

2.5 The confidence level is also a factor that effects the margin of error, and hence the precision of the estimate. Choosing a low confidence level will decrease the margin of error, while a high confidence level increases the margin of error.

2.6 In the CPR audits, however, we remain convinced that because of the numerous nonsampling errors and biases introduced during the property record audits, a more conservative choice of a higher confidence level is justified.

2.7 Assessment of nonsampling errors is always difficult, but should not be ignored – especially when they appear excessive as in this case. Such errors certainly add uncertainty into the decision process. Increasing the confidence level for the margin of error is one way to recognize this. We originally suggested that an increase from 95 percent to 99 percent would reasonable. This remains our view. (See Section 6.)

2.8 Dr. Bell and Mr. Loebbecke both address technical aspects important in analyzing the CPR audit data. While we agree in principle with them on many issues, several incorrect statements have been made. The net effect of which is quite misleading. (See Sections 7 - 11)

2.9 Overall, to reiterate, we feel that there are serious weaknesses in the CPR audit estimates. We continue to maintain that the result of these weaknesses is that the precision of the audit estimates is too poor to be of any credible use for any extrapolation to the book value of the RBOCs inventory.

3 Attention to Precision is Needed for Actionable Estimates.

3.1 An estimate is just that, an *estimate*, not a *true* value. Before utilizing an estimate, one needs to know how precise it is. The confidence level and the margin of error are a means of describing the precision. Confidence bounds, in turn, can be used to judge the validity of decisions based on the sample.

3.2 Dr. Bell would have his readers believe that so long as an estimate is calculated using the right formula out of the right textbook, the estimate is “valid.” This is clearly not true. To be a “valid” basis for action, an estimate not only needs to be calculated using an appropriate formula, but the margin of error must be reasonable.

3.3 To illustrate this, suppose a population consists of the numbers 0,1,2,3 ..., up to 1000. It can be shown that the true average of this population is 500. Now consider estimating the true average from a sample with only two numbers randomly selected from this population. The formula for estimating the mean from the sample is, of course, the sum of the selected numbers divided by two. In this example, the lowest estimate you could obtain is 0.5 (from selecting “0” and “1”) and the highest estimate is 999.5 (from selecting “999” and “1000”). The symmetric margin of error at the 95 percent confidence level will typically be about 400.¹³ This large margin of error indicates that estimates from sample to sample will vary significantly. This kind of instability in the possible estimates is completely ignored by Dr. Bell when he argues to use the point estimates without addressing the estimate’s precision.

3.4 Similar to the example in 3.3, the property record audits failed to sufficiently control the precision of the estimates for overstated RBOC inventory. Therefore, they failed to provide meaningful estimates from which one can draw a conclusion about the value of the missing inventory.

3.5 The estimates from the property records are too imprecise to be actionable. Decisions based on the audit results should only be made after carefully considering the amount of uncertainty. The lack of precision of the estimates needs to be considered when evaluating the results of the audit.

¹³ This calculation is based on the fact that the population of number has a standard deviation of about 289. The standard error of a sample of size two is therefore approximately 204. Multiplying this by 1.96, the

4 A Confidence Bound Should be Used to Determine an Audit's Findings.

4.1 A confidence bound is the result of adding or subtracting the margin of error from the estimate.¹⁴ Such bounds are a means of considering the accuracy of estimates in terms of their confidence and precision. Confidence bounds that are far from their estimates indicate very poor precision (as we saw in 3.3 above). Confidence bounds that are close to their estimates indicate more precise results. Because of the large margins of error of the estimates in the property record audits, the confidence intervals are extremely wide with bounds that are far from the estimated values. These bounds quantify the unreliability of the results obtained.

4.2 Dr. Bell and AT&T argue that the point estimate¹⁵ should be used when considering punitive action against the RBOCs. Mr. Loebbecke is silent on this issue¹⁶ in his affidavit. However, the textbook he co-authored states the contrary:

“After completing tests of the sample, the auditor is in a position to generalize about the population. It would be wrong to conclude that the population error rate is exactly the same as the sample error rate; [emphasis added] the odds of this being the case are just too low. Instead, the auditor must compute the upper precision

confidence factor corresponding to a two-sided, 95 percent confidence level, gives the margin of error for the example.

¹⁴ While serviceable in the current context, it should be noted that this statement is not complete. It only deals with a special case. The method described, however, is what is most often written in textbooks. There are other methods for computing these bounds, but we do not believe it is necessary to describe them here. To determine a confidence bound, the variability of an estimate is calculated using an appropriate statistical formula that depends on the sample design used. The square root of this number is multiplied by a constant that depends on the level of confidence, the sample size, and whether one wants one-sided or two-sided bounds. This product is the “margin of error.” The margin of error is subtracted from the estimate to obtain the lower confidence bound and added to the estimate for the upper confidence bound. The interval between the lower and upper bounds is called the confidence interval. The more imprecise an estimate is, the larger its margin of error is, and the wider the confidence interval is.

¹⁵ The “point estimate” is single number of the estimated value. It does not incorporate the estimate’s confidence and precision.

¹⁶ Point of fact, Loebbecke is silent on most of the major statistical issues in his affidavit, despite the fact that he is a statistical expert and co-authored a book on audit sampling.

limit for the population error rate at the confidence level desired,
based on the actual sample results.”¹⁷

4.3 In 4.2 above, Mr. Loebbecke is discussing evaluation of the estimated proportion of errors; in this case the upper bound is appropriate (and the upper bounds were indeed the ones reported by Ernst & Young).

4.4 To evaluate the overstatement of the inventory value, refer to Roberts’ text on **Statistical Auditing**. In it, he explains:

“Much of the auditor’s work is not constructive, but critical. He must decide whether the evidence supports such propositions as compliance with the pertinent accounting control is satisfactory, this inventory amount is not materially misstated,.... In these circumstances the auditor must decide whether or not the statistical evidence supports the proposition.”¹⁸

4.5 Both the Roberts and Loebbecke texts state that the amount of misstatement that is regarded as “material” should be specified ahead of time – something not done in these audits. Both texts go on to describe constructing decision limits and critical intervals for deciding whether there is enough statistical evidence that the material amount¹⁹ is misstated.

4.6 Unfortunately, these procedures were not followed for the property record audits – a major design flaw and one of the root causes of the poor precision achieved. In any case, these non-standard property record audits cannot be treated exactly like the auditing textbook examples. However, it is clear from these

¹⁷ Arens and Loebbecke, **Applications of Statistical Sampling to Auditing**, Prentice Hall Inc., New Jersey, 1981, p. 75

¹⁸ Roberts, **Statistical Auditing**, American Institute of Certified Public Accountants, New York, NY, 1978 p. 40

¹⁹ Also, when assessing material amounts, both texts consider overstated AND understated amounts in the audit.

textbooks, Mr. Loebbecke's included, that a confidence bound, not the point estimate, should be used when considering the results of an audit.

4.7 To argue that the point estimates in this audit should be used no matter what, is equivalent to arguing that so long as you can find some formula in a book, you can allow any estimate to be used anytime, anywhere, no matter how imprecise or how severe the consequences. Such an argument is simply not statistically sound.

5 A One-Sided Lower Confidence Bound Should be Used.

5.1 There are several reasons why the lower bound should be used for assessing the amount of overstatement in the property records. First of all, only a material overstatement is being assessed. Dr. Bell and AT&T make it very clear that the property record audits never intended to even consider that the RBOCs may have understated any of the value of their hardwire equipment.

5.2 There were simply no data gathered to evaluate understated inventory. This was not a two-way audit; no attempt was made to look for items that were in service but missing from the property records. The auditors did not even increase the quantity shown when more items were found than the number reported in the CPR database.²⁰ This is one-sided decision-making means that there is interest in only one side of the confidence interval.

5.3 The lower bound should be used because when using statistical evidence to state with a level of confidence that the true value of the overstated inventory is at least a certain amount, the lower confidence bound is the largest value that can be used for that amount.

²⁰ The RBOC's reported to Ernst & Young that the FCC scored a record as "unverifiable" when a larger quantity was found than the quantity reported.

5.4 For example, in a statement like, “the overstated inventory is at least 2 million dollars,” the value of 2 million dollars must be the lower confidence bound in order to make the statement with a level of statistical confidence. It cannot be said statistically with any reasonable degree of confidence that the true value is at least the estimated amount, nor can it be said that the true value is at least the upper confidence bound. Every number inside the confidence interval is statistically the same. To make a correct statistical statement with a reasonable level of confidence it can only be said that the true amount is at least the lower confidence bound.

5.5 In addition, the FCC staff was in complete control of the sample design, and the onus was on them to assure appropriate precision. If the point estimate, or the upper confidence bound is used, there is no incentive to conduct an audit with an adequate enough sample. If the point estimate is used, then any estimate, no matter how imprecise (see 3.3 and 4.2) can be used. Clearly this is not appropriate. Nor is the upper bound appropriate, because this can be made arbitrarily large by implementing a poor sample design. The appropriate number for an audit such as the CPR audit is the lower confidence bound.

5.6 This is supported by the Committee on Applied and Theoretical Statistics on the Board on Mathematical Sciences, National Research Council.²¹ This is also consistent with practices by the Internal Revenue Service (IRS).²²

5.7 The lower bound is entirely appropriate because when the government conducts an audit, the taxpayers, like the RBOCs, have no control over the precision of the estimates. They have no say in the design specifications, sample size, or conduct of the audit.

²¹ Panel on Nonstandard Mixtures of Distributions, *Statistical Models in Analysis and Auditing*, Statistical Science, 1989, Vol. 4, No. 1, pp. 2-33. “Because the government may not wish to overestimate the adjustment that the auditee owes the government, interest often centers on the lower confidence limit of monetary error at a specified confidence level allowed by the policy.”

²² Internal Revenue Manual, 1982 42(18) 14.1

6 A Conservative Approach to Determining the Confidence Level is Needed.

6.1 AT&T states that the most commonly used confidence interval in statistics based regulations is 95 percent.²³

6.2 Under normal circumstances for a government conducted audit, a 95 percent confidence level may be appropriate. However, the circumstances of the property record audits are not normal.

6.3 There were several non-random and immeasurable sources of error and potential bias introduced during the implementation of the audits. A few of these sources are discussed below.

6.4 After the initial random selection of central offices, the FCC selected additional offices to cover specific states.^{24,25} This introduces an unknown amount of bias and was not accounted for in the estimation stage. In the textbook that Mr. Loebbecke co-authored, it is explained that this is a type of judgmental sampling and it states that it is improper and a “serious breach of due care”²⁶ to use *statistical measurement techniques* if the sample is selected judgmentally. The text goes on to state that:

²³ *Comments of the AT&T Corp.*, p.5. Note, that other references may discuss a 90 or 95 percent confidence level in sample based results. However, it is important to determine whether the government or the auditee was responsible for the sample design and its budget. When the auditee chooses the lower confidence level of 90 percent, then they are accountable for its consequences. It is also important to determine whether the confidence level discussed is for a one or two sided confidence interval. The one-sided 95 percent lower confidence bound is exactly the same as the lower bound of a two-sided 90 percent confidence interval.

²⁴ *Audit of the Continuing Property Records of BellSouth Telecommunications, Inc. As of July 31, 1997*, Appendix B, p. 6

²⁵ *Audit of the Continuing Property Records of the NYNEX Telephone Operating Companies Also Known As Bell Atlantic North As of March 31, 1997*, Appendix B, p.6

²⁶ Arens and Loebbecke, **Applications of Statistical Sampling to Auditing**, Prentice Hall Inc., New Jersey, 1981 p. 24

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“Only valid statistical selection methods are acceptable when the auditor intends to evaluate a population statistically.”²⁷

6.5 Despite all of Mr. Loebbecke’s and AT&T’s claims to the contrary, there were substantial coding inconsistencies by the auditors. This was established by comparing the scores the auditors told the RBOCs they were receiving on each item at the time of the fieldwork to the scores they actually received after the audits were reviewed back in the home office. For example, about 12.5% of SBC’s codes were rescored²⁸ and over 15 percent of Bell Atlantic South’s codes were rescored.²⁹ How can there be any assurance that these post-inspection adjustments are correct or that others that may not still be necessary were found and recoded by the FCC staff’s own internal review?

6.6 If only 95 percent confidence statements are made, then implicitly the assumption is being made that these audits were done with normal care and minimal “nonsampling” error. There is “nonsampling” error in these audits that is impossible to quantify yet cannot be ignored. As we said in our original submission and reiterate here a plausible approach in the presence of such error is to increase the confidence level to a percentage above the standard 95 percent.

6.7 Considering the unmeasurable amount of error introduced from improper sample selection and coding inconsistencies, the prudent choice would be perhaps a 99 percent confidence level to compensate for the unknown amount of error.³⁰

²⁷ *Ibid.*

²⁸ *Reply to December 22, 1998 Draft Report of the Federal Communications Commission Accounting Safeguards Division Audit of Nevada Bell and Southwestern Bell Telephone Company, Attachment A*

²⁹ *Response to Audit Staff Draft Report of Findings Related to Audit of Continuing Property Records of Bell Atlantic, Appendix A, p. 18.*

³⁰ We should also stress here that we are considering one-sided confidence bounds. If the margin of error used for a one-sided 99 percent lower confidence bound is used to produce a confidence interval, then it is a 98 percent confidence interval.

7 Negative Lower Confidence Bounds

7.1 To calculate a lower confidence bound, the amount of precision, also sometimes known as the “margin of error,” is subtracted from the estimate. Therefore, some estimates for overstated dollars from the property record audits might have negative lower confidence bounds. Indeed, based on our calculations this did occur. The margins of errors for the estimates were larger than the estimates themselves.

7.2 Statistically, when zero is above the lower confidence bound, the audit results cannot be used as evidence that the property record overstated amount is more than zero. This is simple classic textbook statistics, not improper mathematics nor illogical thinking as AT&T asserts.³¹

7.3 The fact that there are negative lower confidence bounds when there were indeed some cases in the sample that would at the very least account for a few thousands dollars of overstated value, demonstrates the poor precision obtained in the audit, not any improper calculation of confidence bounds. As a result, the precision achieved by the audit is too poor to be actionable in adjusting the value of the RBOC property.

8 The Property Record Audits Erroneously Used Too Many Degrees of Freedom

8.1 Dr. Bell agrees with Ernst and Young³² that the estimates from the property record audits should have had a smaller number of degrees of freedom³³ in the calculation of the margin of error, and therefore, the confidence intervals are actually wider than those portrayed by the FCC. However, Dr. Bell guesses

³¹ *Comments of the AT&T Corp.*, p.25

³² *Affidavit of Robert M. Bell*, p. 11

³³ The degrees of freedom determine which constant is used when calculating the margin of error for a specified confidence level. Smaller degrees of freedom produce larger margins of error. Dr. Bell actually states as fact that the degrees of freedom for the audit studies would be about 20 to 24. But considers 10 to 20 in his calculations.

that there would only be a 6 to 14 percent increase in the width of the confidence intervals because the smallest number of degrees of freedom he contemplates are in the range of 10 to 20.

8.2 In fact, there are far less than 10 degrees of freedom for many of the estimates of the overstated inventory amounts. Our calculations indicate that some of the RBOC estimates only have two or three degrees of freedom.³⁴ Therefore, the affect on the confidence intervals is much more substantial than Dr. Bell leads his readers to believe.

8.3 Using resampling methodology (see 10.3), we calculate that the margin of error for a 95 percent lower confidence bound for the dollar value will increase 30 to 50 percent (depending on the RBOC³⁵) over the standard methodology found in textbooks.

9 The Property Audit Estimates are Biased.

9.1 Dr. Bell states that the audit staff produced essentially unbiased point estimates for both the percentage of missing items and the total dollar amount of missing investment.³⁶ Based on the quite limited nature of his representation, we are uncertain how he is able to speak to this. In our view, there are several sources of bias in the audits, worth reiterating here

9.2 First of all, the formulas that the FCC staff reports using produce biased estimates. This is clearly stated under the description of the formulas in the text

³⁴ *Response to Audit Staff Draft Report of Findings Related to Audit of Continuing Property Records of Bell Atlantic*, Appendix A, p. 15. *BellSouth's Response to Audit of Continuing Property Records of BellSouth Telecommunications As of July 31, 1997*, Appendix A. *BellSouth's Response to Audit of Continuing Property Records of BellSouth Telecommunications As of July 31, 1997*, Appendix A..

³⁵ *Response to Audit Staff Draft Report of Findings Related to Audit of Continuing Property Records of Bell Atlantic*, Appendix A, pp. 12-18. *BellSouth's Response to Audit of Continuing Property Records of BellSouth Telecommunications As of July 31, 1997*, Appendix A.

³⁶ *Affidavit of Robert M. Bell*, p. 6

by Cochran³⁷ which both the FCC staff and Dr. Bell cite. In fact, Ernst & Young did study this issue and we agree that the amount of bias (from this source only) is rather small.

9.3 Second, Dr. Bell does not mention at all the bias introduced by the FCC staff when, after the fact of the initial sample selection, the FCC staff added central office sites, to obtain to obtain central offices in particular states.³⁸

9.4 Third, the FCC staff substituted, for the sake of convenience, central offices that were in undesirable or inconvenient locations. Thus the population available for sampling is not the population that estimates are being made on.

9.5 Since the basic formulas themselves are biased, and there are sources of bias in the coding and in the sample selection, it is inappropriate to represent the property audit estimates as “unbiased.”

10 The Affect of Asymmetry is to Reduce the Lower Confidence Bound.

10.1 Dr. Bell comments on the problems of asymmetry of the confidence intervals³⁹ and cites Efron and Tibshirani⁴⁰ as a source for methods to correct for this. The procedures discussed in that text, however, are entirely inappropriate given the complex sample design employed in the audit. The Efron and Tibshirani reference does not even address stratified sample designs – much less two-stage stratified samples. For a proper discussion of the issues of bootstrapping in complex settings, refer to the papers by Sitter⁴¹ and by Rao and Wu.⁴²

³⁷ Cochran, *Sampling Methodology* 3rd ed., John Wiley and Sons, New York, New York, 1997

³⁸ See footnotes 24 and 25.

³⁹ *Affidavit of Robert M. Bell*, p. 11

⁴⁰ Efron and Tibshirani, *An Introduction to the Bootstrap*, Chapman & Hall, 1993

⁴¹ Sitter, *A Resampling Procedure for Complex Survey Data*, *Journal of the American Statistical Association*, 1992, 87, pp. 755-765.

⁴² Rao and Wu, *Resampling Inference with Complex Survey Data*, *Journal of the American Statistical Association*, 1998, 83, pp. 231-241

10.2 Furthermore, in paragraph 32 of his affidavit, Dr. Bell states,

“Specifically, the lower end of the interval should be closer to the point estimate than is the upper end of this interval.”

His unsubstantiated claim is wrong again.⁴³ In fact, we present quite clear contrary evidence. (See 10.3 below.)

10.3 Ernst & Young explored this issue using another resampling technique, different from bootstrapping, and our analysis of the situation suggests otherwise.⁴⁴ This is something Dr. Bell failed to mention. The first stage of sampling the central office sites⁴⁵ from the sampling frame was analyzed by Ernst & Young. It was found that the asymmetry effect is exactly the opposite of Dr. Bell’s assertion. The lower bound extends further away from the point estimate. Dr. Bell is right about one thing; in paragraph 32, he notes that the size of the suitable correction is quite large. However, the effect is to further lower the confidence bound.

11 The Sample Was Not Designed to Produce Precise Estimates of Overstated Inventory.

11.1 The sample was initially designed to estimate the proportion of property records that were in error, not the dollar amount overstated. In fact, the initial sample size calculations were based on a simple random sample, not on the complex design actually used. Dr. Bell agrees with this.

11.2 If the audits had only been used to estimate the percent of records in error, there probably would not have been as many difficulties. However, the audits

⁴³ Dr. Bell even contradicts his own statements later in paragraph 34 when he states that he cannot determine which way the limit will shift.

⁴⁴ See footnote 35.

⁴⁵ The variation among the primary sampling units, which are the central office sites selected, constitutes the major source of variation in a two stage sample and thus Ernst and Young’s analysis the considers the majority of the variance.

were used to estimate total dollars in error, and the sample design chosen was grossly insufficient for this purpose.

11.3 It is apparent that there were two functions of the audit: one was to establish overstated investment; the other was to estimate the proportion of the percent of records in error. The estimate of the overstated investment has the more serious consequences and the design was inadequate for this – as evidence by the large variability of the dollar estimates resulting in the extremely poor precision levels.

11.4 If the goal were to estimate the amount of overstatement, then the sample should have been designed differently from the beginning in order to obtain reasonable confidence and precision levels of the overstated amount.

11.5 Mr. Loebbecke spells this out in another co-authored textbook:

“The most important differences among tests of controls, substantive tests of transactions and tests of details of balances is in what the auditor wants to measure. ... In tests of details of balances, the concern is determining whether the monetary amount of an account balance is materially misstated. Attributes sampling, therefore, is seldom useful for this purpose. Instead, auditors use two types of statistical methods that provide results in *dollar* terms. These are *monetary unit sampling* and *variable sampling*.”⁴⁶

This CPR property audit is a classic example of an attribute sample⁴⁷ being used inappropriately when another design should have been employed.

11.6 The appropriate sample design would still most likely have incorporated a two-stage approach. However, sample size determinations would have been

⁴⁶ Arens and Loebbecke, *Auditing An Integrated Approach 6th ed.*, Prentice Hall, Englewood Cliffs, New Jersey, 1994, p. 459

calculated based on dollar values rather than proportions and should have incorporated a two-way audit for understated inventory as well as overstated inventory. Also the required sample sizes, especially the number of central offices, may have had to be larger to achieve reasonable precision on dollar estimates.⁴⁸

11.7 We disagree with Dr. Bell⁴⁹ that the variance of the proportion estimate would have increased significantly if the design were based on estimating dollar values. His speculation is contrary to both theory⁵⁰ and to our experience. As noted, dollar estimates probably would have required a larger number of central offices in the sample size. Thus, it is unlikely the variance of the proportion estimate would have suffered. In fact, the increased sample may have even improved the precision of the proportion estimates and the FCC could have achieved narrower confidence intervals for the proportion as well.

11.8 Dr. Bell states that it is not possible to optimize a design for both estimates of the dollars in error and estimates of the proportion of records in error.⁵¹ However, it should be noted that this type of problem occurs in almost all large, complex surveys. Sampling statisticians have found that it is possible to satisfy reasonable precision requirements for multiple estimates.

11.9 In addition, AT&T asserts that a two-way audit would have required a costly 100 percent inventory review at each central office selected.⁵² This is again, untrue. "Area sampling" could have been implemented where only a

⁴⁷ An "attribute sample" is intended to estimate a percentage.

⁴⁸ Note that Dr. Bell states that the expected value of an estimate is not influenced by heavily over sampling high cost items (as in pps). That is not the main point. The variability is reduced by pps sampling which is why it should be considered. Also see 11.11.

⁴⁹ *Affidavit of Robert M. Bell*, pp. 5-6

⁵⁰ Cochran **Sampling Methodology** 3rd ed., John Wiley and Sons, New York, New York, 1997, p. 110

⁵¹ *Affidavit of Robert M. Bell*, p. 6

⁵² *Comments of the AT&T Corp.*, pp. 10-11

portion of the office was completely examined, and what was found checked against the CPR records. This is a commonly used practice.

11.10 Dr. Bell asserts that the expected value of an alternative design (using, say, the PPS approach mentioned above) would be the same as under the current design. He presents this in such a manner as to lead the reader to believe the estimated amount of dollars in error would be similar, even if another design were used. This is a false impression.

11.11 Recall the example discussed in Section 3 of the sample of two numbers between 0 and 1000. The expected value of the estimate in any simple random selection of two numbers from this population is 500. However, depending on the luck of the draw, the estimate obtained from any one particular sample can be grossly different. As stated already, it could be as low as 0.5 to as high as 999.5.

11.12 With the current property audit estimates, given their large variances, it is highly improbable that one would achieve a similar point estimate using another random sample with the exact same sample design, during the same period of time, under the same conditions with the very same auditors. The variance is so poor, you cannot expect much stability in the estimates from different random selections using the very same sample design, much less a different (and better) one.

11.13 Dr. Bell goes so far as to state,

“There is no reason to expect that the results of any reasonable alternative would differ substantially in any particular direction.”⁵³

What he fails to address at this point is the precision of the estimates. Three pages later he does admit that the variance could have been reduced by an alternative

⁵³ *Affidavit of Robert M. Bell*, p. 2

design.⁵⁴ The point is, a better designed sample could produce more precise and hence, credible estimates.

11.14 Had a different sample design been used for the continuing property audits, a reasonable degree of precision could have been achieved for the estimates of overstated inventory value. However, the design that was used, was insufficient for that purpose. The outcome from the sample design deficiency is that the property audit estimates are too imprecise to be actionable.

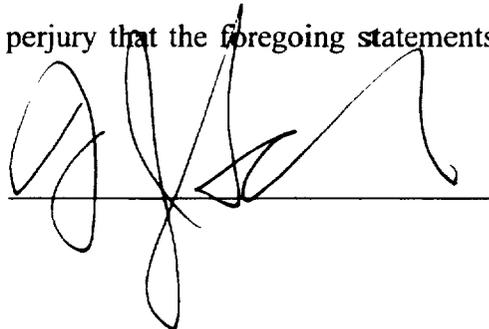
12 Conclusion.

12.1 Dr. Bell, Mr. Loebbecke and AT&T failed to address the basic deficiency of the continuing property record audits. That is, *the estimates for the value of the overstated inventory have extremely poor precision.* The audit sample was not designed to achieve reasonable precision levels for these estimates and the audit sample did not achieve reasonable precision for the estimates. The estimates margins of error for the value of overstated inventory are so large that the amounts reported by the FCC audit staff as overstated investment are unsound and cannot be fairly relied upon as the basis for reducing the RBOCs book values.

⁵⁴ *Affidavit of Robert M. Bell, p. 5*

DECLARATION

I, Fritz Scheuren, declare under penalty of perjury that the foregoing statements are true and correct.

A handwritten signature in black ink, appearing to read 'Fritz Scheuren', written over a horizontal line.

I, Edward J. Mulrow, declare under penalty of perjury that the foregoing statements are true and correct.

A handwritten signature in black ink, appearing to read 'Edward J. Mulrow', written over a horizontal line.

October 21, 1999

ATTACHMENT 7
Final Results

REDACTED
CONFIDENTIAL -- NOT FOR PUBLIC INSPECTION

FOSTER ASSOCIATES, INC.
17595 S. Tamiami Trail, Suite 212, Fort Myers, Florida

AFFIDAVIT OF RONALD E. WHITE, PH.D.

on behalf of
BELL ATLANTIC

October 25, 1999

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**AFFIDAVIT OF
Ronald E. White, Ph.D.
on behalf of
BELL ATLANTIC**

I. Introduction

1. I am the same Ronald E. White who submitted an initial affidavit on behalf of Bell Atlantic in this proceeding. My curriculum vitae was attached as Appendix C to my initial affidavit.

2. I have been asked by Bell Atlantic to respond to the Report on the Impact of Missing Plant on ILEC Revenue Requirements prepared by Snively King Majoros O'Connor & Lee, Inc. at the request of MCI WorldCom.¹ The primary author of the Snively King report was Richard B. Lee, a former employee of AT&T.

3. In particular, I was asked to respond to the claim by Mr. Lee that "Contrary to ILEC contentions ... delayed retirements result in an overstatement of revenue requirements."² While I do not agree with either his reasoning or his conclusions, selected statements were extracted from my initial affidavit and cited erroneously by Mr. Lee as evidence supporting his opinions. Mr. Lee is incorrect in both his reasoning and his conclusions regarding the revenue requirement implications of omitted retirements for Bell Atlantic.

II. Revenue Requirement Implications of Omitted Retirements

4. As reported in my initial affidavit, I was retained by Bell Atlantic to investigate the revenue requirement and capital recovery implications of a failure to record plant retirements when plant is physically removed from service. The principal findings from my earlier investigation were:

- a. Achievement of capital recovery (*i.e.*, return of and return on investor supplied capital) is not impacted by omitted retirements.
- b. It would be improper to assume that past revenue requirements were overstated as a result of omitted retirements. The amount, timing and present value of annual revenue requirements may increase, decrease or remain

¹MCI WorldCom, Inc. Comments, Attachment 2.

²Snively King Report, page 6.

unchanged, depending upon the direction of movement in the composite remaining life of a plant category.

- c. It is virtually impossible to quantify the change in remaining lives for Bell Atlantic attributable to omitted retirements. It is reasonable, however, to conclude that any change in remaining lives attributable to omitted retirements would be immaterial for Bell Atlantic.

5. Based on these findings, it was (and remains) my opinion that annual revenue requirements for Bell Atlantic would not have materially changed if the omitted retirements estimated in the plant accounting audit had been posted in the activity years in which the plant was physically removed from service.

6. Both the timing and the present value of revenue requirements were analyzed in my earlier study using a financial model to simulate omitted retirements. It was demonstrated by modeling various scenarios that changes in depreciation expense associated with omitted retirements are attributable to changes in the remaining life of the vintages for which retirements were not posted. The present value of revenue requirements will increase if remaining lives are lengthened. The present value of revenue requirements will decrease if remaining lives are shortened. Absent a change in remaining life, the present value of the revenue requirements will be identical for both cases.

7. It was further demonstrated in Appendix B to my initial affidavit that the magnitude and direction of any change in the composite remaining life is dependent upon the vintage year, age and size of the omitted retirements. In general, the remaining life of a plant category will increase when plant is added to a vintage in the age distribution and the age of the vintage is less than the average remaining life of the category prior to the plant adjustment. Similarly, the remaining life will decrease if the age of the vintage year is greater than the average remaining life prior to the plant adjustment. The converse of this relationship holds when the age distribution is subsequently reduced by deducting omitted retirements. It was additionally noted that any change in revenue requirements will be negligible when the change in remaining life is small and the change in remaining life will be insignificant if the omitted retirements are small in relation to the age distribution of surviving plant or the retirements are widely distributed over a broad range of vintages.

8. The principles developed in my initial affidavit were applied to the omitted retirements identified by the FCC in the Bell Atlantic plant accounting audit. An examination of the size and distribution of omitted retirements by Bell Atlantic personnel confirmed that the retirements were small relative to the age distribution of surviving plant and broadly distributed over a wide range of vintages. It was further noted that it was doubtful that all omitted retirements would produce changes in remaining lives in the same direction. Compensating changes would further mitigate against the potential for any large change in one direction. It was concluded, therefore, that it is highly unlikely that revenue requirements were misstated by Bell Atlantic when price cap regulation was adopted.

III. Response to Affidavit of Mr. Lee

9. Mr. Lee claims that delayed retirements resulted in an overstatement of revenue requirements for Bell Atlantic because remaining lives were shortened by a failure to post retirements. The basis for his erroneous conclusion is a hypothetical example in his affidavit constructed from an unrealistic set of assumptions that will necessarily produce the result Mr. Lee intended. The critical assumptions in his example include: a) a square dispersion; b) a stabilized plant account; and c) the oldest plant was overstated.

10. The assumption of a square dispersion implies that each vintage will be retired at an age equal to the projection life of the category. In other words, all plant acquired in a particular year is retired in its entirety precisely at the end of the plant's prescribed useful life. For example, all central office equipment installed in a given year with a prescribed life of fifteen years would be retired and removed from service at the end of year fifteen. The assumption of a stabilized plant account implies a constant plant balance is achieved by replacing a vintage of plant investment, whenever it is retired, by new investment that exactly equals the amount of the retirement. Both of these assumptions are inconsistent with normal business investment and retirement practices. The assumption that the oldest plant was overstated means that all omitted retirements were from the oldest vintage. While this is the most extreme example that he could have presented to illustrate how remaining lives may be understated, it would be impossible for Mr. Lee to demonstrate that the assumptions in his example accurately describe the plant accounts of Bell Atlantic.

11. First, Mr. Lee's assumption of a square dispersion is clearly refuted by the dispersion patterns prescribed for Bell Atlantic by the FCC. ³The projection curves prescribed for both Digital Switching and Circuit Equipment are descriptive of plant categories in which at least 50 percent of each vintage will be retired by the time a vintage achieves an age equal to the projection life of the category. The remaining 50 percent (or less) of a vintage placement will be retired over a period ranging between 200 and 400 percent of the projection life, depending upon the shape of the retirement frequency distribution.⁴ Digital Switching, for example, has an FCC prescribed projection life of 16 years with a Bell 2.5 projection curve. It is predictable from the shape of this dispersion that over 50 percent of any vintage addition will be retired before achieving an age of 16 years and the remaining 50 percent will be retired between the ages of 16 and 32 years. The example used by Mr. Lee, however, postulates no retirements prior to the achievement of an age equal to the projection life of a vintage. It is misleading, at best, for Mr. Lee to suggest that the remaining-life relationships derived from a square dispersion are equally applicable to Bell Atlantic.

12. Second, Mr. Lee's assumption of a stabilized plant account is totally refuted by a comparison of the actual percent surviving for each vintage to the theoretical percent surviving from the prescribed projection curve. By definition, the age distribution of surviving plant for a stabilized account will be identical to the proportion surviving from the prescribed projection curve. Although interesting as a theoretical construct related to renewal theory, it would be virtually impossible to find an actual plant account that has achieved or is approaching stability. Bell Atlantic does not have a single plant account that is even remotely approaching stability.

13. Finally, the assumption in Mr. Lee's example that plant recorded in the oldest vintage was overstated by omitted retirements is completely inconsistent with the FCC audit findings upon which MCI relies. Attachment 1 provides a summary of the investment and omitted retirements by

³Digital Switching has a prescribed Bell 2.5 projection curve which is approximately equivalent to an Iowa-type S0.5. The prescribed projection curves for Circuit Equipment range between a Bell 1.5 and 3.0, depending upon the state in which the plant is located. A Bell 1.5 is approximated by an Iowa L0.5 and a Bell 3.0 is approximately an Iowa S1.0. Each of the prescribed projection curves is a low modal dispersion that exhibits a pervasive chance component of retirement and a high rate of infant mortality.

⁴Retirements from a plant category can be viewed as a random sample of permanent withdrawals from service from an unspecified parent population. The mean service life (or expected value) of the parent population is the projection life for the plant category.

vintage year. The omitted retirements are based on the sample claimed by the FCC to be missing and extrapolates the alleged amounts to the entire investment base for the respective vintage years.⁵ It can be observed from this schedule that a) omitted retirements are a relatively small portion of the total plant investment; b) omitted retirements are broadly distributed across vintages; and c) the majority of omitted retirements are concentrated in vintages younger than the average remaining life of the plant categories.

14. From the age distribution of omitted retirements shown in Attachment 1 and the conclusions set forth in my initial affidavit, it is reasonable to expect that annual revenue requirements for Bell Atlantic would not have materially changed if the omitted retirements estimated in the plant accounting audit had been posted in the activity years in which the plant was physically removed from service. This hypothesis can be tested, however, by creating generation arrangements both before and after adjusting for the omitted retirements and comparing the resulting depreciation expense.

15. Table 1 provides a summary calculation of the depreciation expense for Bell Atlantic based on December 31, 1997 plant, reserves and remaining life statistics.

Description	Circuit Equipment			Switching Equipment		
	Unadjusted	Adjusted	Difference	Unadjusted	Adjusted	Difference
A	B	C	D=C-B	E	F	G=F-E
North						
Plant	\$6,356,385	\$6,078,845	(\$277,539)	\$6,972,727	\$6,386,636	(\$586,091)
Reserve	3,813,577	3,536,037	(277,539)	2,698,475	2,112,384	(586,091)
Net Plant	\$2,542,808	\$2,542,808	\$0	\$4,274,252	\$4,274,252	\$0
Remaining Life	5.50	5.50	0.00	8.70	8.60	-0.10
Accrual	\$462,283	\$461,992	(\$290)	\$491,297	\$496,821	\$5,524
Accrual Rate	7.27%	7.60%	-0.33%	7.05%	7.78%	-0.73%
South						
Plant	\$7,167,971	\$6,851,676	(\$316,295)	\$6,086,462	\$5,755,605	(\$330,857)
Reserve	3,585,925	3,269,629	(316,295)	2,301,526	1,970,669	(330,857)
Net Plant	\$3,582,046	\$3,582,046	(\$0)	\$3,784,936	\$3,784,936	\$0
Remaining Life	5.70	5.70	0.00	8.80	8.80	0.00
Accrual	\$628,769	\$628,671	(\$98)	\$430,202	\$430,362	\$160
Accrual Rate	8.77%	9.18%	-0.40%	7.07%	7.48%	-0.41%
Total Accruals	\$1,091,052	\$1,090,664	(\$388)	\$921,499	\$927,183	\$5,684

Table 1. Depreciation Based on FCC Audit Report (Dollars in Thousands)

⁵ Missing or omitted retirements shown in Attachment 1 were derived by applying the sample percentage of missing retirements for each vintage to the hardwired portion of the plant category. For each vintage year omitted retirements were computed as follows: ((value of "missing" sample items as alleged in the report

16. It can be observed from Table 1 that remaining lives and depreciation expense may have been overstated or understated, depending upon the plant category. It can also be observed that the net difference in depreciation expense is an increase of \$5,296 thousand (\$5,684 - \$388) after adjusting for omitted retirements. While this calculation suggests that revenue requirements were understated for Bell Atlantic when price caps were adopted, the indicated change in depreciation expense is insignificant in relation to total accruals in excess of \$2 billion.

17. These findings stand in stark contrast to the conjectural argument advanced by Mr. Lee to support his claim that revenue requirements were overstated and remaining lives were understated for Bell Atlantic because “... the oldest plant is overstated, not the newest.”⁶ According to Mr. Lee, his claim is valid for two reasons: “First, minimal plant tends to be withdrawn from service in the early years after placement. Second, if plant is withdrawn from service, but not properly retired on the books, it tends to remain on the books virtually forever.”⁷

18. Contrary to the opinion of Mr. Lee, retirement dispersion cannot be ignored in predicting the magnitude and direction of any potential change in revenue requirements attributable to omitted retirements. Moreover, as explained in my initial affidavit and demonstrated in Table 1 above, compensating changes in remaining lives will reduce the potential for any large change in revenue requirements in one direction. It is both incorrect and naive to assert that revenue requirements were overstated by Bell Atlantic when price caps were adopted without first investigating the size and age distribution of the omitted retirements.

19. Based on these findings, it remains my opinion that annual revenue requirements for Bell Atlantic would not have materially changed if the omitted retirements estimated in the plant accounting audit had been posted in the activity years in which the plant was physically removed from service.

divided by the value of the total sample) times the amount of recorded plant in service) times the percentage of hardwired investment. While this procedure for extrapolating the sample findings to the category total plant in service is not an endorsement of the procedure, it is consistent with the extrapolation procedure employed by the FCC.

⁶Snavely King Report, page 11.

⁷Ibid., page 11.

Bell Atlantic
Age Distribution of Omitted Retirements
Based on Missing Retirements Claimed in FCC Audit Report

Vintage Year	North Circuit Equipment		North Digital Switching		South Circuit Equipment		South Digital Switching	
	Recorded Plant in Service	Omitted Retirements						
A	B	C	D	E	F	G	H	I
1997	\$622,960,948		\$679,347,729	\$209,050,941	\$868,249,924		\$732,113,907	
1996	528,670,076	93,597,247	611,361,702	33,495,136	767,974,357		706,795,741	
1995	587,882,159	13,079,898	432,368,615	6,572,155	672,909,060	13,197,310	360,493,440	39,731,082
1994	448,498,047	41,083,661	606,442,257	99,924,415	653,362,091	13,574,531	297,999,225	31,657,588
1993	422,260,931		474,931,882	2,911,598	575,996,599	13,600,904	377,345,141	80,215,495
1992	369,165,534	3,248,126	450,970,484	18,992,317	521,199,719	60,281,261	383,424,351	24,444,011
1991	376,858,577	70,525,117	377,849,945	11,975,882	471,089,225	14,620,470	375,604,058	8,948,682
1990	367,546,573	13,855,566	523,951,894	55,339,920	430,922,833	48,490,843	414,413,039	7,861,904
1989	353,887,808	110,635	551,049,213	1,286,711	393,996,990	49,959,595	414,557,767	6,157,329
1988	452,079,478	14,556,072	687,351,044	74,608,932	392,973,041	16,480,414	486,692,836	17,954,556
1987	429,708,314	1,563,881	555,838,862	33,272,610	335,150,965	3,103,424	451,032,304	15,594,458
1986	283,798,019	427,762	410,947,663	18,518,961	284,706,849	5,146,433	456,569,630	24,902,688
1985	293,354,421	13,696,828	248,944,978	1,378,152	250,445,693	35,525,207	368,811,219	54,096,371
1984	229,136,837		140,374,574		154,491,735	16,363,428	105,201,694	3,978,014
1983	218,203,111	883,724	70,663,630	2,898,460	110,168,007	3,244,147	24,771,111	4,019
1982	116,605,733		28,320,895	7,932,929	87,071,499	14,281,810	19,784,774	1,831,943
1981	76,466,606		26,371,567		67,697,337	3,137,648	18,963,561	3,927,199
1980	42,175,994		10,755,154	5,224,597	50,005,552	893,539	16,267,760	5,472,322
1979	23,519,701		20,796,100	2,395,983	29,554,961	304,986	13,493,558	
1978	18,504,778	3,456,089	8,248,074		12,318,239	3,121,922	11,023,034	
1977	11,071,690		3,824,312		7,192,253	27,386	7,309,968	49,399
1976	9,710,968	389,363	2,957,253		5,950,195	2,630	7,008,651	156,212
1975	10,816,712	3,690,087	8,092,880	8,892	4,923,352	937,419	6,975,591	2,143,368
1974	13,695,641		6,889,837		5,694,494		7,137,593	
1973	13,312,605	43,631	10,360,115		5,661,520		4,819,059	1,261,112
1972	10,580,261	2,628,919	6,648,816		3,340,522		4,151,523	48,354
1971	7,096,501		2,976,095		1,282,896		2,951,505	
1970	4,498,813		2,384,497		1,287,381		2,537,611	
1969	2,929,599	328,581	1,666,070		666,280		1,239,768	123,876
1968	2,711,506		1,147,275		216,880		685,810	
1967	1,841,474		683,958		389,947		767,347	297,304
1966	1,494,442	94,003	890,675		494,058		633,939	
1965	1,404,870		1,051,438	34,566	131,040		497,164	
1964	824,691		604,174		199,249		659,241	
1963	532,141	189,917	1,123,505		97,045		446,507	
1962	494,520		720,049		65,569		330,019	
1961	269,619		594,611		12,037		559,859	
1960	297,304		552,266		18,827		380,031	
1959	411,181		523,611	261,806	1,941		283,590	
1958	180,762		452,902		12,981		393,192	
1957	180,496	90,248	381,638		18,235		268,446	
1956	57,240		317,072		2,322		226,011	
1955	58,183		255,082		4,075		115,287	
1954	62,042		240,869		133		249,096	
1953	58,207		308,955	5			143,360	
Pre-1953	509,499		192,646	5,821	23,121		333,717	
Total	6,356,384,612	277,539,355	6,972,726,863	586,090,789	7,167,971,029	316,295,307	6,086,462,035	330,857,286

STATE OF FLORIDA)
)
COUNTY OF LEE)

AFFIDAVIT

The undersigned, Ronald E. White, being first duly sworn on his oath, deposes and says that he has personal knowledge of the matters set forth in the accompanying "Affidavit of Ronald E. White on behalf of Bell Atlantic"; and that the facts contained therein are true and correct to the best of his knowledge, information, and belief.



Ronald E. White, Ph.D.

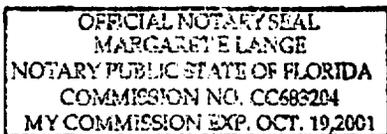
Subscribed and sworn to before me, a Notary Public in and for said County and State, this 25th day of October, 1999.



Margaret E. Lange Notary Public

My County of Residence:
Lee County

My Commission Expires:



CERTIFICATE OF SERVICE

I hereby certify that on this 25th day of October, 1999, copies of the foregoing "Reply Comments on Notice of Inquiry" were sent by first class mail, postage prepaid, to the parties on the attached list.



Jennifer L. Hoh

* Via hand delivery.

Magalie Roman Salas*
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

ITS, Inc.*

(Public Version Only)