	13.3	17.8	22.2	26.7	32.2	36.7
120				0	0	.8	1.7	1.7	2.5	3.3	5.0	6.7	7.5	9.2	10.8	15.0	20.0	24.2	29.2	33.3	38.3
160			0	0	.6	1.2	1.9	3.1	3.8	4.4	5.6	7.5	8.8	10.6	12.5	16.9	21.2	25.6	30.6	35.0	40.0
240		0	.4	.8	1.7	2.5	2.9	3.8	4.6	5.4	7.1	8.8	10.4	12.1	13.8	18.3	22.9	27.5	32.5	37.1	42.1
340		.3	.9	1.5	2.1	2.9	3.8	4.4	5.3	6.2	7.6	9.4	11.2	12.9	14.7	19.4	24.1	28.8	33.5	38.5	43.5
460	0	.4	1.1	1.7	2.6	3.3	4.1	5.0	5.9	6.7	8.5	10.2	12.0	13.7	15.7	20.2	24.8	29.6	34.6	39.3	44.3
1000	.2	.9	1.7	2.5	3.4	4.2	5.1	6.0	6.9	7.8	9.6	11.4	13.3	15.1	17.0	21.8	26.6	31.4	36.3	41.2	46.2

EXHIBIT I

Sheet 1 of 5

TABLE 1-B

Determination of Sample Size

Percentage of Occurrences in Sample

Reliability (Confidence Level): 95%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
50						0	0	0	0	2.0		4.0	6.0	8.0	10.0	14.0	18.0	22.0	26.0	32.0	36.0
60					0	0	0	1.7	1.7		3.3	5.0	6.7	8.3	10.0	15.0	18.3	23.3	28.3	33.3	38.3
70					0	0	1.4		2.9	2.9	4.3	5.7	7.1	10.0	11.4	15.7	20.0	24.3	28.6	34.3	38.6
80				0	0	1.2		2.5		3.8	5.0	6.2	8.8	10.0		16.2	20.0	25.0	30.0	35.0	40.0
90				0	0		2.2		3.3	4.4	5.6	6.7	8.9	10.0	12.2	16.7	21.1	25.6	30.0	35.6	40.0
120			0	.8	.8	1.7	2.5	3.3	4.2	5.0	6.7	8.3	10.0	11.7	13.3	17.5	22.5	27.5	31.7	36.7	41.7
160		0	.6	1.2	1.9	2.5	3.1	3.8	5.0	5.6	7.5	8.8	10.6	12.5	14.4	18.8	23.8	28.1	33.1	38.1	43.1
240		.4	.8	1.7	2.5	3.3	4.2	5.0	5.8	6.7	8.3	10.0	11.7	13.8	15.4	20.0	24.6	29.6	34.6	39.2	44.2
340	0	.6	1.2	2.1	2.9	3.5	4.4	5.3	6.2	7.1	8.8	10.6	12.4	14.4	16.2	20.9	25.6	30.6	35.3	40.3	45.3
460	0	.9	1.5	2.4	3.3	3.9	4.8	5.7	6.7	7.6	9.3	11.1	13.0	14.8	16.7	21.5	26.3	31.1	36.1	40.9	45.9
1000	.4	1.2	2.0	2.9	3.8	4.7	5.6	6.5	7.4	8.4	10.2	12.1	14.0	15.9	17.8	22.7	27.5	32.4	37.4	42.3	47.5

EXHIBIT I

Sheet 2 of 5

TABLE 1-C

Determination of Sample Size

Percentage of Occurrences in Sample

Reliability (Confidence Level): 90%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
50					0	0	0	2.0	2.0		4.0	6.0	8.0	10.0	10.0	16.0	20.0	24.0	30.0	34.0	38.0
60				0	0	0	1.7		3.3	3.3	5.0	6.7	8.3	10.0	11.7	16.7	21.7	25.0	30.0	35.0	40.0
70				0	0	1.4		2.9		4.3	5.7	7.1	8.6	11.4	12.9	17.1	21.4	25.7	31.4	35.7	41.4
80			0	0	1.2		2.5		3.8	5.0	6.2	7.5	10.0			17.5	22.5	27.5		36.2	
90			0	0		2.2		3.3	4.4		6.7	7.8	10.0	12.2	13.3	17.8	22.2	27.8	32.2	36.7	42.2
120		0	0	.8	1.7	2.5	3.3	4.2	5.0	5.8	7.5	9.2	10.8	12.5	14.2	19.2	24.2	28.3	33.3	38.3	43.3
160		0	.6	1.2	2.5	3.1	3.8	5.0	5.6	6.2	8.1	10.0	11.9	13.8	15.6	20.0	25.0	29.4	34.4	39.4	44.4
240	0	.4	1.2	2.1	2.9	3.8	4.6	5.4	6.2	7.1	8.8	10.8	12.5	14.6	16.2	20.8	25.8	30.8	35.4	40.4	45.4
340	0	.9	1.5	2.4	3.2	4.1	5.0	5.9	6.8	7.6	9.4	11.2	13.2	15.0	17.1	21.8	26.5	31.5	36.2	41.2	46.2
460	.2	.9	1.7	2.6	3.5	4.3	5.2	6.1	7.2	8.0	9.8	11.7	13.7	15.4	17.4	22.2	27.0	32.0	37.0	41.7	46.7
1000	.5	1.3	2.2	3.1	4.0	4.9	5.9	6.8	7.7	8.7	10.6	12.5	14.4	16.4	18.3	23.2	28.0	33.0	37.9	42.9	47.9

EXHIBIT I

Sheet 3 of 5

TABLE 1-D

Determination of Sample Size

Percentage of Occurrences in Sample

Reliability (Confidence Level): 85%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
50				0	0	0	2.0	2.0	2.0	4.0	6.0	6.0	8.0	10.0	12.0	16.0	22.0	26.0	30.0	34.0	40.0
60				0	0	1.7		3.3	3.3	5.0	6.7	8.3	10.0	11.7	13.3	18.3		26.7	31.7	36.7	41.7
70			0	0	1.4		2.9		4.3		7.1	8.6	10.0		14.3	18.6	22.9	27.1	32.9	37.1	42.9
80			0	0		2.5		3.8	5.0	5.0	7.5	8.8	10.0	12.5		18.8	23.8	28.8		37.5	
90			0	1.1			3.3	4.4		5.6	7.8	8.9	11.1		14.4	18.9	24.4	28.9	33.3	38.9	43.3
120		0	.8	1.7	2.5	3.3	4.2	5.0	5.8	6.7	8.3	10.0	11.7	13.3	15.0	20.0	25.0	30.0	34.2	39.2	44.2
160		0	1.3	1.9	2.5	3.8	4.4	5.0	6.3	6.9	8.8	10.6	12.5	14.4	16.3	20.6	25.6	30.6	35.6	40.0	45.0
240	0	.8	1.3	2.1	3.3	4.2	5.0	5.8	6.7	7.5	9.6	11.3	13.3	15.0	17.1	21.7	26.7	31.3	36.3	41.3	46.3
340	.3	.9	1.8	2.6	3.5	4.4	5.3	6.2	7.1	7.9	10.0	11.8	13.5	15.6	17.4	22.4	27.1	32.1	37.1	41.8	46.8
460		1.1	2.0	2.8	3.7	4.6	5.7	6.5	7.4	8.3	10.2	12.2	13.9	15.9	17.8	22.6	27.6	32.4	37.4	42.4	47.1
1000	.6	1.4	2.3	3.3	4.2	5.1	6.1	7.0	8.0	8.9	10.8	12.8	14.7	16.6	18.6	23.5	28.4	33.3	38.3	43.3	48.3

EXHIBIT I

Sheet 4 of 5

TABLE 1-E

Determination of Sample Size

Percentage of Occurrences in Sample

Reliability (Confidence Level): 80%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
50				0	0	2.0	2.0	2.0	4.0	4.0	6.0	8.0	10.0	12.0	14.0	18.0	22.0	28.0	32.0	38.0	42.0
60			0	0	1.7		3.3	3.3	5.0	5.0	6.7	8.3	10.0			18.3	23.3	28.3	33.3	38.3	43.3
70			0	0				4.3		5.7	7.1	8.6	11.4	12.9	14.3	18.6	24.3	28.6	34.3	38.6	
80		0	0	1.3		2.5	3.8		5.0	6.3	7.5	10.0			15.0	20.0	25.0	28.8		38.8	43.8
90		0	0		2.2			4.4	5.6	6.7	7.8	10.0		13.3	15.6	20.0		30.0	34.4	40.0	44.4
120		0	.8	1.7	2.5	3.3	4.2	5.0	5.8	6.7	8.3	10.8	12.5	14.2	15.8	20.8	25.8	30.8	35.0	40.0	45.0
160		.6	1.3	1.9	3.1	3.8	4.4	5.6	6.3	7.5	9.4	11.3	13.1	15.0	16.9	21.3	26.3	31.3	36.3	41.3	46.3
240	0	.8	1.7	2.5	3.3	4.2	5.0	6.3	7.1	7.9	10.0	11.7	13.8	15.4	17.5	22.1	27.1	32.1	37.1	42.1	46.7
340	.3	1.2	2.1	2.9	3.8	4.7	5.6	6.5	7.4	8.2	10.3	12.1	14.1	15.9	17.9	22.6	27.6	32.6	37.3	42.4	47.4
460	.4	1.3	2.2	3.0	3.9	4.8	5.9	6.7	7.6	8.7	10.4	12.4	14.3	16.3	18.3	23.0	28.0	32.8	37.8	42.8	47.8
1000	.6	1.5	2.4	3.4	4.3	5.3	6.2	7.2	8.1	9.1	11.0	13.0	14.9	16.9	18.8	23.7	28.7	33.6	38.6	43.6	48.6

EXHIBIT I

Sheet 5 of 5

TABLE 2-A

Evaluation of Results
Number of Occurrences in Sample
Reliability (Confidence Level): 99%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
50									0			1	2		3	5	7	9	11	13	16
60								0			1	2	3		4	7	9	12	14	17	20
70							0			1	2	3	4	5	6	9	11	14	18	21	24
80						0			1		2	4	5	6	7	10	14	17	21	25	29
90					0			1		2	3	5	6	7	9	12	16	20	24	29	33
120				0		1	2		3	4	6	8	9	11	13	18	24	29	35	40	46
160			0		1	2	3	5	6	7	9	12	14	17	20	27	34	41	49	56	64
240		0	1	2	4	6	7	9	11	13	17	21	25	29	33	44	55	66	78	89	101
340		1	3	5	7	10	13	15	18	21	26	32	38	44	50	66	82	98	114	131	148
460	0	2	5	8	12	15	19	23	27	31	39	47	55	63	72	93	114	136	159	181	204
1000	2	9	17	25	34	42	51	60	69	78	96	114	133	151	170	218	266	314	363	412	462

EXHIBIT II

Sheet 1 of 5

TABLE 2-B

Evaluation of Results
Number of Occurrences in Sample
Reliability (Confidence Level): 95%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
50						0				1		2	3	4	5	7	9	11	13	16	18
60					0			1			2	3	4	5	6	9	11	14	17	20	23
70					0		1		2		3	4	5	7	8	11	14	17	20	24	27
80				0		1		2		3	4	5	7	8	9	13	16	20	24	28	32
90				0		1	2		3	4	5	6	8	9	11	15	19	23	27	32	36
120			0	1		2	3	4	5	6	8	10	12	14	16	21	27	33	38	44	50
160		0	1	2	3	4	5	6	8	9	12	14	17	20	23	30	38	45	53	61	69
240		1	2	4	6	8	10	12	14	16	20	24	28	33	37	48	59	71	83	94	106
340	0	2	4	7	10	12	15	18	21	24	30	36	42	49	55	71	87	104	120	137	154
460	0	4	7	11	15	18	22	26	31	35	43	51	60	68	77	99	121	143	166	188	211
1000	4	12	20	29	38	47	56	65	74	84	102	121	140	159	178	227	275	324	374	423	473

EXHIBIT II

Sheet 2 of 5

TABLE 2-C

Evaluation of Results
Number of Occurrences in Sample
Reliability (Confidence Level): 90%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
50					0			1			2	3	4	5		8	10	12	15	17	19
60				0			1		2		3	4	5	6	7	10	13	15	18	21	24
70				0		1		2		3	4	5	6	8	9	12	15	18	22	25	29
80			0		1		2		3	4	5	6	8	9	10	14	18	22	25	29	33
90			0		1	2		3	4		6	7	9	11	12	16	20	25	29	33	38
120		0		1	2	3	4	5	6	7	9	11	13	15	17	23	29	34	40	46	52
160		0	1	2	4	5	6	8	9	10	13	16	19	22	25	32	40	47	55	63	71
240	0	1	3	5	7	9	11	13	15	17	21	26	30	35	39	50	62	74	85	97	109
340	0	3	5	8	11	14	17	20	23	26	32	38	45	51	58	74	90	107	123	140	157
460	1	4	8	12	16	20	24	28	33	37	45	54	63	71	80	102	124	147	170	192	215
1000	5	13	22	31	40	49	59	68	77	87	106	125	144	164	183	232	280	330	379	429	479

EXHIBIT II

Sheet 3 of 5

TABLE 2-D

Evaluation of Results
Number of Occurrences in Sample
Reliability (Confidence Level): 85%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
50				0			1			2	3		4	5	6	8	11	13	15	18	20
60				0		1		2		3	4	5	6	7	8	11	13	16	19	22	25
70			0		1		2		3		5	6	7	8	10	13	16	19	23	26	30
80			0		1	2		3	4		6	7	8	10	11	15	19	23	26	30	34
90			0	1		2	3	4		5	7	8	10	11	13	17	22	26	30	35	39
120		0	1	2	3	4	5	6	7	8	10	12	14	16	18	24	30	36	41	47	53
160		0	2	3	4	6	7	8	10	11	14	17	20	23	26	33	41	49	57	64	72
240	0	2	3	5	8	10	12	14	16	18	23	27	32	36	41	52	64	75	87	99	111
340	1	3	6	9	12	15	18	21	24	27	34	40	46	53	59	76	92	109	126	142	159
460	1	5	9	13	17	21	26	30	34	38	47	56	64	73	82	104	127	149	172	195	218
1000	6	14	23	33	42	51	61	70	80	89	108	128	147	166	186	235	284	333	383	433	483

EXHIBIT II

Sheet 4 of 5

TABLE 2-E

Evaluation of Results
Number of Occurrences in Sample
Reliability (Confidence Level): 80%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
50				0		1			2		3	4	5	6	7	9	11	14	16	19	21
60			0		1		2		3		4	5	6	7	8	11	14	17	20	23	26
70			0		1		2	3		4	5	6	8	9	10	13	17	20	24	27	30
80		0		1		2	3		4	5	6	8	9	10	12	16	20	23	27	31	35
90		0		1	2		3	4	5	6	7	9	10	12	14	18	22	27	31	36	40
120		0	1	2	3	4	5	6	7	8	10	13	15	17	19	25	31	37	42	48	54
160		1	2	3	5	6	7	9	10	12	15	18	21	24	27	34	42	50	58	66	74
240	0	2	4	6	8	10	12	15	17	19	24	28	33	37	42	53	65	77	89	101	112
340	1	4	7	10	13	16	19	22	25	28	35	41	48	54	61	77	94	111	127	144	161
460	2	6	10	14	18	22	27	31	35	40	48	57	66	75	84	106	129	151	174	197	220
1000	6	15	24	34	43	53	62	72	81	91	110	130	149	169	188	237	287	336	386	436	486

EXHIBIT II

Sheet 5 of 5

TABLE 1-A

Determination of Sample Size

Percentage of Occurrences in Sample

Reliability (Confidence Level): 99%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	(A) 8	9	10	12	14	16	18	20	25	30	35	40	45	50
50									0	0	0	2.0	4.0	4.0	6.0	10.0	14.0	18.0	22.0	26.0	32.0
60								0	0	0	1.7	3.3	5.0	5.0	6.7	11.7	15.0	20.0	23.3	28.3	33.3
70							0	0	0	1.4	2.9	4.3	5.7	7.1	8.6	12.9	15.7	20.0	25.7	30.0	34.3
80						0	0	0	1.2			5.0	6.2	7.5	8.8		17.5	21.2	26.2	31.2	36.2
90					0	0	0	1.1		2.2	3.3	5.6	6.7	7.8	10.0	13.3	17.8	22.2	26.7	32.2	36.7
120				0	0	.8	1.7	1.7	2.5	3.3	5.0	6.7	7.5	9.2	10.8	15.0	20.0	24.2	29.2	33.3	38.3
160			0	0	.6	1.2	1.9	3.1	3.8	4.4	5.6	7.5	8.8	10.6	12.5	16.9	21.2	25.6	30.6	35.0	40.0
240		0	.4	.8	1.7	2.5	2.9	3.8	4.6	5.4	7.1	8.8	10.4	12.1	13.8	18.3	22.9	27.5	32.5	37.1	42.1
340		.3	.9	1.5	2.1	2.9	3.8	4.4	5.3	6.2	7.6	9.4	11.2	12.9	14.7	19.4	24.1	28.8	33.5	38.5	43.5
460	0	.4	1.1	1.7	2.6	3.3	4.1	5.0	5.9	6.7	8.5	10.2	12.0	13.7	15.7	20.2	24.8	29.6	34.6	39.3	44.3
1000	.2	.9	1.7	2.5	3.4	4.2	5.1	6.0	6.9	7.8	9.6	11.4	13.3	15.1	17.0	21.8	26.6	31.4	36.3	41.2	46.2

WORKSHEET 1

Sheet 1 of 2

TABLE 1-A

Determination of Sample Size

Percentage of Occurrences in Sample

Reliability (Confidence Level): 99%

Sample Size	Precision (Upper Limit) Percentage																				
	1	2	3	4	5	6	7	A 8	9	10	12	14	16	18	20	25	30	35	40	45	50
50									0	0	0	2.0	4.0	4.0	6.0	10.0	14.0	18.0	22.0	26.0	32.0
60								0	0	0	1.7	3.3	5.0	5.0	6.7	11.7	15.0	20.0	23.3	28.3	33.3
70							0	0	0	1.4	2.9	4.3	5.7	7.1	8.6	12.9	15.7	20.0	25.7	30.0	34.3
80						0	0	0	1.2			5.0	6.2	7.5	8.8		17.5	21.2	26.2	31.2	36.2
90					0	0	0	1.1		2.2	3.3	5.6	6.7	7.8	10.0	13.3	17.8	22.2	26.7	32.2	36.7
120				0	0	.8	1.7	1.7	2.5	3.3	5.0	6.7	7.5	9.2	10.8	15.0	20.0	24.2	29.2	33.3	38.3
160			0	0	.6	1.2	1.9	3.1	3.8	4.4	5.6	7.5	8.8	10.6	12.5	16.9	21.2	25.6	30.6	35.0	40.0
240		0	.4	.8	1.7	2.5	2.9	3.8	4.6	5.4	7.1	8.8	10.4	12.1	13.8	18.3	22.9	27.5	32.5	37.1	42.1
340		.3	.9	1.5	2.1	2.9	3.8	4.4	5.3	6.2	7.6	9.4	11.2	12.9	14.7	19.4	24.1	28.8	33.5	38.5	43.5
C 460	0	.4	1.1	1.7	2.6	3.3	4.1	B 5.0	5.9	6.7	8.5	10.2	12.0	13.7	15.7	20.2	24.8	29.6	34.6	39.3	44.3
1000	.2	.9	1.7	2.5	3.4	4.2	5.1	6.0	6.9	7.8	9.6	11.4	13.3	15.1	17.0	21.8	26.6	31.4	36.3	41.2	46.2

WORKSHEET 1

Sheet 2 of 2

WORKSHEET 2

ABC LOAN COMPANY

In the annual audit of the ABC Loan Company, the auditor must verify the accuracy of the company's records of its 20,000 outstanding loan balances. The auditor decides to select a statistical sample that will give him 95% confidence that not more than 3% of the balances are in error. He estimates from his previous experience with the firm that about one percent of the balances are in error.

1. Estimated error rate _____

2. Specified upper precision limit _____

3. Confidence (Reliability) level _____

4. Required sample size _____

5. Number of occurrences in sample _____

6. Actual upper precision limit _____

TABLE 2-B

Evaluation of Results
Number of Occurrences in Sample
Reliability (Confidence Level): 95%

Sample Size	Precision (Upper Limit) Percentage																				
	1	C 2	3	4	5	6	7	8	9	10	12	14	16	18	20	25	30	35	40	45	50
50						0				1		2	3	4	5	7	9	11	13	16	18
60					0			1			2	3	4	5	6	9	11	14	17	20	23
70					0		1		2		3	4	5	7	8	11	14	17	20	24	27
80				0		1		2		3	4	5	7	8	9	13	16	20	24	28	32
90				0		1	2		3	4	5	6	8	9	11	15	19	23	27	32	36
120			0	1		2	3	4	5	6	8	10	12	14	16	21	27	33	38	44	50
160		0	1	2	3	4	5	6	8	9	12	14	17	20	23	30	38	45	53	61	69
240		1	2	4	6	8	10	12	14	16	20	24	28	33	37	48	59	71	83	94	106
A 340	0	B 2	4	7	10	12	15	18	21	24	30	36	42	49	55	71	87	104	120	137	154
460	0	4	7	11	15	18	22	26	31	35	43	51	60	68	77	99	121	143	166	188	211
1000	4	12	20	29	38	47	56	65	74	84	102	121	140	159	178	227	275	324	374	423	473

WORKSHEET 3

WORKSHEET 4

MAJOR EASTERN UTILITY

In an audit of the Major Eastern Utility, the auditor seeks to determine with 90% confidence that the percentage of disbursement vouchers which have not been signed by an authorized individual does not exceed 5%. He estimates, from his experience with the organization, that about 2% of the vouchers are not thus signed.

1. Estimated occurrence rate _____

2. Specified upper precision limit _____

3. Reliability (Confidence) level _____

4. Required sample size _____

5. Number of occurrences in sample _____

6. Actual upper precision limit _____

WORKSHEET 5

WESTERN BUSINESS SCHOOL

In the course of an audit of the disbursement vouchers at the Western Business School, the auditor must select a sample of 20 disbursement vouchers from a total of 800 vouchers. He elects to use random systematic sampling.

Worksheet 5

Sheet 2 of 3

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
101	13284	16834	74151	92027	24670	36665	00770	22878	02179	51602	07270	76517	92275	45960
102	21224	00370	30420	03883	94648	89428	41583	17564	27395	63904	41548	49197	82277	24120
103	99052	47887	81085	64933	66279	80432	65793	83287	34143	13241	30590	97760	35848	91983
104	00199	50993	98603	38452	87890	94624	69721	57484	67501	77638	44331	11257	71131	11059
105	60578	06483	28733	37867	07936	98710	98529	27186	31237	80612	44488	97819	70401	95419
106	91240	18312	17441	01929	18163	69201	31211	54288	39296	37318	65724	90401	79017	62077
107	97458	14229	12063	59611	32249	90466	33216	19358	02591	54263	88449	01912	07436	50813
108	35249	38646	34475	72417	60514	69257	12489	51924	86871	92446	36607	11458	30440	52639
109	38980	46600	11759	11900	46743	27860	77940	39298	97838	95145	32378	68038	89351	37005
110	10750	52745	38749	87365	58959	53731	89295	59062	39404	13198	59960	70408	29812	83126
111	36247	27850	73958	20673	37800	63835	71051	84724	52492	22342	78071	17456	96104	18327
112	70994	66986	99744	72438	01174	42159	11392	20724	54322	36923	70009	23233	65438	59685
113	99638	94702	11463	18148	81386	80431	90628	52506	02016	85151	88598	47821	00265	82525
114	72055	15774	43857	99805	10419	76939	25993	03544	21560	83471	43989	90770	22965	44247
115	24038	65541	85788	55835	38835	59399	13790	35112	01324	39520	76210	22467	63275	32286
116	74976	14631	35908	28221	39470	91548	12854	30166	09073	75887	36782	00268	97121	57676
117	35553	71628	70189	26436	63407	91178	90348	55359	80392	41012	36270	77786	89578	21059
118	35676	12797	51434	82976	42010	26344	92920	92155	58807	54644	58581	95331	78629	73344
119	74815	67523	72985	23183	02446	63594	98924	20633	58842	85961	07648	70164	34994	67662
120	45246	88048	65173	50989	91060	89894	36036	32819	68559	99221	49475	50558	34698	71800
121	76509	47069	86378	41797	11910	49672	88575	97966	32466	10083	54728	81972	58975	30761
122	19689	90332	04315	21358	97248	11188	39062	63312	52496	07349	79178	33692	57352	72862
123	42751	35318	97513	61537	54955	08159	00337	80778	27507	95478	21252	12746	37554	97775
124	11946	22681	45045	13964	57517	59419	58045	44067	58716	58840	45557	96345	33271	53464
125	96518	48688	20996	11090	48396	57177	83867	86464	14342	21545	46717	72364	86954	55580
126	35726	58643	76869	84622	39098	36083	72505	92265	23107	60278	05822	46760	44294	07672
127	39737	42750	48968	70536	84864	64952	38404	94317	65402	13589	01055	79044	19308	83623
128	97025	66492	56177	04049	80312	48028	26408	43591	75528	65341	49044	95495	81256	53214
129	62814	08075	09788	56350	76787	51591	54509	49295	85830	59860	30883	89660	96142	18354
130	25578	22950	15227	83291	41737	79599	96191	71845	86899	70694	24290	01551	80092	82118
131	68763	69576	88991	49662	46704	63362	56625	00481	73323	91427	15264	06969	57048	54149
132	17900	00813	64361	60725	88974	61005	99709	30666	26451	11528	44323	34778	60342	60388
133	71944	60227	63551	71109	05624	43836	58254	26160	32116	63403	35404	57146	10909	07346
134	54684	93691	85132	64399	29182	44324	14491	55226	78793	34107	30374	48429	51376	09559
135	25946	27623	11258	65204	52832	50880	22273	05554	99521	73791	85744	29276	70326	60251
136	01353	39318	44961	44972	91766	90262	56073	06606	51826	18893	83448	31915	97764	75091
137	99083	88191	27662	99113	57174	35571	99884	13951	71057	53961	61448	74909	07322	80960
138	52021	45406	37945	75234	24327	86978	22644	87779	23753	99926	63898	54886	18051	96314
139	78755	47744	43776	83098	03225	14281	83637	55984	13300	52212	58781	14905	46502	04472
140	25282	69106	59180	16257	22810	43609	12224	25643	89884	31149	85423	32581	34374	70873
141	11959	94202	02743	86847	79725	51811	12998	76844	05320	54236	53891	70226	38632	84776
142	11644	13792	98190	01424	30078	28197	55583	05197	47714	68440	22016	79204	06862	94451
143	06307	97912	68110	59812	95448	43244	31262	88880	13040	16458	43813	89416	42482	33939
144	76285	75714	89585	99296	52640	46518	55486	90754	88932	19937	57119	23251	55619	23679
145	55322	07598	39600	60866	63007	20007	66819	84164	61131	81429	60676	42807	78286	29015
146	78017	90928	90220	92503	83375	26986	74399	30885	88567	29169	72816	53357	15428	86932
147	44768	43342	20696	26331	43140	69744	82928	24988	94237	46138	77426	39039	55596	12655
148	25100	19336	14605	86603	51680	97678	24261	02464	86563	74812	60069	71674	15478	47642
149	83612	46623	62876	85197	07824	91392	58317	37726	84628	42221	10268	20692	15699	29167
150	41347	81666	82961	60413	71020	83658	02419	33322	66036	98712	46795	16308	28413	05417
151	38128	51178	75096	13609	16110	73533	42564	59870	29399	67834	91055	89917	51096	89011
152	60950	00455	73254	96067	50717	13878	03216	78274	65863	37011	91283	33914	91303	49326
153	90524	17320	29832	96118	75792	25326	22940	24904	80523	38928	91374	55597	97567	38914
154	49897	18278	67160	39408	97056	43517	84426	59650	20247	19293	02019	14790	02852	05819
155	18494	99209	81060	19488	65596	59787	47939	91225	98768	43688	00438	05548	09443	82897

WORKSHEET 5

WESTERN BUSINESS SCHOOL (cont.)

Sample Element	Interval	Population Element
1		22
2	17	39
3	57	96
4	27	123
5	--	--
6	--	--
7	--	--
8	39	286
9	59	345
10	20	365
11	52	417
12	3	420
13	35	455
14	30	485
15	55	540
16	20	560
17	32	592
18	63	655
19	80	735
20	44	779
21	43	822

WORKSHEET 6

Sample Element	Interval	Population Element
1	--	_____
2	_____	_____
3	_____	_____
4	_____	_____
5	_____	_____
6	_____	_____
7	_____	_____
8	_____	_____
9	_____	_____
10	_____	_____

Worksheet 6
Sheet 2 of 3

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
156	65373	72984	30171	37741	70203	94094	87261	30056	58124	70133	18936	02138	59372	09075
157	40653	12843	04213	70925	95360	55774	76439	61768	52817	81151	52188	31940	54273	49032
158	51638	22238	56344	44587	83231	50317	74541	07719	25472	41602	77318	15145	57515	07633
159	69742	99303	62578	83575	30337	07488	51941	84316	42067	49692	28616	29101	03013	73449
160	58012	74072	67488	74580	47992	69482	58624	17106	47538	13452	22620	24260	40155	74716
161	18348	19855	42887	08279	43206	47077	42637	45606	00011	20662	14642	49984	94509	56380
162	59614	09193	58064	29086	44385	45740	70752	05663	49081	26960	57454	99264	24142	74648
163	75688	28630	39210	52897	62748	72658	98059	67202	72789	01869	13496	14663	87645	89713
164	13941	77802	69101	70061	35460	34576	15412	81304	58757	35498	94830	75521	00603	97701
165	96656	86420	96475	86458	54463	96419	55417	41375	76886	19008	66877	35934	59801	00497
166	03363	82042	15942	14549	38324	87094	19069	67590	11087	68570	22591	65232	85915	91499
167	70366	08390	69155	25496	13240	57407	91407	49160	07379	34444	94567	66035	38918	65708
168	47870	36605	12927	16043	53257	93796	52721	73120	48025	76074	95605	67422	41646	14557
169	79504	77606	22761	30518	28373	73898	30550	76684	77366	32276	04690	61667	64798	66276
170	46967	74841	50923	15339	37755	98995	40162	89561	69199	42257	11647	47603	48779	97907
171	14558	50769	35444	59030	87516	48193	02945	00922	48189	04724	21263	20892	92955	90251
172	12440	25057	01132	38611	28135	68089	10954	10097	54243	06460	50856	65435	79377	53890
173	32293	29938	68653	10497	98919	46587	77701	99119	93165	67788	17638	23097	21468	36992
174	10640	21875	72462	77981	56550	55999	87310	69643	45124	00349	25748	00844	96831	30651
175	47615	23169	39571	56972	20628	21788	51736	33133	72696	32605	41569	76148	91544	21121
176	16948	11128	71624	72754	49084	96303	27830	45817	67867	18062	87453	17226	72904	71474
177	21258	61092	66634	70335	92448	17354	83432	49608	66520	06442	59664	20420	39201	69549
178	15072	48853	15178	30730	47481	48490	41436	25015	49932	20474	53821	51015	79841	32405
179	99154	57412	09858	65671	70655	71479	63520	31357	56968	06729	34465	70685	04184	25250
180	08759	61089	23706	32994	35426	36666	63988	98844	37533	08269	27021	45886	22835	78451
181	67323	57839	61114	62112	47547	58023	64630	34886	98777	75442	95592	06141	45096	73117
182	09255	13986	84834	20764	72206	89393	34548	93438	88730	61805	78955	18952	46436	58740
183	36304	74712	00374	10107	85061	69228	81969	92216	03568	39630	81869	52824	50937	27954
184	15884	67429	86612	47367	10242	44880	12060	44309	46629	55105	66793	93173	00480	13311
185	18745	32031	35303	08134	33925	03004	59929	95418	04917	57596	24878	61733	92834	64454
186	72934	40086	88292	65728	38300	42323	64068	98373	48971	09049	59943	36538	05976	82118
187	17626	02944	20910	57662	80181	38579	24580	90529	52303	50436	29401	57824	86039	81062
188	27117	61399	50967	41399	81636	16663	15634	79717	94696	59240	25543	97989	63306	90946
189	93995	18678	90012	63645	85701	85269	62263	68331	00389	72571	15210	20769	44686	96176
190	67392	89421	09623	80725	62620	84162	87368	29560	00519	84545	08004	24526	41252	14521
191	04910	12261	37566	80016	21245	69377	50420	85658	55263	68667	78770	04533	14513	18099
192	81453	20283	79929	59839	23875	13245	46808	74124	74703	35769	95588	21014	37078	39170
193	19480	75790	48539	23703	15537	48885	02861	86587	74539	65227	90799	58789	96257	02708
194	21456	13162	74608	81011	55512	07481	93551	72189	76261	91206	89941	15132	37738	59284
195	89406	20912	46189	76376	25538	87212	20748	12831	57166	35026	16817	79121	18929	40628
196	09866	17414	55977	16419	01101	69343	13305	94302	80703	57910	36933	57771	42546	03003
197	86541	24681	23421	13521	28000	94917	07423	57523	97234	63951	42876	46829	09781	58160
198	10414	96941	06205	72222	57167	83902	07460	69507	10600	08858	07685	44472	64220	27040
199	49942	06683	41479	58982	56288	42853	92196	20632	62045	78812	35895	51851	83534	10689
200	23995	68882	42291	23374	24299	27024	67460	94783	40937	16961	26053	78749	46704	21983
201	78994	36244	02673	25475	84953	61793	50243	63423	69309	80308	49977	18075	43227	08266
202	04909	58485	70686	93930	34880	73059	06823	80257	44193	08337	47655	75932	29209	41954
203	46582	73570	33004	51795	86477	46736	60460	70345	37322	19987	67143	41129	89514	46892
204	29242	89792	88634	60285	07190	07795	27011	85941	01852	43096	31173	43730	48505	17958
205	68104	81339	97090	20601	78940	20228	22803	96070	10251	62711	66200	74330	13820	18966
206	17156	02182	82504	19880	93747	80910	78260	25136	62018	62919	73801	57195	83457	70597
207	50711	94789	07171	02103	99057	98775	37997	18325	88281	61091	97889	79977	04544	72963
208	39449	52409	75095	77720	39729	03205	09313	43545	43786	70443	41350	73369	42405	80516
209	75629	82729	76916	72657	58992	32756	01154	84890	04107	17469	59346	68651	97433	89491
210	01020	55151	36132	51971	32155	60735	64867	35424	25257	93844	39928	52519	34368	02114

WORKSHEET 6

Sample Element	Interval	Population Element
1	--	49
2	43	92
3	18	110
4	39	149
5	30	179
6	11	190
7	54	244
8	35	279
9	30	309
10	12	321

SUMMARY OF VOLUME TWO

Chapter I

1. Sampling for attributes generally involves determining the frequency at which a specific characteristic occurs in a given body of data. This frequency is described as the occurrence rate. A typical attribute sampling plan might involve the determination of the rate of errors in invoices, percentage of accounts receivable more than 90 days overdue, or some similar characteristic.

2. Statistical sampling techniques permit the auditor to examine a relatively small percentage of the items in a population, and based upon his sample findings, draw certain conclusions concerning the population. This conclusion can be expressed with a specified degree of reliability and a quantitative definition of the precision of his estimate.

3. Generally, in an attribute sampling program, an auditor seeks to determine that the rate of occurrence of a certain characteristic does not exceed some specified rate. Therefore, his sampling program usually defines the criteria in terms of this upper precision limit as well as the desired reliability. For example, a typical sampling program might be to determine, with 95% confidence, that a group of invoices does not contain more than 2% of invoices which are in error.

Chapter II

1. Once the sampling program has been defined, the auditor's next step is to determine the appropriate sample size. Tables are provided to permit rapid selection of the sample size based on the specifications of the sampling program.

2. The tables for sample size determination are several, each of which corresponds to a different value of reliability. Thus, the appropriate table is determined by the reliability specified in the sampling plan.

3. Each of the tables for determination of sample size consists of estimated sample occurrence rates arranged in lines corresponding to various values of sample size.

4. To use the tables for sample size determination, the auditor must know the reliability, an estimated occurrence rate, and his upper precision limit. The upper precision limit and reliability are specified in his sampling plan and the estimated occurrence rate is generally available to him from experience with the records under examination.

5. On the table corresponding to his specified reliability, the auditor then enters the column corresponding to his specified upper precision limit and proceeds down the column until he reaches his estimated occurrence rate or the next higher value which does appear on the table. He then notes the line in which this value appears. This is his required sample size.

6. The auditor will notice that his required sample size is affected by three factors: reliability, upper precision limit, and estimated occurrence rate. The effect of each of these factors can be analyzed by varying one factor, while holding the remaining two factors constant. Thus, it can be shown that increasing the reliability increases the required sample size. Similarly, as the estimated occurrence rate increases, the required sample size increases. However, increasing the upper precision limit decreases the required sample size.

7. The tables used in this volume assume random sampling with replacement. In those instances where the sample must be drawn without replacement, the tables may still be used, but the results thus obtained will be more conservative than those which would have been obtained under sampling with replacement.

Chapter III

1. After drawing his sample, the auditor simply counts the number of times the characteristic occurs and refers to the tables for evaluation of sample results.

2. The tables for evaluation of sample results are similar to those for determination of sample size, with one important exception. The tables consist of several individual tables, each corresponding to a different value of reliability. The column headings correspond to varying values of upper precision limit and the line headings correspond to varying values of sample size. However, the numbers appearing in the body of the table correspond to various values of number of occurrences

in the sample, unlike the tables for determination of sample size, where the numbers in the body of the table referred to various values of estimated occurrence rate.

3. To evaluate his sample result, the auditor first selects the appropriate table for his specified reliability. Entering the table at the line corresponding to his sample size, he proceeds along that line until he reaches the number of occurrences he discovered in his sample or, if that number does not appear, the next higher value. He then notes the column in which the number appears, that column being his upper precision limit. If that value of upper precision limit is less than the value established in his sampling objectives, the criteria have been satisfied.

4. The relationships among sample size, number of occurrences, reliability, and upper precision limit in evaluation of results are analogous to those in determination of sample size. By holding any one of the three factors, number of occurrences, reliability, and sample size constant while varying the other two, the resultant effect on upper precision limit can be measured.

5. As the number of occurrences increases, the upper precision limit increases. Similarly, an increase in the specified reliability will increase the upper precision limit. As the sample size increases, the upper precision limit decreases.

6. An increase in sample size narrows the difference between upper precision limit and frequency of sample occurrences. Thus, increasing the sample size, while holding the frequency of sample occurrences constant, can produce a lower value of upper precision limit.

7. In Chapter II, it was mentioned that an auditor generally is in a position to estimate his sample occurrence rate. However, this is not always the case. Where the auditor can make no reasonable estimate of this rate, it is suggested that he draw a preliminary random sample of 50 items. The results of this sample should be evaluated and if the upper precision limit is less than the specified value, the criteria of the sampling plan should be considered satisfied. If the upper precision limit exceeds the specified value, then an estimated occurrence rate should be calculated by dividing the number of occurrences found by the sample size, 50. With this estimated occurrence rate, the required sample size should be determined and an additional sample drawn to reach the determined number.