

DIRECT TESTIMONY

of

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Financial Analysis Division
Illinois Commerce Commission

Northern Illinois Gas Company

d/b/a Nicor Gas Company

Proposed General Increase in Gas Rates

Docket No. 08-0363

August 27, 2008

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1 Witness Identification

2 **Q. Please state your name and business address.**

3 A. My name is Bill L. Voss. My business address is 527 East Capitol Avenue,
4 Springfield, Illinois 62701.

5 **Q. By whom are you employed and in what capacity?**

6 A. I am employed by the Illinois Commerce Commission as a Technical
7 Assistant to the Director of the Financial Analysis Division. The Financial
8 Analysis Division is a division within the Public Utilities Bureau of the Illinois
9 Commerce Commission ("ICC" or "Commission").

10 **Q. Please describe your professional background and affiliations.**

11 A. I joined the staff of the Illinois Commerce Commission ("Staff") in March
12 1989. I am a Certified Public Accountant licensed to practice in Illinois. My
13 prior accounting experience includes three years as an accounting
14 supervisor for a telephone utility and five years as the corporate controller of
15 a small business. I hold a Master of Accounting Science degree from the
16 University of Illinois at Urbana-Champaign.

17 **Q. Have you previously testified before this Commission?**

18 A. Yes, I have. I was on the Staff of the Accounting Department for twelve
19 years and testified in numerous rate cases and other proceedings. Since
20 becoming the Technical Assistant to the Director of the Financial Analysis
21 Division, I have continued to testify on technical matters.

22 Purpose of Testimony

23 **Q. What is the purpose of your testimony in this proceeding?**

24 A. The purpose of my testimony to describe the selection of a statistically valid
25 sample, which was used in the evaluation of the plant additions of Northern
26 Illinois Gas Company d/b/a Nicor Gas Company (“Nicor Gas” or “Company”).

27 Schedule and Attachment Identification

28 **Q. Are you sponsoring any schedules with your testimony?**

29 A. Yes. I am sponsoring the following schedules:

- | | | |
|----|----------------|---------------------------------------------------|
| 30 | Schedule 12.01 | Summary of Information Provided |
| 31 | Schedule 12.02 | Summary of Accounts Payable Contractor Costs |
| 32 | | Transaction Records |
| 33 | Schedule 12.03 | Determination of the Population That Was Examined |
| 34 | Schedule 12.04 | Records Available for Examination |
| 35 | Schedule 12.05 | Frequency Distribution of the Population That Was |
| 36 | | Sampled |
| 37 | Schedule 12.06 | Determination of Strata Boundaries |

38	Schedule 12.07	Population Characteristics of Each Stratum
39	Schedule 12.08	Calculation of Desired Standard Error
40	Schedule 12.09	Calculation of Sample Size and Allocation to Strata
41	Schedule 12.10	Comparison of Strata Population Characteristics to the
42		Samples' Characteristics
43	Schedule 12.11	Comparison of the Strata Population to the Sample
44		Population

45 **Q. Are you sponsoring any attachments with your testimony?**

46 A. Yes. I am sponsoring the following Attachment:

47 Attachment A Listing of Field Information Provided with Descriptions

48 The field names were included with the detailed transactions information
49 provided by Nicor Gas as discussed later in this testimony. The descriptions
50 of the field information in Attachment A were provided by Nicor Gas.

51 Determination of the Sample Population

52 **Q. Why is Staff using statistical sampling to evaluate plant additions in**
53 **this proceeding?**

54 A. Staff determined that the use of statistical sampling in evaluating plant
55 additions could potentially reduce the number of items reviewed by Staff and
56 allow Staff to make statistically valid extrapolations pertaining to a specific
57 population of the plant additions under review.

58 **Q. Please describe the initial procedures that you followed to obtain the**
59 **plant additions information from Nicor Gas.**

60 A. Staff discussed the use of statistical sampling with representatives from Nicor
61 Gas via telephone meetings in May and June 2008. Nicor Gas provided
62 initial sample information in May 2008. Staff reviewed the information
63 provided by Nicor Gas, and requested detailed transaction information
64 pertaining to plant additions for the years 2007, 2006, 2005, and 2004. Nicor
65 Gas provided Staff with the detailed transaction information on June 30 for
66 2007 transactions, on July 9 for 2006 transactions, and on July 15 for 2005
67 and 2004 transactions.

68 **Q. Please describe the transaction information provided by Nicor Gas.**

69 A. Nicor Gas provided the plant additions transaction information in four data
70 base files. Each of the four data base files—one for each year—contains the
71 collection of data records for all plant addition work orders that were closed
72 to plant. If the work order was closed in a prior year and not unitized,¹ then
73 the transaction information for that work order will again appear in the data
74 base file for a subsequent year until the year after the work order was
75 unitized. Thus, some transaction records can appear in multiple years.

¹ According to Nicor Gas, when a work order is closed, the costs associated with the work order are moved from Account 107, "Construction work in progress," and are placed in Account 106, "Completed construction not classified." When the work order is unitized, the costs are removed from Account 106 and placed in the appropriate gas plant accounts (Accounts 301 to 399).

76 Nicor Gas provided a total of 1,309,306 records containing transaction
77 information for the four years. For each record, there were 17 fields that
78 could contain information pertaining to each transaction. Attachment A to
79 this testimony presents a list of the fields with a description of each field.

80 **Q. Please explain your Schedule 12.01, entitled “Summary of Information**
81 **Provided.”**

82 A. Schedule 12.01 presents a summary of the detailed transaction information
83 that Nicor Gas provided Staff. Line 1 shows the number of records for each
84 of the years. Line 4 presents the total net dollar amount of the transactions
85 for each year. Lines 5 through 9 show some of the characteristics of the
86 records by providing the total dollar values of the positive and negative
87 transactions and by providing record counts of the positive dollar value
88 transactions, negative dollar value transactions, and zero dollar value
89 transactions. Line 10 presents the total absolute dollar value of the positive
90 and negative transactions. Line 11 identifies the dates on which the detailed
91 transaction information was received from Nicor Gas.

92 **Q. What procedures did you follow to prepare the transaction records for**
93 **statistical sampling?**

94 A. When I received each year’s data base file, I imported that data into a
95 Microsoft Excel (“Excel”) worksheet. I then copied the entire worksheet to a

96 second worksheet where I added a column to identify the year of the
97 transaction information file and a column to hold a sequence number. I then
98 inserted the appropriate year and sequence numbers into these two
99 columns, respectively. For the 2007 file, I inserted sequence numbers
100 beginning with 1 and ending with 373,349. The beginning and ending
101 sequence numbers are shown on lines 2 and 3 of Schedule 12.01. I
102 assigned these sequence numbers in the original order that the records were
103 received from Nicor Gas and imported into Excel. After I had performed the
104 several manipulations of the data described in this testimony, these
105 sequence numbers enabled me to reorder the data received into the actual
106 order in which it was received before the selection of the sample.

107 After examining the data, Staff made the determination to statistically sample
108 the transaction data supported by contractors' invoices. Staff determined
109 that it would sample the population of transaction records with values less
110 than \$150,000 and greater than zero dollars. Staff further determined that it
111 would conduct a 100% examination of the transaction records for contractor
112 costs greater than or equal to \$150,000.

113 For 2007 and 2006, Staff included the following three account categories into
114 its review:

115	<u>Account Category</u>	<u>Description</u>
116	15510	CWIP Contractor Costs

117 15511 CWIP Cntr Costs - Landscaping

118 15512 CWIP Cntr Costs - Paving

119 For the years 2005 and 2004, contactor costs for landscaping and paving
120 were included in account category 15510.

121 I then prepared transaction records worksheets for each year that contained
122 only the accounts payable transactions records for contractor costs less than
123 \$150,000 and greater than zero dollars. The transaction records for
124 contractor costs greater than or equal to \$150,000 were gathered on a
125 separate worksheet.

126 **Q. Did you examine the accounts payable transaction records for any**
127 **potential duplicate records?**

128 A. Yes. I examined the worksheets for each year containing only the
129 transactions records that contained only the accounts payable transactions
130 records for contractor costs less that \$150,000 and greater than zero dollars
131 for potential duplicate records. I took this transaction record data from each
132 of the four years and examined the data for duplicates. To place the data in
133 the proper order for discovering potential duplicates within each year, I
134 performed five sorts on the data fields in the sequence listed below:

- 135 1. ACTIVITY—from A to Z,
- 136 2. POSTING_DATE—from oldest to newest,
- 137 3. REFERENCE—from A to Z,

- 138 4. LAWSON_ACTTRANS_DESCRIPTION—from A to Z, and
139 5. TRAN_AMOUNT—from smallest to largest.

140 I then used Excel to compare the sorted information in the five data fields
141 listed above and identify potential duplicates. Each potential duplicate was
142 identified by the presence of identical information within all five of the data
143 fields listed above. The record containing the *first occurrence* of the identical
144 information remained in the population. Each subsequent occurrence of a
145 record containing the identical information was identified as a potential
146 duplicate record. The identification of potential duplicate records is an *intra-*
147 year comparison.

148 I identified 1,661 potential duplicates with a total dollar value of
149 \$1,893,541.58. I removed the potential duplicate records from the population
150 from which I drew a statistical sample. Staff did review these potential
151 duplicates with Nicor Gas and determined that the potential duplicate records
152 did not represent any actual duplicate payments.

153 **Q. Please explain your Schedule 12.02, entitled “Summary of Accounts**
154 **Payable Contractor Costs Transaction Records.”**

155 A. Schedule 12.02 presents a summary of the accounts payable contractor
156 costs transaction records that are less than \$150,000 and greater than zero
157 dollars for the years 2007, 2006, 2005, and 2004. Line 1 shows the number

158 of these transaction records for each of the years. Line 2 presents the total
159 dollar values of these transaction records for each year. The total number of
160 records is 106,112 with a four-year total dollar value of \$353,963,333.93.
161 Line 3 shows the number of potential duplicate records, and line 4 shows the
162 total dollar value of the potential duplicate records. Line 5 shows the number
163 of these transaction records less potential duplicate records. Line 6 presents
164 the total dollar value of the transaction records on line 5. After the removal of
165 potential duplicate records, the total number of records is 104,451 with a total
166 dollar value of \$352,069,792.35.

167 **Q. Did you examine the accounts payable transaction records for any**
168 **overlap records?**

169 A. Yes. As I discussed at lines 69 through 75 above, some identical transaction
170 records can appear in multiple years. I have labeled the additional
171 occurrences of an identical record as *overlap* records. The overlap records
172 are present when a work order was closed in a prior year and not unitized. In
173 such circumstances, the transaction records information for that work order
174 will again appear in the data base file for each subsequent year until the year
175 after the work order was unitized.

176 To search for overlap records, I combined the transaction records for the
177 years 2007, 2006, 2005, and 2004 on a single worksheet containing 104,451

178 records with a total dollar value of \$352,069,792.35. I then examined the
179 worksheet containing these transactions records for overlap records. The
180 process is identical to the process for finding potential duplicate records. To
181 place the data in the proper order for discovering overlap records, I
182 performed five sorts on the data fields in the sequence listed below:

- 183 1. ACTIVITY—from A to Z,
- 184 2. POSTING_DATE—from oldest to newest,
- 185 3. REFERENCE—from A to Z,
- 186 4. LAWSON_ACTTRANS_DESCRIPTION—from A to Z, and
- 187 5. TRAN_AMOUNT—from smallest to largest.

188 I then used Excel to compare the sorted information in the five data fields
189 listed above and identify overlap records. Each overlap record was identified
190 by the presence of identical information within all five of the data fields listed
191 above. The record containing the *first occurrence* of the identical information
192 remained in the population. Each subsequent occurrence of a record
193 containing the identical information was identified as an overlap record. The
194 identification of overlap records is an *inter-year* comparison.

195 This comparison identified 50,649 overlap records with a total dollar value of
196 \$132,192,008.15. The removal of the overlap records resulted in a
197 population of 53,802 records with a dollar value of \$219,877,784.20. This
198 population includes all the accounts payable contractor costs transaction
199 records less than \$150,000 and greater than zero dollars.

200 **Q. Did Staff further evaluate the population that it sampled?**

201 A. Yes. Staff evaluated the population that it planned to sample and decided to
202 eliminate transaction records that were less than \$500 from the population to
203 be sampled. I removed these smaller records to concentrate on records with
204 a larger dollar value. This decision resulted in the removal of 21,684 records
205 with a dollar value of \$4,303,719.06.

206 **Q. What is the final size of the population that was examined?**

207 A. With the inclusion of the 58 records for transactions greater than or equal to
208 \$150,000, the final size of the population that was examined is 32,176
209 records with a dollar value of \$231,112,973.72.

210 **Q. Please explain your Schedule 12.03, entitled "Determination of the**
211 **Population That Was Examined."**

212 A. Schedule 12.03 presents the final steps in the development of the population
213 from which I drew the samples. Line 1 presents the total of accounts payable
214 contractor costs transaction records less than \$150,000 and greater than
215 zero dollars. The number of those records, 104,451, and the dollar amount
216 of those records, \$352,069,792.35, are the amounts aggregated in the Total
217 column for lines 5 and 6 on Schedule 12.02. Line 2 provides the amounts of
218 the overlap records. Line 3 shows the total amounts after the removal of the

219 overlap records. Line 4 provides the amounts for the records less than \$500
220 and greater than zero dollars. Line 5 presents the amounts for the total of
221 accounts payable contractor costs transaction records less than \$150,000
222 and greater than or equal to \$500. Line 6 provides the amounts for the
223 records greater than \$150,000. Line 7 presents the amounts for the total of
224 the accounts payable contractor costs greater than or equal to \$500. Thus,
225 line 7 presents the population to be examined with a size of 32,176 records
226 and a dollar value of \$231,112,973.22.

227 Determination of the Sample Size

228 **Q. What sampling technique did you use to determine the sample size?**

229 A. I have used stratified random sampling. Sample size depends upon the
230 variation of the population. A large variation would result in a large sample
231 size. Thus, an appropriate sample size may be too large to effectively review
232 within the context of this rate proceeding. A stratified sample can reduce the
233 effect on sample size of large variation.² Staff elected to use five strata for
234 the determination of sample size. The top stratum consisted of the
235 transaction records greater than or equal to \$150,000. In Staff's review, all of
236 the invoices associated with the records in the top stratum were examined.
237 The top stratum consists of 58 records with a dollar value of \$15,538,908.08.

² Auditing Practice Release. *Audit Sampling*. New York, NY: American Institute of Certified Public Accountants, 1999. Page 84.

238 The sample for the remaining four strata were drawn from the 32,118 records
239 associated with accounts payable contractor costs less than \$150,000 and
240 greater than or equal to \$500. As shown on line 2 of Schedule 12.04, the
241 dollar value of these records is \$215,574,065.14.

242 **Q. Please explain your Schedule 12.04, entitled “Records Available for**
243 **Examination.”**

244 A. Schedule 12.04 shows the totals for the number of records and the dollar
245 values of the records available for examination. Line 1 presents the totals for
246 the transaction records greater than or equal to \$150,000. Line 2 shows the
247 totals for the records associated with accounts payable contractor costs less
248 than \$150,000 and greater than \$500; these records will be examined on a
249 sample basis. Line 3 calculates the totals of lines 1 and 2.

250 **Q. What is the first step to determine the boundaries of the four strata?**

251 A. I first developed a frequency distribution of the records in the population from
252 which the sample was drawn. This frequency distribution groups the data
253 into a number of ranges and presents the frequency—the number of
254 records—for each range. The frequency distribution is presented in
255 Schedule 12.05.

256 **Q. Please explain your Schedule 12.05, entitled “Frequency Distribution of**
257 **the Population That Was Sampled.”**

258 A. Schedule 12.05 presents the frequency distribution of the sample population
259 less than \$150,000 and initial calculations necessary to determine the
260 boundaries of the four strata. Column A lists the 22 ranges used in the
261 frequency distribution. Column B shows the range length in dollars for each
262 of the ranges in column A. Column C provides the frequency of the records
263 within each range listed in column A. Column D presents the product
264 resulting from the multiplication of the square root of the frequency in column
265 C by the square root of the range length in column B. Column E presents the
266 cumulative total of the products calculated in column D. Column F presents
267 the total dollar value of the records in each range. The respective totals are
268 calculated on line 23.

269 **Q. What were the next steps to determine the boundaries of the four**
270 **strata?**

271 A. I divided the total of the product of the square roots found on line 23, column
272 D, of Schedule 12.05, by 4—the desired number of strata. This was done to
273 obtain the target ending points of each for the four strata. The upper
274 boundary of each of the four strata should be as close as possible to the

275 appropriate target ending point.³ The target ending points were then
276 compared with the cumulative totals on Schedule 12.05 to find the closest
277 cumulative total for each stratum. At the end of these comparisons, I
278 identified the following four strata:

- 279 • \$500 to less than \$4,000,
- 280 • \$4,000 to less than \$12,000,
- 281 • \$12,000 to less than \$30,000, and
- 282 • \$30,000 to less than \$150,000.

283 **Q. Please explain your Schedule 12.06, entitled “Determination of Strata**
284 **Boundaries.”**

285 A. Schedule 12.06 presents information on the strata boundaries. Line 1 shows
286 the total of the products resulting from the multiplication of each range’s
287 square root of the frequency by the square root of the range length as
288 calculated on Schedule 12.05, line 23, column D. Lines 2 through 5 calculate
289 the target ending points for each for the four strata. Lines 6 through 9 show
290 the upper boundary of each of the four strata, the stratum range in dollars,
291 and the range length in dollars.

292 **Q. What was the next step in determining the sample size?**

³ Roberts, Donald M. *Statistical Auditing*. New York, NY: American Institute of Certified Public Accountants, 1978. Pages 97 and 98.

293 A. Using Excel, I obtained the number of records, the total dollar amount, the
294 mean, the standard deviation, and the variance for each stratum and for the
295 total population. These population characteristics were used in subsequent
296 steps for the calculation of the sample size and the allocation of the sample
297 size among the four strata.

298 **Q. Please explain your Schedule 12.07, entitled “Population**
299 **Characteristics of Each Stratum.”**

300 A. Schedule 12.07 presents the population characteristics described above.
301 Lines 1 through 5 provide the number of records, the total dollar amount, the
302 mean, the standard deviation, and the variance for each of the four strata.
303 Line 7 provides these characteristics for the total population.

304 **Q. What formula did you use to calculate the sample size?**

305 A. I used the following formula to calculate the sample size:

306
$$n = \frac{(\sum N_i \sigma_{Yi})^2}{SE^2 + \sum N_i \sigma_{Yi}^2}$$

307 In this formula, n is the sample size. In the fraction on the right-hand side of
308 the formula, the numerator represents the square of the sum of the number
309 of records in each stratum multiplied by that stratum’s standard deviation of
310 the recorded amounts. The denominator is the total of two terms. The first

311 term— SE^2 —represents the square of the desired standard error for the
312 estimate of the recorded amounts, and the second term— $\sum N_i \sigma_{Yi}^2$ —
313 represents the sum of the number of records in each stratum multiplied by
314 that stratum's variance of the recorded amounts.

315 The formula above has been adapted from the standard formula, shown
316 below, which is used to determine sample size when the actual standard
317 deviations of the strata are known:⁴

318
$$n = \frac{U_R^2 (\sum N_i \sigma_{Yi})^2}{A^2 + U_R^2 \sum N_i \sigma_{Yi}^2}$$

319 The adaptation was made to simplify the calculations; the numerator and
320 denominator in the formula on line 318 were divided by UR^2 to obtain the
321 formula on line 306. When divided by UR^2 , the term A^2 became SE^2 —
322 the desired standard error of the estimate.

323 **Q. What were the next steps in determining the sample size?**

324 A. I calculated the desired standard error. The desired standard error of the
325 estimate of recorded amounts is represented by SE in the above formula for
326 the calculation of sample size. The desired standard error was calculated so
327 that the sample would provide an estimate of the total recorded amount that

⁴ Roberts. Page 102.

328 achieved a 2% relative precision at a 90% confidence level. This was done
329 to ensure that the sample would provide a close approximation of the
330 population.

331 I then calculated the sample size to be 721 and allocated the sample size to
332 the four strata. The allocation was determined by the method known as
333 “optimum allocation” because this method produces the lowest standard
334 error of the estimate.⁵ Using this method, the sample of 721 was allocated to
335 the first four strata in proportion to the product of the number of records in the
336 stratum multiplied by that stratum standard deviation.

337 As is common in audit sampling, all planning must be based upon what is
338 known. The only values known before the audit were the recorded amounts
339 of the population of invoices. The sample size was determined so that the
340 sample would provide a very precise estimate of the total recorded amount
341 which could then be compared to the known total recorded amount. In audit
342 sampling, the precision of an estimate is calculated at some level of
343 reliability, called a confidence level. If the sample size were chosen with a
344 2% relative precision at a 90% confidence level, the sample size would be
345 sufficiently large to provide reliable results. The use of a 90% confidence
346 level is common in audit sampling because it provides a high degree of
347 assurance that the results are reliable.

⁵ Roberts. Page 99.

348 **Q. Please explain your Schedule 12.08, entitled “Calculation of Desired**
349 **Standard Error.”**

350 A. Schedule 12.08 presents the calculation of the desired standard error using
351 the dollar value of the records available for examination from Schedule
352 12.04, the normal distribution factor of 1.645 for a 90% confidence level, and
353 2% for the desired relative precision. The desired standard error is
354 calculated on line 4. The desired standard error (line 4) is equal to the
355 precision (line 1 x line 3) divided by the normal distribution factor (line 2).

356 **Q. Please explain your Schedule 12.09, entitled “Calculation of Sample**
357 **Size and Allocation to Strata.”**

358 A. Schedule 12.09 calculates the sample size using the formula explained
359 above and allocates the sample size to the four strata. Lines 1 through 4
360 present various characteristics for the strata with totals calculated on line 5.
361 Line six calculates the sample size. The amount on line 5 at column E when
362 squared represents the numerator—the calculated amount for the term—
363 $(\sum N_i \sigma_{Y_i})^2$ —in the formula explained above for the calculation of sample
364 size. The amount on line 5 at column F is the calculated amount for the
365 second term in the denominator— $\sum N_i \sigma_{Y_i}^2$ —of the same formula. Lines 7
366 through 10 allocate the sample size of 721 to the four strata based upon the
367 products resulting from the multiplication of the number of records on lines 1

368 through 4, column B, by the respective standard deviations in column C
369 multiplied by the total sample size of 721 and divided by line 5, column E.
370 Line 11 provides subtotals for lines 7 through 10. Line 12 shows the 58
371 items in the 100% stratum. Line 13 shows the total sample size of 779.

372 Selection of the Samples from Each Stratum

373 **Q. How did you select the samples from strata 1 through 4?**

374 A. I took the worksheet containing the 32,118 records and inserted a new
375 column into the worksheet that would eventually contain a selection number.
376 I divided the worksheet into the four strata. I sorted the records in each of
377 the four strata by the sequence number from smallest to largest. The
378 records in each stratum were in the original order that they were received
379 from Nicor Gas. I then inserted a selection number into each record; for
380 each stratum, the selection numbers began with 1 and continued through the
381 last record in the stratum.

382 I then began my selection of random numbers using the RANDBETWEEN
383 function of Excel. For the first three strata, I selected the allocated (rounded)
384 quantities of random numbers as calculated on line 7 through 9 in column C
385 of Schedule 12.09 plus 5 additional random numbers to use in the event that
386 Excel returned duplicate random numbers. For the fourth stratum, I selected
387 the allocated (rounded) quantity of random numbers as calculated on line 10

388 in column C of Schedule 12.09 plus 20 additional random numbers to use in
389 the event that Excel returned duplicate random numbers. I replaced each
390 duplicate random number in the order that the duplicate number appeared
391 with the one of the additional random numbers selected for each strata. After
392 replacing the duplicates, I arranged the random numbers into ascending
393 numerical order.

394 Using Excel, I then prepared a listing of selected sample records for which
395 Staff requested supporting information from Nicor Gas.

396 **Q. Did you evaluate the selected samples from each stratum?**

397 A. Yes. I compared the characteristics of the strata population to characteristics
398 of the selected sample records that were drawn from their respective strata.
399 Using these characteristics, I calculated the estimate of the total recorded
400 amount in the population and the standard error of the estimate as well as
401 the precision at a 90% confidence level. I first used the following formula to
402 calculate the achieved precision of the estimated total amount:⁶

403
$$A'_{MS} = U_R \sqrt{\sum N_i (N_i - n_i) \frac{S_{xi}^2}{n_i}}$$

⁶ Roberts. Page 103.

404 In the formula directly above, A'_{MS} is the achieved precision. U_R is the
405 normal distribution factor of 1.645 for a 90% confidence level. The standard
406 error of the estimate— $\sqrt{\sum N_i (N_i - n_i) \frac{s_{xi}^2}{n_i}}$ —equals the square root of
407 the sum of each stratum's number of records multiplied by the difference
408 obtained by subtracting the number of records in the stratum's sample from
409 the stratum's number of records multiplied by the variance of the records in
410 the sample divided by the number of records in the sample.

411 I then calculated the sample estimate of the total population by aggregating
412 the products resulting from the multiplication of each stratum's sample mean
413 by the number of records in the stratum.

414 **Q. Please explain your Schedule 12.10, entitled "Comparison of Strata**
415 **Population Characteristics to the Samples' Characteristics."**

416 A. Schedule 12.10 presents a comparison of the number of records, total
417 dollars, mean, standard deviation, and variance for each stratum and for
418 each sample drawn from each stratum.

419 **Q. Please explain your Schedule 12.11, entitled "Comparison of the Strata**
420 **Population to the Sample Population."**

421 A. Schedule 12.11 shows the calculation of the standard error of the estimate, a
422 comparison of the population total with the estimated total, and the
423 calculation of the relative precision of the estimate. The difference between
424 the population total and the estimated total is less than two-tenths of one
425 percent. This demonstrates how well the sample matched the population
426 and also achieved the goal for the relative precision of 2%.

427 Line 1 through 6 present the calculation of the standard error of the estimate.
428 Line 7 shows the aggregations of the sample estimate of total population for
429 strata 1 through 4, and line 9 provides the total of the estimated population.
430 Line 11 shows the difference between the total of the estimated population
431 (line 9) and the total of the actual population (line 10). Line 12 calculates the
432 relative difference by dividing the difference (line 11) by the total of actual
433 population (line 10). Line 13 calculates the precision of the estimated total by
434 multiplying the standard error of the estimate (line 6) by the normal
435 distribution factor for a 90% confidence level. Line 14 calculates the relative
436 precision of the estimated total by dividing the precision of the estimated total
437 (line 13) by the total of the actual population (line 10).

438 Application of the Results from the Review of the Sample

439 **Q. What were the results from the review of the sample?**

440 A. Staff witness Ostrander found no exceptions among the 779 invoices in the
441 stratified random sample. Thus, in this proceeding, there is no adjustment to
442 calculate based upon the statistical sampling of contractor invoices.

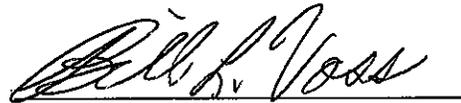
443 Conclusion

444 **Q. Does this question conclude your prepared direct testimony?**

445 A. Yes, it does.

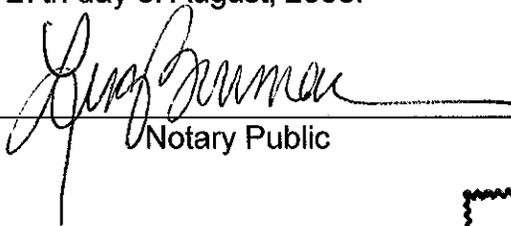
VERIFICATION

I, Bill L. Voss, being first duly sworn, depose and state that I am a Technical Analyst in the Financial Analysis Division of the Illinois Commerce Commission; that I sponsor the foregoing Direct Testimony of Bill L. Voss; that I have personal knowledge of the information stated in the foregoing Direct Testimony; and that such information is true and correct to the best of my knowledge, information and belief.



Illinois Commerce Commission

Subscribed and sworn to before me
this 27th day of August, 2008.



Notary Public

Nicor Gas Company
Summary of Information Provided
For the Years 2007, 2006, 2005, and 2004

Line #	Description (A)	2007 (B)	2006 (C)	2005 (D)	2004 (E)
1	Total number of records	373,349	335,294	325,542	375,121
2	Beginning sequence number	1	373,350	708,644	1,034,186
3	Ending sequence number	373,349	708,643	1,034,185	1,309,306
4	Total net dollar amount	\$ 210,080,619.01	\$ 296,453,520.10	\$ 266,427,344.01	\$ 299,079,208.24
5	Total value of positive records	\$ 1,486,219,794.25	\$ 1,568,789,186.32	\$ 1,263,764,433.43	\$ 1,224,138,620.44
6	Count of positive records	309,955	284,062	272,190	240,904
7	Total value of negative records	\$ (1,276,139,175.24)	\$ (1,272,335,666.22)	\$ (997,337,089.42)	\$ (925,059,412.20)
8	Count of negative records	48,134	44,975	51,070	32,766
9	Count of zero records	15,260	6,257	2,282	1,451
10	Total absolute value	\$ 2,762,358,969.49	\$ 2,841,124,852.54	\$ 2,261,101,522.85	\$ 2,149,198,032.64
11	Date provided	06/30/2008	07/09/2008	07/15/2008	07/15/2008

Nicor Gas Company
Summary of Accounts Payable Contractor Costs Transaction Records
For the Years 2007, 2006, 2005, and 2004

Line #	Description (A)	2007 (B)	2006 (C)	2005 (D)	2004 (E)	Total (F)
1	Total number of accounts payable contactor costs transaction records < 150K and > zero	34,806	29,442	23,796	18,068	106,112
2	Total dollar value of the records on line 1	\$ 86,987,046.99	\$ 87,682,138.18	\$ 89,553,273.81	\$ 89,740,874.95	\$ 353,963,333.93
3	Total number of potential duplicate records	721	559	291	90	1,661
4	Total dollar value of potential duplicates	\$ 694,978.08	\$ 540,708.17	\$ 461,875.02	\$ 195,980.31	\$ 1,893,541.58
5	Total number of accounts payable contactor costs transaction records <150K and > zero less potential duplicates	34,085	28,883	23,505	17,978	104,451
6	Total dollar value of the records on line 5	\$ 86,292,068.91	\$ 87,141,430.01	\$ 89,091,398.79	\$ 89,544,894.64	\$ 352,069,792.35

Nicor Gas Company
Determination of the Population That Was Examined
For the Years 2004 through 2007

Line #	Description (A)	Number of Records (B)	Amount (C)	Notes (D)
1	Total of accounts payable contactor costs transaction records < 150K and > zero after the removal of potential duplicate records	104,451	\$ 352,069,792.35	
2	Total of overlap records	<u>50,649</u>	<u>132,192,008.15</u>	
3	Total of accounts payable contactor costs transaction records <150K and > zero after the removal of overlap records	53,802	\$ 219,877,784.20	line 1 - line 2
4	Total of records < \$500	<u>21,684</u>	<u>4,303,719.06</u>	
5	Total of accounts payable contactor costs transaction records < 150K and ≥ \$500	32,118	\$ 215,574,065.14	line 3 - line 4
6	Total of accounts payable contactor costs transaction records ≥ 150K	<u>58</u>	<u>15,538,908.08</u>	
7	Total of accounts payable contractor costs transaction records greater than or equal to \$500	<u><u>32,176</u></u>	<u><u>\$ 231,112,973.22</u></u>	line 5 + line 6

**Nicor Gas Company
 Records Available for Examination
 For the Years 2004 through 2007**

Line #	Description of Accounts Payable Contractor Costs Transaction Records	Number of Records	Amount	Notes
	(A)	(B)	(C)	(D)
1	Records ≥ \$150,000 (100% examined)	58	\$ 15,538,908.08	
2	Records < \$150,000 and ≥ \$500 (to be examined on a sample basis)	<u>32,118</u>	<u>215,574,065.14</u>	
3	Total of records available for examination	<u><u>32,176</u></u>	<u><u>\$ 231,112,973.22</u></u>	line 1 + line 2

Nicor Gas Company
Frequency Distribution of the Population That Was Sampled
For the Years 2004 through 2007

Line #	Range in Dollars (A)	Range Length in Dollars (B)	Frequency (C)	SQRT(column C) x SQRT(column B) (D)	Cumulative Total (E)	Total Dollars in Range (F)
1	500 to <1K	500.00	6,654	1,824.0066	1,824.0066	\$ 4,765,030.64
2	1K to <2K	1,000.00	5,837	2,415.9884	4,239.9950	8,422,096.36
3	2K to <3K	1,000.00	3,407	1,845.8061	6,085.8011	8,392,535.25
4	3K to <4K	1,000.00	2,435	1,560.4487	7,646.2498	8,464,677.35
5	4K to <5K	1,000.00	1,913	1,383.1124	9,029.3622	8,580,960.97
6	5K to <6K	1,000.00	1,470	1,212.4356	10,241.7978	8,045,926.56
7	6K to <7K	1,000.00	1,258	1,121.6060	11,363.4038	8,142,675.76
8	7K to <8K	1,000.00	1,009	1,004.4899	12,367.8937	7,555,855.31
9	8K to <9K	1,000.00	916	957.0789	13,324.9726	7,773,846.73
10	9K to <10K	1,000.00	800	894.4272	14,219.3998	7,577,294.63
11	10K to <12K	2,000.00	1,201	1,549.8387	15,769.2385	13,159,514.06
12	12K to <14K	2,000.00	972	1,394.2740	17,163.5125	12,577,665.86
13	14K to <16K	2,000.00	718	1,198.3322	18,361.8447	10,744,799.36
14	16K to <18K	2,000.00	620	1,113.5529	19,475.3976	10,520,607.63
15	18K to <20K	2,000.00	524	1,023.7187	20,499.1163	9,934,479.61
16	20K to <25K	5,000.00	885	2,103.5684	22,602.6847	19,759,503.20
17	25K to <30K	5,000.00	481	1,550.8062	24,153.4909	13,090,050.52
18	30K to <40K	10,000.00	497	2,229.3497	26,382.8406	17,007,957.03
19	40K to <50K	10,000.00	282	1,679.2856	28,062.1262	12,575,291.10
20	50K to 75K	25,000.00	133	1,823.4583	29,885.5845	8,007,599.22
21	75K to <100K	25,000.00	63	1,254.9900	31,140.5745	5,331,095.93
22	100K to <150K	50,000.00	43	1,466.2878	32,606.8623	5,144,602.06
23	Totals	<u>149,500.00</u>	<u>32,118</u>	<u>32,606.8623</u>		<u>\$ 215,574,065.14</u>

**Nicor Gas Company
 Determination of Strata Boundaries
 For the Years 2004 through 2007**

Line #	Description (A)	Amount (B)	(C)	Notes (D)
1	Total of the products of the square roots	32,606.8623		Schedule 12.05, line 23, column d
	<u>Target ending points</u>			
2	First stratum	8,151.7156		line 1 x 0.25
3	Second stratum	16,303.4312		line 1 x 0.50
4	Third stratum	24,455.1467		line 1 x 0.75
5	Fourth stratum	32,606.8623		line 1 x 1.00
	<u>Upper Boundary</u>	<u>Stratum Range in Dollars</u>	<u>Range Length in Dollars</u>	
6	7,646.2498	500 to < 4K	\$ 3,500	Upper boundary--Schedule 12.05, line 4, column e
7	15,769.2385	4K to < 12K	8,000	Upper boundary--Schedule 12.05, line 11, column e
8	24,153.4909	12K to < 30K	18,000	Upper boundary--Schedule 12.05, line 17, column e
9	32,606.8623	30K to < 150K	120,000	Upper boundary--Schedule 12.05, line 22, column e

**Nicor Gas Company
 Population Characteristics of Each Stratum
 For the Years 2004 through 2007**

Line #	Stratum (A)	Number of Records (B)	Total Dollars (C)	Mean (D)	Standard Deviation (E)	Variance (F)
1	500 to < 4K	18,333	\$ 30,044,339.60	1,638.81	977.84	956,174.90
2	4K to < 12K	8,567	60,836,074.02	7,101.21	2,234.00	4,990,758.10
3	12K to < 30K	4,200	76,627,106.18	18,244.55	4,722.08	22,298,002.75
4	30K to < 150K	1,018	48,066,545.34	47,216.65	20,970.32	439,754,242.94
5	≥ 150K	<u>58</u>	<u>15,538,908.08</u>	267,912.21	159,205.82	25,346,493,815.31
6	Totals	<u>32,176</u>	<u>\$ 231,112,973.22</u>			
<u>Total Population</u>						
7	≥ 500	32,176	\$ 231,112,973.22	7,182.78	16,441.59	270,325,857.79

**Nicor Gas Company
Calculation of Desired Standard Error
For the Years 2004 through 2007**

Line #	Description (A)	Amount (B)	Notes (C)
1	Dollar value of records available for examination	\$ 231,112,973.22	Schedule 12.04, line 3
2	Normal distribution factor for a 90% confidence level	1.645	
3	Desired relative precision	2%	
4	Desired standard error	<u>\$ 2,809,884.17</u>	line 3 x line 1 / line 2

Nicor Gas Company
Calculation of Sample Size and Allocation to Strata
For the Years 2004 through 2007

Line #	Stratum	Number of Records	Standard Deviation	Variance	Number of Records x Standard Deviation	Number of Records x Variance
	(A)	(B)	(C)	(D)	(E) [E = B x C]	(F) [F = B x D]
1	500 to < 4K	18,333	977.84	956,174.90	17,926,776.67	17,529,554,443.11
2	4K to < 12K	8,567	2,234.00	4,990,758.10	19,138,682.02	42,755,824,624.63
3	12K to < 30K	4,200	4,722.08	22,298,002.75	19,832,719.64	93,651,611,541.33
4	30K to < 150K	1,018	20,970.32	439,754,242.94	21,347,783.87	447,669,819,310.69
5	Totals	<u>32,118</u>			<u>78,245,962.20</u>	<u>601,606,809,919.76</u>

Notes

6 Sample size 720.5355 Sample size calculation = (line 5, column E)² / ((Schedule 12.08 Desired standard error)² + line 5, column F))

Allocation of the Sample Size to the Strata, Including the 100% Stratum

	Allocation	Allocation (Rounded)	
7 500 to < 4K	165.0805	165	line 6, column B x line 1, column E / line 5, column E
8 4K to < 12K	176.2404	176	line 6, column B x line 2, column E / line 5, column E
9 12K to < 30K	182.6315	183	line 6, column B x line 3, column E / line 5, column E
10 30K to < 150K	196.5831	197	line 6, column B x line 4, column E / line 5, column E
11 Strata 1 through 4	<u>720.5355</u>	721	line 7 + line 8 + line 9 + line 10
12 ≥ 150K		<u>58</u>	Schedule 12.04, line 1, column B
13 Total		<u>779</u>	line 11 + line 12

Nicor Gas Company
Comparison of Strata Population Characteristics to the Samples' Characteristics
For the Years 2004 through 2007

Line #	Stratum (A)	Number of Records (B)	Total Dollars (C)	Mean (D)	Standard Deviation (E)	Variance (F)
<u>Strata Characteristics</u>						
1	500 to < 4K	18,333	\$ 30,044,339.60	1,638.81	977.84	956,174.90
2	4K to < 12K	8,567	60,836,074.02	7,101.21	2,234.00	4,990,758.10
3	12K to < 30K	4,200	76,627,106.18	18,244.55	4,722.08	22,298,002.75
4	30K to < 150K	1,018	48,066,545.34	47,216.65	20,970.32	439,754,242.94
5	≥ 150K	<u>58</u>	<u>15,538,908.08</u>	267,912.21	159,205.82	25,346,493,815.31
6	Totals	<u><u>32,176</u></u>	<u><u>\$ 231,112,973.22</u></u>			
<u>Sample Characteristics</u>						
7	500 to < 4K	165	\$ 273,125.62	1,655.31	1,043.88	1,089,689.45
8	4K to < 12K	176	1,262,982.86	7,176.04	2,265.47	5,132,374.48
9	12K to < 30K	183	3,303,465.39	18,051.72	4,532.14	20,540,252.87
10	30K to < 150K	197	9,361,128.01	47,518.42	21,658.26	469,080,403.13
11	≥ 150K	<u>58</u>	<u>15,538,908.08</u>	267,912.21	159,205.82	25,346,493,815.31
12	Totals	<u><u>779</u></u>	<u><u>\$ 29,739,609.96</u></u>			

Nicor Gas Company
Comparison of the Strata Population to the Sample Population
For the Years 2004 through 2007

Line #	Description (A)	Amount (B)	Notes (C)
1	Stratum 1 -- 500 to < 4K	2,199,679,779,577.10	
2	Stratum 2 -- 4K to < 12K	2,096,274,528,358.89	
3	Stratum 3 -- 12K to < 30K	1,893,676,624,778.59	
4	Stratum 4 -- 30K to < 150K	<u>1,990,086,706,426.06</u>	
5	Total	<u><u>8,179,717,639,140.64</u></u>	
6	Standard error of the estimate	<u><u>2,860,020.57</u></u>	square root of line 5
7	Sample estimate of total population	\$ 216,014,851.51	aggregation for the four strata of the stratum's sample mean multiplied by number of records in the stratum
8	Value of the 100% stratum	<u>15,538,908.08</u>	Schedule 12.04, line 1, column C
9	Total of estimated population	<u><u>\$ 231,553,759.59</u></u>	
10	Total of actual population	<u><u>\$ 231,112,973.22</u></u>	Schedule 12.04, line 3, column C
11	Difference	<u><u>\$ 440,786.37</u></u>	line 9 - line 10
12	Relative difference	<u><u>0.1907%</u></u>	line 11 / line 10
13	Precision of the estimated total	<u><u>\$ 4,704,733.84</u></u>	line 6 x 1.645
14	Relative precision	<u><u>2.0357%</u></u>	line 13 / line 10

Nicor Gas Company
 Listing of Field Information Provided with Descriptions

Field Name	Description
ACTIVITY_GRP	Lawson activities/work orders are grouped in categories. Nicor Gas' group is called "Utility."
ACTIVITY	Work order number
ACCT_CATEGORY	Same as General Ledger account number
LAWSON_ACACCTCAT_DESCRIPTION	General Ledger account description
POSTING_DATE	Transaction Date
R_SYSTEM	Source System – AP (Accounts Payable), IC (Inventory Control), GL (General Ledger journal entry), XF (non-Lawson interface)
SOURCE_CODE	Description of the event that created the transaction – for example: AD (Vendor Invoice Distribution), JE (Journal Entry), IS (Inventory)
COMPANY	Company number (for example, 200 = Nicor Gas)
ACCT_UNIT	Department number
ACCOUNT	General Ledger account number
SUB_ACCOUNT	General Ledger account sub account number
REFERENCE	Various – invoice number, journal entry source, etc.
LAWSON_ACTRANS_DESCRIPTION	Vendor name
TRAN_CURRENCY	Type of currency – in all cases, US Dollars
TRAN_AMOUNT	Transaction dollar amount
UNITS_AMOUNT	Transaction units, if any – could represent payroll hours or material quantities
Plant Acct	Prime account number