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October 4, 2018

Daniel P. Wolf
Executive Secretary
Minnesota Public Utilities Commission
121 East Seventh Place, Suite 350
St. Paul, MN 55101-2147

RE: Docket No. G004/D-18-369
Reply Comments to the Comments of the Minnesota Department of Commerce, Division of Energy Resources

Dear Mr. Wolf:

Great Plains Natural Gas Co. (Great Plains), a Division of MDU Resources Group, Inc., herewith electronically files its reply comments to the Comments of the Minnesota Department of Commerce, Division of Energy Resources (Department) filed on August 16, 2018.

Great Plains appreciates the Department's review of the Company's annual depreciation study and the Commission's extension of time necessary to address the Department's comments.

To first summarize, Great Plains retained a new consultant, Concentric Energy Advisors ("Concentric") to prepare its depreciation studies starting with this update submitted on June 1, 2018. It was discovered that in the transition of records to and between Concentric and the previous consultant, the assets in several accounts encountered errors in the original investment by vintage, which has now been corrected. All other inconsistencies have also been identified and corrected, if necessary. The total change in the revised depreciation study provided in attachment B versus the Company's June 1st study is a decrease in annual depreciation expense of $4,795.

To now address the Department's comments submitted on August 16, 2018, Great Plains provides additional information and support in order for the Department to fully evaluate the Company's study.

The Department's recommendations are as follows:

1. Provide additional information regarding the use of the Vintage Group approach as the basis for calculating the remaining life and depreciation rates as well as other concerns raised;
2. Explain and support the notable change in Accounts 396.1 and 396.2;
3. Explain the switch to square curve approach, how it affects the remaining life compared to the prior study, and why the technique was not applied to Account 391.3;
4. Update revised depreciation schedules and identify and explain changes; and
5. Update the status of the PVC replacement program.

In order to properly address the Department's concerns, Great Plains provides some general comments regarding the Company's annual study and has provided responses to each of the recommendations noted above, both of which were developed in conjunction with its consultant, Concentric.

General Comments

The completion of depreciation studies includes a number of highly specialized analyses and depreciation rate calculations. In most circumstances, an annual technical update simply refreshes the aged account balances associated with each original installation year to adjust for the annual plant addition and retirement activity and does not modify any of the depreciation parameters (average service life, Iowa curve selection and net salvage percentages) or depreciation rate methods, procedures or techniques. However, in the specific circumstances of this Docket, Concentric was retained to complete this technical update. As part of the processes completed by Concentric, a review of the depreciation rate calculation methods used in the prior full depreciation study was completed in order to be able to attest to the accuracy and reasonableness of the resultant depreciation rates and expense. During this review, it was identified that refinements in the calculation of the remaining life depreciation rates (as discussed in the following section of these Reply Comments) that have become commonplace for a number of decades were not used in the development of the approved depreciation rates. In this unique circumstance, Concentric incorporated a refinement into the remaining life calculations to ensure a more precise calculation of remaining life. It is not anticipated or planned that future technical annual updates will require any new changes to the calculations used in the depreciation rate development.

In retrospect, it is noted that the inclusion of a description of the remaining life calculation that was provided in the original Concentric report at pages 2-2 and 2-3, did not identify that the described calculation was changed from the calculations used in the last full depreciation study and an explanation should have been provided.

1. Provide additional information regarding the use of the Vintage Group approach as the basis for calculating the remaining life and depreciation rates as well as other concerns raised.

Concentric notes that clarification regarding the remaining life calculations used in the current docket as compared to those used in prior dockets is required. Unfortunately,

many similar terms are often used by depreciation professionals to describe slightly differing functions. It appears that the terminology related to the use of the Vintage Group approach to remaining life calculations, used in response to Minnesota Department of Commerce Information Request No. 2, inadvertently implied that the Vintage Group Model (or Procedure) was used. For clarity, the depreciation calculations used in this docket were performed using the Straight-Line method, the Average Life Group (Broad Group) Procedure, and applied on a remaining life basis. This is unchanged from prior dockets. However, the refinement made in this docket related to the application of a remaining life basis on a Vintage Group approach. This approach weighs the calculations of remaining life on an allocation of the actual book accumulated depreciation account by the Calculated Accumulated Depreciation (CAD) Factor determined for each vintage of plant in service. This method is described as a CAD weighted calculation in the textbook Depreciation Systems by Frank K. Wolf and W. Chester Fitch, published by the Iowa State University in 1994 under the title "Adjustments" within the Broad Group Model. A copy of the relevant pages is attached to these Reply Comments and marked as Attachment A. In contrast, the remaining life calculations in prior studies was based on a broad group averaging of the composite remaining life. This method is also discussed as the Amortization Method (AM) in Depreciation Systems under the title "Adjustments" within the Broad Group Model.

Attachment A is an extract from "Depreciation Systems"; the Average Life Group – Broad Group Procedure is discussed from pages 140 through 152. The discussion from pages 140 through 142 describes the calculations as used in both the current and prior dockets. As noted in the second paragraph at page 142 the methods described indicate that: "This method of calculating the annual accrual is sometimes called 'broad group depreciation'. However, this system does not include a method of adjustment that reflects the value of the recorded accumulated provision for depreciation. If the amortization method (AM) of adjustment is used, the calculated accumulated depreciation (CAD) for the continuous property group must be found." Beginning at page 147 through to page 149 the approaches to determine the adjustment required in remaining life calculations are described. All the approaches include the allocation of the book accumulated depreciation reserve to vintages. At pages 149 through 152 a comparison of the approaches to use in the calculations of the remaining life (when used within the Broad Group Procedure) are compared. In this section a fourth method (as used in prior Great Plains studies) is described. Within this section at page 150, it states:

> *"the italicized sections indicate that allocation of the accumulated reserve for depreciation (i.e., the book reserve) in proportion to the CAD (i.e. the reserve requirement) is the preferred method of application but use of a weighted remaining life may be a reasonable alternative. At the time of the initial issue of Standard Practice U-4 (1952), property records contained less detail than now and computers were not in general use. It seems likely that the lack of detailed accounting data and need to minimize computations may have motivated the alternative of calculating a weighted average remaining life."*

It is also noted that the final paragraph of the Broad Group Procedure discussion at page 152 concluded that an allocation of the booked accumulated reserve to vintages ratably based on the vintage CAD calculations as completed in the depreciation rate calculations within this study is the preferred approach.

While it is agreed that the weighting calculations applied by Concentric within the Remaining Life calculations were different than those used in prior studies, it is important to note that the vintage group weighting (or CAD weighting as described in the textbook Depreciation Systems), was explained within the original petition at pages 2-2 and 2-3. Concentric advises that the use of the vintage group (or CAD weighting) is widely used by depreciation professionals and has been accepted by the public utility regulators in many States and by the Federal Energy Regulatory Commission. Concentric also notes that, as described in later sections of these Reply Comments, a CAD allocation was used by the prior depreciation consultant in the development of the accumulated depreciation balances for a number of sub accounts related to Account 367 - Transmission Mains, Account 376 – Distribution Mains and Account 380 – Services.

At pages 3 and 4 of the Department's Comments, a list of concerns regarding the vintage group approach was outlined. Each concern is listed below followed by Great Plains' response:

- First, Great Plains has not indicated that its plant records and retirement practices, or its accounting systems, precisely reflect the vintages of existing plant in place and removed from service. The quality and accuracy of data used in the *Vintage Group* approach directly impacts the quality and precision of its results. The Department has noted inconsistency between GPNG's current and last year's study as to the value of plant among vintage years, and that in last year's study, GPNG had reasoned record keeping errors were behind certain year-to-year changes noted in its prior depreciation study.

  Response

  Great Plains' plant records and retirement practices and its accounting records do reflect the vintages of existing plant in place and removed from service. The Company's plant accounting records are paper based prior to the acquisition of Great Plains by MDU Resources in 2000, which does present certain challenges. However, the inconsistencies that have been identified have been primarily the result of data transfer issues related to the transition to the current consultant from the previous consultant.

  Great Plains agrees that the accuracy of the remaining life calculations as used in the current docket is dependent upon the accuracy of the aged vintage in order that accurate Calculated Accumulated Depreciation allocations can be made.

Great Plains has now corrected all errors and inconsistencies related to the value of plant among vintages identified by the Department. A complete revised depreciation study has been included as Attachment B. Each error or inconsistency has been fully described below.

- Second, in preparing this annual update, Great Plains chose to roll-up several subaccounts (used to record pipeline infrastructure investment by material type) under certain plant categories (Account 367 – *Transmission Mains*, 376 – *Distributions Mains* and 380 – *Services)* into one primary account, per group, when developing a depreciation rate, rather than continuing its past practice to analyze each subaccount separately (as different materials may have different service lives). The act of rolling up material-based subaccounts that have different life characteristics to form an average, in spite of the calculation ease computer technology offers in enabling increased precision, appears counter-productive and, in doing so, may compromise the precision or accuracy benefits that the *Vintage Group* approach's reasoned-use has to offer. In fact, these three plant account groups that GPNG decided to roll-up make up the majority (70 percent) of GPNG's total plant investment.

Response

In the circumstances of each of these three accounts, Great Plains' plant accounting system tracks the accumulated depreciation related to these accounts only in the overall account. There is no tracking of the accumulated depreciation amounts to any of the sub-accounts related to each of these three accounts. While the accounting system used by Great Plains tracks sufficient detail for the assets to be allocated into the sub groups used in prior depreciation studies, prior depreciation studies developed depreciation parameters by each sub account, but then aggregated the results into a composite depreciation rate which relates to the overall aggregate of the sub-accounts. For each of these three accounts, it is the composite rate of all the sub accounts that is applied to all of the assets within the sub-accounts within the Great Plains accounting system. The prior depreciation study developed the accumulated depreciation balances for each of the detailed accounts though an allocation procedure, very similar in nature to the Concentric use of the Calculated Accumulated Depreciation (or CAD) approach as used by Concentric in the remaining life calculations.

Given the use of a composite depreciation rate for these three overall asset groups, any benefit of the development of the depreciation parameters by sub-group is lost in development and use of the composite depreciation rate for the larger group. Therefore, development of the depreciation rate on the overall account vintage balances and booked accumulated depreciation balances provides a depreciation rate that is developed in the same manner as the rate will be applied in Great Plains' accounting system.

- Third, GPNG's petition did not commit that the Company will continue to use *Vintage Group* approach in future years, regardless of the vendor they may choose to prepare future studies. The Department's concern here is that switching approaches year-to-year, or every few years, may provide a company the opportunity to manipulate operating results;

  Response
  Great Plains will commit to continue the use of the current approach in future technical updates. If, in the development of the next full depreciation study, another approach is contemplated Great Plains will fully describe and support a proposed change at that time.

- Fourth, GPNG does not employ use of the *Vintage Group* approach for all plant accounts (Account 375). The Petition has not sufficiently explained the reasoning for its selective use.

  Response
  In the prior depreciation study, the depreciation rate applicable to Account 375 was based on the use of an interim survivor curve and a specific life span date to recognize the terminal and final retirement of the assets (as noted by the footnote 1 on Table 1 of the Concentric report). As such, the determination of the depreciation rate for this account in prior studies was based on a unique approach to this account. Concentric viewed that the use of the currently approved depreciation rate for this account continued to be appropriate given the unique circumstances of the Life Span approach.

- Fifth, other utility subsidiaries of MDU Resources Group, Inc. appear to be using the *Broad Group* approach, and not the *Vintage Group* approach

  Response
  The same depreciation consultant has historically been used for both Great Plains and Montana-Dakota's depreciation studies. As such, a consistent approach to the determination of the Broad Group remaining life has been utilized across both companies. Great Plains and Montana-Dakota have recently begun using Concentric as their depreciation consultant and expects to employ the same approach in both companies.

- Sixth, from the Department's rough calculations to estimate depreciation results using a *Broad Group* approach (summarized in DOC Table 1 below), it appears that had GPNG applied the *Broad Group* approach in this annual update, its overall depreciation expense would be higher than what is currently proposed under the *Vintage Group* method.

  Response
  While future impacts on the use of the CAD (or Vintage Group) remaining life approach will be dependent on the specific aged vintage distribution at the time of

future studies, it is noted that use of the CAD allocations in remaining life will usually result in slightly lower depreciation rate and resultant expense. This is caused by the fact that more current vintages typically have larger amounts of original cost remaining and lower CAD amounts which are specifically depreciated over a longer remaining life than the composite average remaining life of the account. As such, the results as summarized by the DOC in Table 1 are consistent with expected results of a change to the use of the CAD allocations within the remaining life calculations.

2. Explain and support the notable change in Accounts 396.1 and 396.2

Great Plains apologizes for omitting its response to DOC IR No. 2.G.

In the previous study, Accounts 396.1 - Power Operated Equipment - Trailers and 396.2 - Power Operated Equipment were combined into a single Account (396.0 – Power Operated Equipment). For the 2018 Technical Update, Great Plains chose to keep the accounts separate as per the FERC accounts structure. For this comparison, combined totals are used.

The change in depreciation rate since the prior study is a result of the combination of the following factors.

- Since the prior study, the total amount of Original Cost has increased by $291,517 from $961,851 to $1,253,367.
- Also during 2017, the total Book Depreciation Reserve decreased by $119,001, including retirements and salvage proceeds of $242,179.

The combination of these factors results in an increase of the total annual accrual by $44,730, from ($27,797) in the prior study, to $16,933 for the 2018 update. The resulting change in total Annual Accrual directly impacts the depreciation rate. In this case, the impact was an increase of the total rate to 1.35% from -2.89% in the prior study.

3. Explain the switch to square curve approach, how it affects the remaining life compared to the prior study, and why the technique was not applied to Account 391.3.

The use of a square curve is, in fact, an amortization approach. However, prior depreciation studies have incorporated the use of amortization accounting (or square curves) on a Whole Life Basis, rather than on a Remaining Life Basis. As such, there was no change in approach in the use of using square curves versus the previously approved amortization accounting approach. However, a remaining life approach to adjust for variances between calculated (or theoretical) accumulated depreciation balances and actual booked balances is as appropriate for these accounts as it is for any other account. It is noted that the variances between the calculated accumulated depreciation amounts and booked amounts generally do not vary as much in these

accounts as it can in other accounts, therefore the required adjustments are typically more minimal.

The technique has now been applied in the attached revised depreciation schedules to be consistent.

4. Update revised depreciation schedules and identify and explain changes.

As previously discussed, several inconsistencies and errors that were identified by the Department have been resolved. Following are accounts that reflect a change from the rates initially filed and an explanation of the change:

- 365.2 – Rights of Way – correction of vintages – increase of $46.
- 374.2 – Rights of Way – correction of vintages – decrease of $16.
- 376.0 – Mains – the depreciation report filed in Docket 17-450 did not include a detailed depreciation calculation schedule for Account 376.11 as this account was depreciated over five years - "Replacement Program" as described on pages 4.23 and 4.24 of the report. In the technical updated filed on June 1, 2018, Concentric combined all 376 accounts (i.e. 376, 376.1, 376.11, 376.2, 376.28, 376.2, 376.4, 376.5, and 376.55), including 376.11.

  For the 1966 vintage, the inclusion of the 1966 vintage for Account 376.11 of $305,223.48 in the previous study equals the current study's 1966 vintage opening balance for all 376 accounts of $713,419.62. Furthermore, the application of a 2017 retirement of -$18,000.30 for the 1966 vintage to the opening balance of $713,419.62 equals Concentric's 2017 vintage balance for 1966 of $695,419.32. Decrease of $2,802.
- 379.0 – Meas. & Reg. Station Equipment-City Gate – in addition to the correction of vintages related to the transition of depreciation consultants, in the previous study, the 2015 Original Cost included an addition of $4,810.84 that was subsequently reclassified to retirement costs. Therefore, the 2015 balance of $97,516.71 was corrected to reflect the correction for a total of $92,705.87. Decrease of $1.
- 380.0 – Services – the depreciation report filed in Docket 17-450 prepared did not include a detailed depreciation calculation page in support of Account 380.11 as this account was depreciated over five years - "Replacement Program" as described on pages 4.41 and 4.42. In the technical updated filed on June 1, 2018, Concentric combined all 380 accounts (i.e. 380, 380.1, 380.11, 380.55, and 380.6), including 380.11.

  For the 1967 vintage, the inclusion of the 1967 vintage for Account 380.11 of $233,990.15 in the previous study equals the current study's 1967 vintage opening balance for all 380 accounts of $352,628.90. Furthermore, the application of the 2017 retirement of -$5,113.65 in account 380.11 for the 1967 vintage to the opening balance of $352,628.90 equals Concentric's 2017 vintage balance of $338,196.07. Decrease of $3,476.

- 385.0 – Industrial Meas. & Reg. Station Equipment – correction of a typographical error – increase of $207.
- 391.1 – Office Furniture & Equipment – correction of vintages – increase of $2,734.
- 391.3 – Computer & Electronic Equipment – correction of vintages – increase of $7,988.
- 392.1 – Transportation Equipment-Trailers – correction of vintages – increase of $109.
- 392.2 – Transportation Equipment – correction of vintages – increase of $1,261.
- 394.0 – Tools, Shop & Garage Equipment – in addition to the correction of vintages related to the transition of depreciation consultants, in the previous study, the 2016 Original Cost included an addition of $69,500 that was found to be placed in service in April 2017. Therefore, the 2016 balance of $125,519 was corrected for a total of $56,019 – decrease of $10,463.
- 396.1 – Power Operated Equipment-Trailers – correction of vintages – increase of $207.
- 396.2 – Power Operated Equipment – correction of vintages – increase of $1,463.
- 397.0 – Communication Equipment – correction of vintages – decrease of $2,049.
- 398.0 – Miscellaneous Equipment – correction of vintages – decrease of $1.

As previously mentioned, in the transition of records to and between Concentric and the previous consultant, the assets in several accounts above encountered errors in the original investment by vintage which has now been corrected. All other corrections have also been identified as shown above. The total change in the revised depreciation study in Attachment B versus the Company's June 1st study is a decrease of $4,795.

5. Update the status of the PVC replacement program

Great Plains continues its mains and services PVC replacement program and is approaching 42% completion. The remaining life of Account 378 is largely dependent on the life of the PVC replacement program, which has not changed, and continues to be supported. The depreciation rates for Accounts 381 and 383, Meters and House Regulators, respectively, presented in the current technical update are unchanged from the previous study. During 2017, as noted in Great Plains GUIC Annual Report and Petition Filing, only 669 services were replaced. Great Plains will continue to monitor the status of the PVC replacement and will provide a more robust analysis in its next technical update.

The Department also recommended that the Commission require Great Plains to transparently disclose changes to it depreciation study approach in future depreciation filings and to provide schedules of additions, retirements, adjustments and transfer activity for each plant-in-service and respective accumulated depreciation accounts. Great Plains agrees with the Department's recommendation and will provide the required information.

Again, to summarize, the total change in the depreciation study revised to reflect the corrections described above and provided in attachment B versus the Company's June 1st study is a decrease in annual depreciation expense of $4,795.

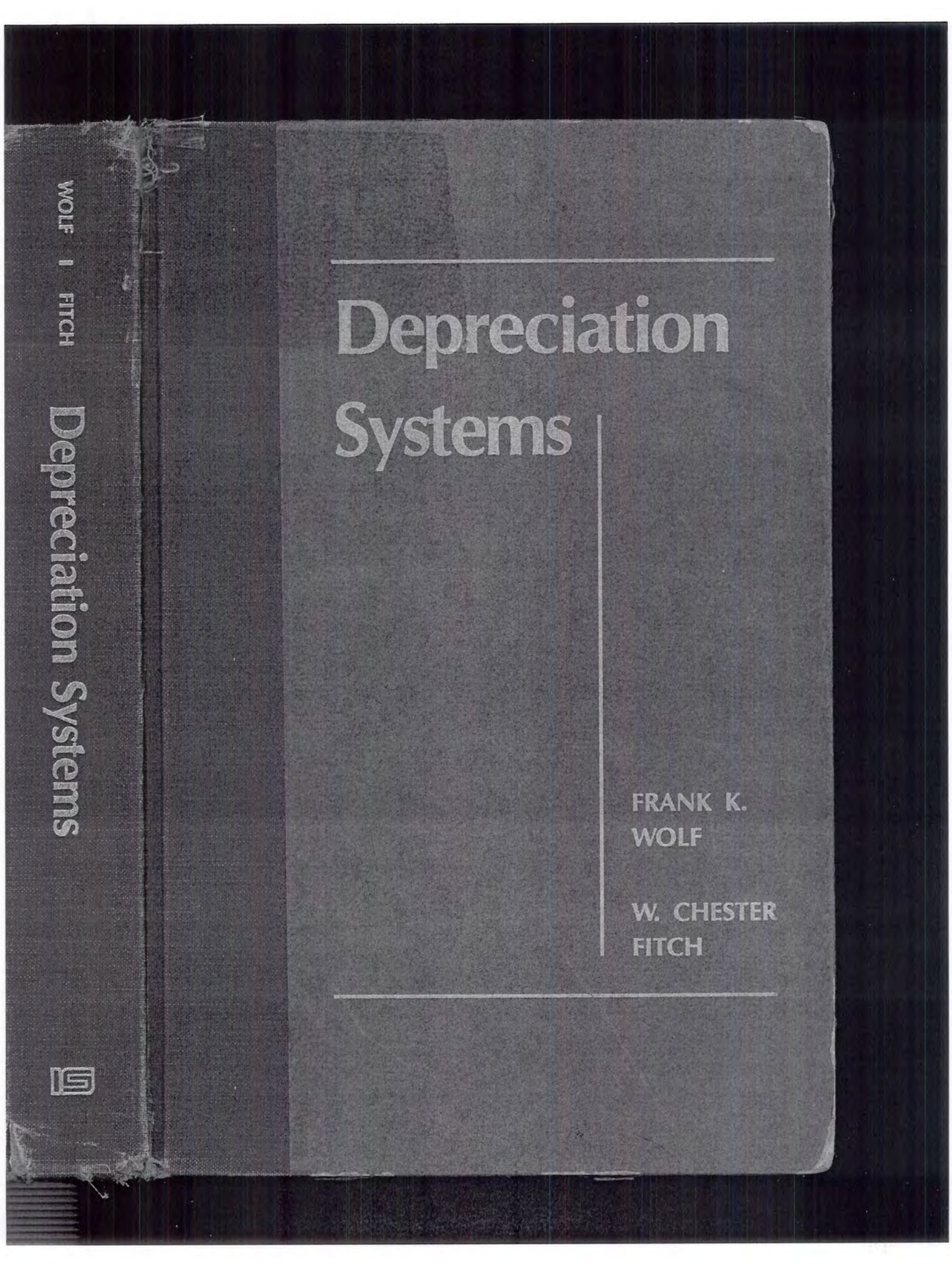
If you have any questions regarding these reply comments, please contact me at (701) 222-7856, or Brian Meloy, at (612) 335-1451.

Sincerely,

/s/ Tamie A. Aberle

Tamie A. Aberle
Director of Regulatory Affairs

Attachment A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groups each of which have the same life and salvage characteristics. This is called the *broad group model.* The other approach is to view the continuous property group as a collection of vintage groups each of which can have different life and salvage characteristics. This is called the *vintage group model.* The model being used will be identified by either stating that the broad or vintage group model is being used or by adding the initials BG or VG to those defining the depreciation system (e.g., SL-AL-AM-BG).

THE BROAD GROUP MODEL

The broad group model requires that a single survivor curve and a single salvage schedule be chosen to represent all the vintages in the continuous property group. Though it is likely that individual vintages will have different life and salvage characteristics, the broad group model makes the simplifying assumption that all vintages in the continuous property group have identical life and salvage characteristics. Thus, if the broad group model is used, it must be reasonable to represent the life and salvage characteristics of each vintage with a single survivor curve and salvage schedule.

The Average Life Procedure

The average life (AL) procedure is discussed in this section. First the amortization (i.e., the SL-AL-AM-BG system) and then the remaining life method of adjustment (i.e., the SL-AL-RL-BG system) will be illustrated.[2] Both the life and salvage characteristics must be chosen in a manner consistent with the assumptions of the broad group model to provide reasonable estimates of depreciation. When using the average life procedure, the reasoning used to choose the life and salvage characteristics of the broad group is the same for both the AM and RL methods of adjustment.

Figure 6.1 represents the realized (historical) and future (forecast) life characteristics of a continuous property group. Each row represents a vintage group. The first row represents the oldest surviving vintage and the final row the most recent vintage. Each column represents a calendar year. The first column is the year during which the oldest surviving vintage was installed. The space dividing the realized life and the future life marks the end of the most recent year, and the last column is the year the last unit from the last surviving vintage is retired. Let each cell represent the vintage surviving plant at the end of the calendar year, so that the cells in any row form a survivor curve reflecting the life characteristics of that vintage.

Tables 8.1 and 8.2 in Chapter 8 contain the schedule of additions, retirements, and plant balances for the continuous property group called Account 897—Utility Devices. This property group is used to illustrate the

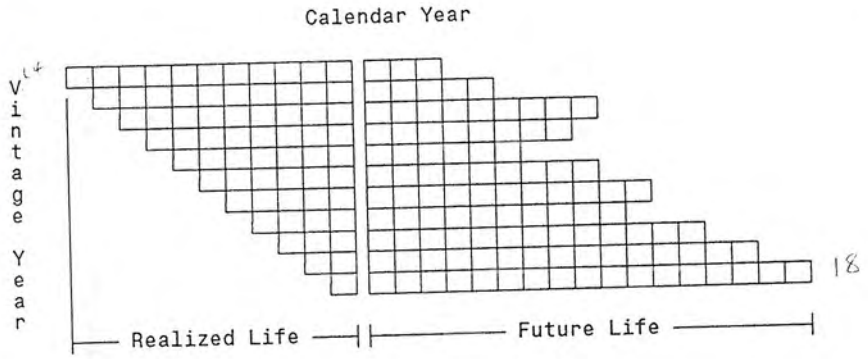

Figure 6.1. A representation of the realized and future life of a continuous property group.

calculation of the annual accrual for depreciation. Tables 8.1 and 8.2 contain the data necessary to construct the triangular-shaped, realized life portion of Figure 6.1. Place yourself in time at the end of the final year for which there is data (i.e., for Account 897 this is December 31, 1990). Look back in time and see the historical record of additions and retirements. Now imagine moving forward in time. As the years pass, visualize the declining vintage balances, with some vintages becoming completely retired while others remain in service. Finally, the last unit of the last vintage is retired. The record of the future balances, contained in the righthand side of the figure, defines the future life. Each row (i.e., each vintage survivor curve) can be divided into either realized life or future life. Older vintages are mostly realized life and newer vintages are mostly future life. The realized life is documented in the aged data while the future life is a forecast. The product of the age at retirement times the amount of the retirement, summed over all retirements and divided by the total retirements is the average life. The job of the depreciation professional is, first, to determine the realized life and, second, to forecast the future life. Then when using the AL procedure and the broad group model, he or she must select the survivor curve that best describes the life characteristics (i.e., a single curve that describes both the realized life and the future life) of the single group of property formed by combining the vintage groups shown in Figure 6.1. The Iowa S1–10 survivor curve will be used to describe the life characteristics of Account 897 for use with the average life procedure and the broad group model.

Figure 6.1 also can be used to help explain the method of estimating the average salvage ratio and the future salvage ratios. For this purpose, let

each cell in Figure 6.1 represent the net salvage for the corresponding vintage and calendar years. The sum of all salvage, realized and future, divided by the original cost of all retirements, realized and future, is the average salvage ratio. This average contains salvage associated with early retirements from older vintages, later retirements from newer vintages, and all other combinations of vintage and calendar years. The salvage for any vintage contains both realized salvage and future salvage. The future salvage ratio is the total forecast future salvage divided by the future retirements. The future retirements, assuming all transactions will be regular retirements, must equal the plant in service at the time of the study. The average salvage ratio used in the illustration is −25%, and the future salvage ratio is −30%. This implies the realized salvage ratio is larger (i.e., nearer zero) than −25%.

The annual accrual using the straight line method, the average life procedure, and the broad group model is the product of the SL-AL rate and the average annual balance. The SL-AL accrual rate is [1 − (−0.25)]/10 or 12.50%. The 1990 accrual is the 12.50% rate times the average balance during 1990, \$4791.00,[3] and is \$598.88. This method of calculating the annual accrual is sometimes called "broad group depreciation." However, this system does not include a method of adjustment that reflects the value of the recorded accumulated provision for depreciation. If the amortization (AM) method of adjustment is used, the calculated accumulated depreciation (CAD) for the continuous property group must be found.

The broad group assumption that the life and salvage characteristics of all vintages in the continuous property group are the same does not affect the calculation of the \$598.88 annual accrual; the 10-year life and −25% salvage describe the characteristics of the combined vintages, but not necessarily any specific vintage. To calculate the CAD, it is necessary to divide the continuous property group into vintages and assign a remaining life, an average salvage ratio, and a future salvage ratio to each vintage. If the data are unaged, the \$4791.00 average balance must be aged (see Chapter 12). The data for Account 897 are aged, so the vintage balances are known. The assumption that all vintages have the same life and salvage characteristics allows the use of a single survivor curve to find the RL for each vintage and allows the assignment of the same average salvage ratio to each vintage.

Table 6.1 presents the calculation of the 1990 accrual and the CAD on January 1, 1990, for Account 897. The calculations are made at the vintage level and use the Iowa S1–10 curve, an average salvage ratio of −25%, and a future salvage ratio of −30% for all vintage calculations. Column (a) designates the vintage year and column (b) shows the average plant in service during the year. The beginning of and end of year balances for the 1982 vintage are \$390.00 and \$380.00 respectively, so the average balance during the year is \$385.00. Columns (c) and (d) show the average life and

average salvage ratio used to calculate the accrual rate. When the broad group model is used, the same rate, 12.50%, is applied to each vintage. Column (e) shows the future salvage ratio, and the estimate of −30% represents a weighted average that is applied to all vintages. The annual accrual, column (f), equals the annual rate times the average annual balance. The 1990 balance is zero during the first half of the year and $90.00 during the last half of the year (Tables 8.1 and 8.2 show additions of $90.00 and no retirements during 1990). This yields a $45.00 average during the year. Column (g) shows the remaining life of each vintage on January 1, 1990. The age of the 1982 vintage on January 1, 1990, is 7.5 years, and the corresponding value from the table of Iowa curves is 4.36 years. The calculated accumulated depreciation ratio (CADR) on January 1, 1990, column (h), is (1 − ASR)(1 − RL/AL) + (ASR − FSR).[4] For 1982, this calculation is [1 − (−0.25)](1 − 4.36/10.0) + [−0.25 − (−0.30)] or 0.755. The calculated accumulated depreciation (CAD), column (j), is the product of the January 1, 1990, balance, column (i), and the CADR, column (h). The

Table 6.1. Calculation of the 1990 annual accrual for depreciation and the January 1, 1990, calculated accumulated depreciation for Account 897 using the SL-AL-AM system of depreciation and the broad group model. The Iowa S1-10 curve is used to describe the life characteristics of the broad group.

Inst year (a)	Average balance (b)	Avg life (c)	Salvage Avg% (d)	Salvage Fut% (e)	Annual accrual (f)	RL (g)	CADR (h)	Balance 1/1/1990 (i)	CAD (j)
1966	22.50	10.0	-25.0	-30.0	2.81	.00	1.300	30.00	39.00
1967	.00	10.0	-25.0	-30.0	.00	.00	1.300	.00	.00
1968	.00	10.0	-25.0	-30.0	.00	.00	1.300	.00	.00
1969	6.50	10.0	-25.0	-30.0	.81	.00	1.300	8.00	10.40
1970	30.00	10.0	-25.0	-30.0	3.75	.14	1.283	36.00	46.19
1971	45.00	10.0	-25.0	-30.0	5.63	.40	1.250	45.00	56.24
1972	111.00	10.0	-25.0	-30.0	13.88	.68	1.215	117.00	142.17
1973	93.50	10.0	-25.0	-30.0	11.69	.97	1.179	99.00	116.73
1974	13.50	10.0	-25.0	-30.0	1.69	1.27	1.142	16.00	18.27
1975	94.00	10.0	-25.0	-30.0	11.75	1.58	1.103	94.00	103.66
1976	286.00	10.0	-25.0	-30.0	35.75	1.91	1.062	292.00	310.03
1977	112.00	10.0	-25.0	-30.0	14.00	2.25	1.019	112.00	114.09
1978	190.00	10.0	-25.0	-30.0	23.75	2.62	.973	190.00	184.87
1979	546.50	10.0	-25.0	-30.0	68.31	3.01	.924	553.00	511.11
1980	203.00	10.0	-25.0	-30.0	25.38	3.42	.872	206.00	179.66
1981	138.00	10.0	-25.0	-30.0	17.25	3.87	.816	138.00	112.59
1982	385.00	10.0	-25.0	-30.0	48.13	4.36	.755	390.00	294.40
1983	295.50	10.0	-25.0	-30.0	36.94	4.90	.688	296.00	203.65
1984	340.00	10.0	-25.0	-30.0	42.50	5.48	.615	340.00	208.97
1985	465.00	10.0	-25.0	-30.0	58.13	6.13	.533	465.00	247.96
1986	220.00	10.0	-25.0	-30.0	27.50	6.86	.443	220.00	97.46
1987	139.00	10.0	-25.0	-30.0	17.38	7.66	.343	140.00	47.99
1988	430.00	10.0	-25.0	-30.0	53.75	8.54	.232	430.00	99.81
1989	580.00	10.0	-25.0	-30.0	72.50	9.50	.112	580.00	65.11
1990	45.00	10.0	-25.0	-30.0	5.63	10.00	--	0.00	0.00
	4791.00				598.88			4797.00	3210.35
	Composite accrual rate				12.50%				
	CADR				66.92%				

annual accrual, \$598.88, and the CAD, \$3210.35, for the account are the sum of the vintage accruals and vintage CADs. The composite annual accrual rate is 598.88/4791.00 or 12.50% and the CADR is 3210.35/4797.00 or 66.92%. Application of the 12.50% rate to each vintage and summing the accruals is equivalent to applying that rate to the average balance for the account; either method yields a \$598.88 annual accrual.

The calculation of the annual accrual for the years before 1970 requires special consideration. The maximum life of the S1–10 survivor curve is 20 years. If the retirements exactly followed the S1–10 curve, property installed before 1970 would be fully retired by the start of 1990 and property installed during 1970 would be fully retired during the 1990 calendar year. This can be seen by observing that the remaining life on January 1, 1990, for all vintages installed before 1970 is zero. However, both the 1966 and 1969 vintages have nonzero balances during 1990. This does not necessarily mean that the S1–10 is a poor choice of curves to describe the broad group life characteristics. The broad group model requires that one curve be selected to describe the life characteristics of the combined vintages. An Iowa type curve can only be expected to approximate the actual survivor curve. In this case, the tail of the theoretical curve does not reflect the long lives of a small amount of property from the early vintages. The S1–10 curve is used to represent all of the property in Account 897, though individual vintages may be better described by other curves.

Though it could be argued that the 1966 and 1969 vintages are fully accrued and should not contribute to the accrual, a common practice is to apply the accrual rate to all surviving plant. This reflects the view that even though the average vintage lives vary, the average life of the combined group (i.e., the continuous property group) is 10 years. On an individual basis, some vintages may appear to be overaccrued and others underaccrued, but the combined group will be properly accrued. Application of the annual accrual to the average annual balance of the continuous property group applies the rate to all vintages.

Now consider the remaining life method of adjustment (e.g., the SL-AL-RL-BG system of depreciation). The annual accrual is equal the future accrual divided by the remaining life. The future accrual and the remaining life are calculated at a specific time.[5] A common convention is to base all calculations on the balance, the accumulated provision for depreciation (i.e., the book depreciation, or book reserve, or depreciation reserve), the future salvage, and the remaining life, at *the start of the year.* This convention will be used in the following illustrations. On January 1, 1990, the future accrual for Account 897 is the plant in service, \$4842.00, less the future salvage, less the accumulated provision for depreciation. If we set the accumulated provision for depreciation equal to \$3210.35 (i.e., the value of the CAD calculated in Table 6.1), the variation between the accumulated provision for depreciation and the CAD will equal zero and the

remaining life accrual should (approximately) equal the SL-AL-AM accrual of $598.88.

Two approaches to find the annual accrual for the SL-AL-RL system of depreciation can be used. Both require that balance be aged (i.e., divided into vintages), and that each vintage be assigned a future salvage ratio and a remaining life. The first approach allocates the $3210.35 accumulated provision for depreciation to the vintages, calculates the accrual for each vintage, and sums the vintage accruals to find the accrual for the depreciable group. The second approach calculates a weighted average remaining life, which is divided into the $3082.00 future accrual to find the annual accrual for the depreciable group.

Table 6.2 shows the calculation of the 1990 annual accrual and the January 1, 1990, CAD using the first approach. Column (b) shows the plant balance, column (c) the accumulated provision for depreciation, column (d) the future salvage ratio, and column (f) the remaining life, all on January 1, 1990. The $3210.35 accumulated provision for depreciation has been allocated to the vintages in proportion to the vintage CAD shown in Table 6.1. The rationale for this method of allocation is discussed later. The future accrual, column (e), is the balance less the future salvage less the accumulated provision for depreciation. For the 1982 vintage, the future accrual is 390.00 − (−117.00) − 294.40 or $212.60. The RL of the Iowa S1−10 curve at age 7.5 years is 4.36 years, so the accrual is 212.60/4.36 or $48.76.

A modification to the calculation of the annual accrual for the 1990 vintage is required because it has no January 1, 1990 balance. A common convention is to multiply the average balance during the year by the SL-AL rate of 12.50% (i.e., use the accrual calculated in Table 6.1). Summation of the vintage accruals yields an annual accrual of $600.34 for the account, and the resulting composite accrual rate is 600.34/4842.00 or 12.40%.

When the accruals are made during the year, the current year additions (i.e., $90.00 during 1990) are not yet known and must be estimated. At the end of the year, a "true up" is necessary to adjust for the difference between the actual and estimated additions. Some consider it practical to calculate the composite rate based on the activity up to the beginning of the current year (i.e., the composite rate would exclude 1990 balance and accrual and be 594.71/4797.00 or 12.40%). This rate[6] is applied to the monthly balances, so that the accruals take on the new additions as they are added. The 12.40% rate, rather than the theoretically correct 12.50% rate, will be applied to the 1990 additions. This is considered acceptable because the resulting difference is normally less than the error inherent in the model, and it will be corrected over the remaining life of the additions. This approach is practical because it eliminates the need to estimate additions for the current year.

We assumed the accumulated provision for depreciation was main-

Table 6.2. Calculation of the 1990 annual accrual using the SL-AL-RL system of depreciation and the broad group model. An Iowa S1-10 curve is used to describe the broad group life characteristics. The accumulated provision for depreciation is set equal to the CAD when calculated using an average salvage ratio of -25% and a future salvage ratio of -30.0%.

Inst year (a)	Balance 1/1/1990 (b)	Acc depr 1/1/1990 (c)	Fut sal ratio % (d)	Future accrual (e)	RL 1/1/1990 (f)	Annual accrual (g)
1966	30.00	39.00	-30.0	.00	.00	.00
1967	.00	.00	-30.0	.00	.00	.00
1968	.00	.00	-30.0	.00	.00	.00
1969	8.00	10.40	-30.0	.00	.00	.00
1970	36.00	46.19	-30.0	.61	.14	4.36
1971	45.00	56.24	-30.0	2.26	.40	5.65
1972	117.00	142.17	-30.0	9.93	.68	14.60
1973	99.00	116.73	-30.0	11.97	.97	12.34
1974	16.00	18.27	-30.0	2.53	1.27	2.00
1975	94.00	103.66	-30.0	18.54	1.58	11.75
1976	292.00	310.03	-30.0	69.57	1.91	36.50
1977	112.00	114.09	-30.0	31.51	2.25	14.00
1978	190.00	184.87	-30.0	62.13	2.62	23.75
1979	553.00	511.11	-30.0	207.79	3.01	69.13
1980	206.00	179.66	-30.0	88.14	3.42	25.75
1981	138.00	112.59	-30.0	66.81	3.87	17.25
1982	390.00	294.40	-30.0	212.60	4.36	48.76
1983	296.00	203.65	-30.0	181.15	4.90	37.00
1984	340.00	208.97	-30.0	233.03	5.48	42.50
1985	465.00	247.96	-30.0	356.54	6.13	58.13
1986	220.00	97.46	-30.0	188.54	6.86	27.50
1987	140.00	47.99	-30.0	134.02	7.66	17.50
1988	430.00	99.81	-30.0	459.19	8.54	53.75
1989	580.00	65.11	-30.0	688.90	9.50	72.50
1990	45.00*	0.00	-25.0*	56.25	10.00	5.63
	4842.00	3210.35		3082.00		600.34

Composite accrual rate 12.40%
Composite remaining life 5.134 years

* The 1990 calculations are based on the average balance and SR.

tained at the account level.[7] If the accumulated provision for depreciation is maintained at a broader level, it is necessary to allocate it to the depreciable group or account level. The allocation process will most likely spread any indicated deficiency or excess in the accumulated provision for depreciation in one account among all the accounts, thus obscuring the source of the variation. Better feedback and control are obtained when the accumulated provision for depreciation is maintained at the same level as the depreciable group rather than at a broader level.

A discussion in Chapter 5 pointed out that if the variation between the CAD and the accumulated provision for depreciation is zero, then the SL-AL-AM and the SL-AL-RL systems will yield identical vintage accruals. Comparison of the vintage accruals in Tables 6.1 and 6.2 show they are close, $598.88 versus $600.34, but not equal. This is the result of using the average balance during the year in one case and the beginning of year balance in the other. To show that the vintage accruals are the same for both

systems if the same reference points are used, calculate the accrual for the 1982 vintage using the AM method of adjustment, but base the calculations on the beginning of year balance rather than on the average balance. The annual accrual is then 390.00 × 0.1250 or $48.76, the same as the RL accrual. Or, if the RL calculation was made at midyear, rather than at the beginning of the year, the resulting RL accrual would equal the $48.13 shown in Table 6.1. When the variation is zero and the same computational convention is used, the systems will yield identical annual vintage accruals.

A statistic called the *composite remaining life* can be calculated by dividing the future accrual by the annual accrual, or 3082.00/600.34 or 5.134 years. This composite remaining life also can be viewed as the reciprocal of the weighted average of 1/RL for each vintage, where the weight is the vintage future accrual. Note that this composite remaining life depends on the survivor curve, the salvage, the balances, and the provision for accumulated depreciation. *It cannot be directly estimated.*

Adjustments

Suppose the accumulated provision for depreciation on January 1, 1990, for Account 897 is $2900.00. When the amortization method of adjustment is used, the $2900.00 is compared with the $3210.35 CAD shown in Table 6.1, and a variation of $310.35 is found. Is this an indication that the account may be underaccrued significantly? If so, over what period should this variation be amortized? Remember that the CAD is sensitive to the estimates of average life, curve type, average salvage, and future salvage. The "deficit" of $310.35 could be the result of changes in accounting policy, unforeseen events, a deviation from the forecast, random deviations from the averages the CAD is based on, or on combinations of these. The CAD must be viewed as an estimate, not as a "fact." Whether or not an adjustment is made to the annual accrual rests heavily on the judgment of the depreciation professional. That judgment is guided by management policy.

When the RL method of adjustment is used in combination with the approach of allocating the accumulated provision for depreciation to the vintages, the variation (e.g., the $310.35) is often allocated to each vintage in proportion to the vintage CAD. Mathematically this is the same as allocating the accumulated provision for depreciation (e.g., the $2900.00) in proportion to the CAD. Because the CAD is the product of the CADR and the balance, allocation in proportion to the CAD gives more weight to older vintages, because they will have larger CADRs, and more weight to vintages with larger balances left to recover. This method of allocation is logical and appropriate if the factors causing the variation are associated with previous estimates or past activities such that, over time, the cumulative vintage variation is approximately proportional to the age of the vin-

tage. When the variation is known to have a different source, a different basis for allocation may be justified.

Table 6.3 shows the allocation of the $2900 accumulated provision for depreciation in proportion to the CAD. One way to compute the allocation is to focus on the $310.35 variation. For the 1982 vintage, the total allocation is the original $294.40 CAD less the allocated proportion of the variation. This equals 310.35 × (294.40/3210.35) or $28.46, so the 1982 allocation is $294.40 − $28.46 or $265.94. Or, more simply, the $265.94 can be calculated as 2900.00 × (294.40/3210.35). The 1982 accrual is the future accrual of $241.06 divided by the remaining life of 4.36 years or $55.29. Or the $55.29 accrual can be viewed as the original $48.76 accrual plus a remaining life adjustment of $28.46/4.36 or $6.53. The annual accrual for the account increases from $600.34 to $759.10, reflecting an adjustment of $158.76 for the 1990 year. The composite accrual rate increases from

Table 6.3. Calculation of the annual accrual using the SL-AL-RL system of depreciation and the broad group model. An Iowa S1-10 curve is used to describe the broad group life characteristics and a future salvage of -30.0% is estimated. Allocation of the $2900.00 accumulated provision for depreciation is in proportion to the vintage CADs shown in Table 6.1.

Inst year (a)	Balance 1/1/1990 (b)	Acc depr 1/1/1990 (c)	Fut sal ratio % (d)	Future accrual (e)	RL 1/1/1990 (f)	Annual accrual (g)
1966	30.00	35.23	-30.0	3.77	.00	.00
1967	.00	.00	-30.0	.00	.00	.00
1968	.00	.00	-30.0	.00	.00	.00
1969	8.00	9.39	-30.0	1.01	.00	.00
1970	36.00	41.71	-30.0	5.09	.14	36.38
1971	45.00	50.81	-30.0	7.69	.40	19.22
1972	117.00	128.42	-30.0	23.68	.68	34.83
1973	99.00	105.42	-30.0	23.28	.97	24.00
1974	16.00	16.50	-30.0	4.30	1.27	3.39
1975	94.00	93.64	-30.0	28.56	1.58	18.10
1976	292.00	280.06	-30.0	99.54	1.91	52.22
1977	112.00	103.06	-30.0	42.54	2.25	18.90
1978	190.00	167.00	-30.0	80.00	2.62	30.58
1979	553.00	461.72	-30.0	257.18	3.01	85.54
1980	206.00	162.29	-30.0	105.51	3.42	30.82
1981	138.00	101.71	-30.0	77.69	3.87	20.06
1982	390.00	265.94	-30.0	241.06	4.36	55.29
1983	296.00	183.96	-30.0	200.84	4.90	41.02
1984	340.00	188.77	-30.0	253.23	5.48	46.18
1985	465.00	223.99	-30.0	380.51	6.13	62.03
1986	220.00	88.04	-30.0	197.96	6.86	28.87
1987	140.00	43.35	-30.0	138.65	7.66	18.11
1988	430.00	90.17	-30.0	468.83	8.54	54.88
1989	580.00	58.81	-30.0	695.19	9.50	73.16
1990	45.00*	0.00	-25.0*	56.25	10.00	5.63
	4842.00	2900.00		3392.35		759.10
	Composite accrual rate			15.68%		
	Composite remaining life			4.47 years		

* The 1990 calculations are based on the average balance and SR.

12.40% to 15.68%, and the composite remaining life decreases from 5.13 years to 4.47 years. A comparison of Tables 6.2 and 6.3 shows that when the variation is $310.35, the older vintages receive a relatively larger portion of the total accrual than when the variation is zero. This reduces the composite remaining life.

The Weighted Average Remaining Life

The second approach to the calculation of the annual accrual when using the SL-AL-RL system is to divide the future accrual of the continuous property group by a *weighted average remaining life.* This approach simplifies the calculations by circumventing the need to allocate the accumulated provision for depreciation to each vintage and is of particular interest because it is widely used.

A basic reference to the remaining life method of adjustment is *Determination of Straight-line Remaining Life Depreciation Accruals* by the California Public Utilities Commission. Originally issued in 1952, a more recent revision is dated 1961. Subtitled *Standard Practice U-4,* this guide covers a wide range of topics including accounting for depreciation, life estimation, determination of salvage, staff procedures, and tables of the Iowa curves. Application of the remaining life method to both a unit of property and to mass property groups is discussed. Several methods of estimating remaining life are identified and examined. The following (italics added) is from Chapter 5, paragraph 11, of the 1961 revision:

> **SELECTING A METHOD OF WEIGHTING**
> In selecting a method of weighting, several considerations apply. First, *it is desired that the method of weighting used shall produce the same results as though the book reserve had been prorated to the various age groups or classes of property on the basis of the applicable reserve requirement.* Secondly, it is desirable that the result obtained by weighting be in conformance with the provisions of certain of the uniform systems of accounts, that the accrual computed for an account as a whole shall be the same as if separate accruals had been computed for each class of property and the total obtained. Under these considerations, direct weighting produces proper results if the average service life of each age group or class of property weighted is approximately the same. Reciprocal weighting produces proper results if the reserve for the various classes of property or groups weighted is distributed in proportion to the plant dollars, a condition which is more likely in stable plant with slow growth. Average service life weighting produces proper results if the book reserve and the reserve requirement are closely the same. From these considerations it is concluded that direct or future dollar weighting is the proper method to use between age groups, whereas either reciprocal weighting or average service life weighting will usually yield the better approximation between classes of property. *In very large accounts where individual classes of property*

exceed $100,000 of plant, occasionally a utility may prefer to prorate the book reserve within the account according to a reserve requirement between each class of property rather than to attempt any of the other weighting methods. Such a proration is used only infrequently, is made only at the time of a periodic review for weighting purposes within a very large account, and is normally not carried forward from the date of the calculation.

The italicized sections indicate that allocation of the accumulated reserve for depreciation (i.e., the book reserve) in proportion to the CAD (i.e., the reserve requirement) is the preferred method of application, but use of a weighted remaining life may be a reasonable alternative. At the time of the initial issue of *Standard Practice U-4* (1952), property records contained less detail than now and computers were not in general use. It seems likely that the lack of detailed accounting data and need to minimize computations may have motivated the development of the alternative of calculating a weighted average remaining life.

The three types of weighting described in Chapter 5, paragraph 10, of *Standard Practice U-4* are called *direct weighting, reciprocal weighting, and average service life weighting*. Each is a weighted average of the vintage remaining lives (RL), where the weights are combinations of the vintage balances (Bal) and the vintage average lives (AL). The direct weighted remaining life is $\Sigma(\text{Bal} \times \text{RL})/\Sigma(\text{Bal})$. The reciprocal weighted remaining life is $\Sigma[(\text{Bal})/\Sigma(\text{Bal}/\text{RL})$. Finally, the average service life weighted remaining life is $\Sigma[(\text{Bal}/\text{AL}) \times \text{RL}]/\Sigma(\text{Bal}/\text{AL})$. In each case, the Σ is over all vintages.

A fourth weighted remaining life is the straight line, average life weighted remaining life. This weighting includes the average salvage ratio (ASR) and is the vintage balance times vintage accrual rate, or $\text{Bal} \times (1 - \text{ASR})/\text{AL}$. Thus the straight line, average life weighted remaining life is $\Sigma\{[\text{Bal} \times (1 - \text{ASR})/\text{AL}] \times \text{RL}\}/\Sigma[\text{Bal} \times (1 - \text{ASR})/\text{AL}]$. The importance of this weighted remaining life is that *when the variation between the accumulated provision for depreciation and the CAD is zero, calculation of the annual accrual either by allocating the accumulated provision for depreciation to each vintage in proportion to the vintage CAD or using the straight line, average life weighted remaining life yields the same result.*[8] If the ASR is the same for each vintage, the straight line, average life weighted remaining life reduces to the average service life weighted remaining life. Furthermore, if the AL is the same for each vintage, the average service life weighted remaining life reduces to the direct weighted remaining life. Thus, if the broad group model is used, the straight line, average life weighted remaining life equals the direct weighted remaining life.

The straight line, average life weighted remaining life for Account 897 can be calculated from the balances and remaining lives shown in Table 6.3.

Each RL is weighted by the balance times the rate [(1 − ASR)/AL]. The numerator is the Σ{[Bal × (1 − ASR)/AL] × RL} or [45.00 × (1.25/10) × 10.00 + 580.00 × (1.25/10) × 9.5 + 430.00 × (1.25/10) × 8.54 + . . . + 36.00 × (1.25/10) × 0.14] or 3082.00. The denominator is the Σ[Bal × (1 − ASR)/AL] or [45.00 × (1.25/10) + 580.00 × (1.25/10) + 430.00 × (1.25/10) + . . . + 36.00 × (1.25/10] or 600.34. The straight line, average life weighted remaining life is then 3082.00/600.34 or 5.134 years. Calculation of the direct weighted remaining life also yields 5.134 years. If the accumulated provision for depreciation is $3210.35, then the future accrual, from Table 6.2, is $3082.00 and the annual accrual is 3082.00/5.134 or $600.34.

Table 6.4 summarizes the results of using allocation of the accumulated provision for depreciation, shown in Tables 6.2 and 6.3, and two types of weighting. Column (a) shows three values of the accumulated provision for depreciation. The value in the second row, $3210.35, is from Table 6.2 and represents a zero variation from the CAD, as noted in column (b). The first and third rows represent a $310.35 variation above and below the CAD. Column (c) shows the future accrual of $3082.00, from Table 6.2, when the variation is zero. Columns (d) and (e) are the results of allocation in proportion to the CAD, columns (f) and (g) the results of direct weighting, and columns (h) and (i) the results of reciprocal weighting. The accrual is the future accrual divided by the RL.

When the variation is zero, the two approaches (allocation of the accumulated provision for depreciation to vintages in proportion to the CAD and calculation of direct weighted remaining life) result in the same accrual. However, if the variation is $310.35 (i.e., a deficit), and the first approach is used, the composite RL is reduced to 4.47 and the rate is increased to 22.4%. A variation of −$310.35 (i.e., an excess) increases the RL to 6.28 years and decreases the rate to 15.9%. The more the variation varies from zero, the more the rate varies from 1/5.13 or 19.5%. Because

Table 6.4. Results of allocating the accumulated provision for depreciation in proportion to the CAD, direct weighting, and reciprocal weighting when calculating the annual accrual. Calculations are made for the three values of the accumulated provision for depreciation shown in column (a).

Accum depr (a)	Variation (b)	Future accrual (c)	Allocation RL (d)	Allocation Accrual (e)	Direct wt* RL (f)	Direct wt* Accrual (g)	Reciprocal wt RL (h)	Reciprocal wt Accrual (i)
2900.00	310.35	3392.35	4.47	759.10	5.13	661.29	2.78	1220.29
3210.35	.00	3082.00	5.13	600.34	5.13	600.34	2.78	1108.65
3520.70	-310.35	2771.65	6.28	441.35	5.13	540.29	2.78	997.01

* Same as either average service life or straight line, average life weighted remaining life. This is the result of using the same AL and ASR for each vintage.

the direct weighted remaining life is independent of the variation, it remains a constant 5.134 years. Thus, the two approaches may yield significantly different accruals when the variance is not close to zero.

Regardless of the variation, the results of reciprocal weighting do not appear to be reasonable. In this example, when the variation is zero the accrual resulting from use of the reciprocal weighted remaining life is almost twice the annual accrual using the SL-AL rate (i.e., from Table 6.4, $1108.65 versus $600.34). These results are consistent with the warning in *Standard Practice U-4* that reciprocal weighting produces proper results only if the accumulated provision for depreciation is distributed in proportion to plant balances.

Because the two approaches used to calculate the annual accrual may yield different results, the question, "Is one approach better than the other?" is raised. Both require the same data and estimates. Both require the assumption that all vintages have the same life and salvage characteristics. The calculations for either approach are quickly made on a small computer. The first approach requires calculation of the CAD, while the second does not. It can be argued that the CAD should be calculated even though the RL method of adjustment is used, so that the depreciation professional is aware of the degree of adjustment included in the remaining life accrual. If the second approach is, as suggested in *Standard Practice U-4,* an approximation to the more desirable procedure of allocation of the accumulated provision for depreciation to each vintage, then the first approach is preferred.

Life Cycle Depreciation

Earlier in this chapter the SL-AL accrual rate was multiplied by the plant in service to find the annual accrual, and it was noted that this is sometimes called broad group depreciation. Thus, only the life and salvage for the continuous property group, and not each vintage, need be estimated. However, if the life and salvage characteristics change from vintage to vintage, then forecasting the required life and salvage is an imposing challenge. Not only must the life and salvage of property currently in service be forecast, but the magnitude, life, and salvage of all future additions must also be forecast. If the life of the continuous property group continues far into the future, then this is a difficult and perplexing task. If the end of the life of the continuous group is in the near future, then the task may be manageable.

Life cycle depreciation is based on the concept that the average life and salvage of a continuous property group can be forecast. The continuous property group must consist of units with a common technology. Thus, by the end of the life cycle of the technology (i.e., the time starting with the introduction of the technology until the time it is replaced with a new

Attachment B

2018 TECHNICAL DEPRECIATION UPDATE
Great Plains Natural Gas Co.

TECHNICAL UPDATE
Calculated Annual Depreciation Accrual Rates Applicable to Plant in Service as of December 31, 2017

Prepared May 2018
Revised October 1st, 2018

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May 18, 2018

Montana-Dakota Utilities Co.
400 North Fourth Street
Bismarck, North Dakota 58501

Attention: Mr. Garret Senger
Executive Vice President
Regulatory Affairs, Customer Service and Administration

Dear Garret,

Pursuant to your request, we have conducted a technical update to the depreciation study completed in May 2017. The calculated annual depreciation accrual rates presented in this 2018 update are related to the actual plant in service through to December 31, 2017. The depreciation rates are based on the straight-line, average life group procedure, applied on a remaining life basis.

We gratefully acknowledge the assistance of MDU personnel in the completion of this update.

Should you have any questions or concerns, please do not hesitate to contact me directly at 587-997-6489

Yours truly,

CONCENTRIC ADVISORS, ULC

Larry E. Kennedy
Vice President

Project: 03479
LEK/bmw

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SECTION 1

1 STUDY HIGHLIGHTS

Pursuant to request of the Great Plains Natural Gas Co. ("GPNG" or the "Company"), Concentric Energy Advisors ("Concentric") completed a Technical Update ("the Update") to the results of the depreciation study filed by GPNG in May 2017. The results of the Update contained herein relate to the natural gas transmission, distribution and General Plant assets as of December 31, 2017. The purpose of the update is to determine the annual depreciation accrual rates and amounts for ratemaking purposes applicable to the original cost of plant as of December 31, 2017.

The depreciation rates in this update have been calculated using the same depreciation methods, procedures and techniques employed in the last GPNG depreciation study. Additionally, the depreciation rate calculations are based on the average service life, retirement dispersion and net salvage estimates developed in the last full depreciation study.

The Update results are summarized at an aggregate functional group level as follows:

Summary of Original Cost, Currently Approved Accrual Percentages and Amounts, and Updated Accrual Percentage and Amounts

Plant Group / Accounts	Original Cost	Annual Accrual		Annual Accrual Updated	
Transmission Plant	$2,555,239	1.75%	$44,717	1.24%	$31,558
Distribution Plant	$43,806,947	4.57%	$2,001,978	4.55%	$1,991,946
General Plant	$6,334,250	3.60%	$228,033	3.94%	$249,371
TOTAL	**$52,696,437**	**4.31%**	**$2,274,728**	**4.31%**	**$2,272,875**

SECTION 2

2 BASIS OF THE UPDATE

2.1 Scope

Concentric has been retained to develop a technical Update to the depreciation study completed in 2017 for GPNG. The purpose of the Update was to determine the annual depreciation accrual rates and amounts for ratemaking purposes applicable to the actual surviving original cost as of December 31, 2017. The depreciation accrual rates presented herein are based on generally-accepted methods and procedures for calculating depreciation.

The annual depreciation accrual rates and amounts are based on the broad group straight line method of depreciation using the Average Life Group ("ALG") procedure and were applied using the remaining life technique. The calculations were based on the actual plant accounting ledger values as at December 31, 2017. Inherent in the application of the depreciation parameters with the remaining life technique, the accumulated depreciation accounts are trued up of any variances between the actual book accumulated depreciation reserve and calculated accrued depreciation requirement are amortized over the composite remaining life of each group of assets.

2.1.1 Purpose of a technical update

Concentric notes that the depreciation rates should be reviewed periodically as plant and accumulated depreciation account activity may result in materially different depreciation rates. The survivor curves, net salvage percentages, and amortization periods determined in the Company's most recent full depreciation study should be the basis for the periodic recalculations. Complete depreciation studies, which re-evaluate these parameters, should be performed every three to five years.

When depreciation rates are calculated utilizing a remaining life technique, the depreciation rate is established by dividing the undepreciated value of each group of assets (after consideration to the net salvage requirements) by the composite remaining life of the group of assets. This calculation is made for each vintage surviving investment as of the date of the study (or Update), and then composited into a calculation for the account or group as a whole. As follows, this calculation requires two estimates:

- The actual booked accumulated depreciation for each vintage within each account. GPNG does not track the booked accumulated depreciation reserve by vintage within each account. The depreciation expense is calculated at an account level and booked to accumulated depreciation at the same account level. Concentric notes that this is the practice employed by virtually all regulated utilities. As such, the accumulated depreciation by account, is allocated within the account, to each vintage on the basis of the calculated accumulated by vintage. The calculated accumulated depreciation is a function of the estimated survivor curve, the average service life estimate, the net salvage estimates and the achieved age of each vintage.

- The estimated remaining life of each vintage with each account. The estimated remaining life of each account is a direct function of the achieved age of each vintage, the estimated survivor curve and the average service life estimate.

Once the above two estimates are determined (the allocated booked reserve by vintage and the average remaining life of each vintage) an annual accrual requirement for each vintage is determined by dividing the net book value for each vintage (considering the estimated future salvage requirements) by the average remaining life of the vintage. The annual requirement for each vintage is summed at the account level and divided into the sum of the accounts original cost surviving as of the study date to determine a required remaining life depreciation accrual rate for the account.

The calculations as described above are dependent upon the actual total account book depreciation and the estimated remaining life of each vintage. The depreciation rate can vary year over year due to plant addition and retirement activity. Additionally, the age of retirements in any given year can cause a required adjustment to the depreciation rate going forward. Therefore, annual technical updates are often required by regulators.

2.2 Information Provided by GPNG

GPNG has provided Concentric with the required information as of December 31, 2017 for all accounts being studied in this Update. The information includes the following:

- current balances by vintage year for each account (aged balances). The balances provide the amount of investment sorted by installation year currently in operation. GPNG arranged for the prior depreciation consultant (AUS Consultants) to forward the aged balances and service life files to Concentric to avoid the time and costs re-creating these existing files through December 31, 2016. The actual 2017 transaction plant accounting data was forwarded directly from GPNG to Concentric so that the 2016 files could be updated through December 31, 2017;
- the actual booked accumulated depreciation amounts by account as of December 31, 2017 were forwarded directly from GPNG to Concentric; and
- the last full depreciation study was provided to Concentric to use in the determination of prior depreciation practices and approved depreciation parameters.

2.3 Data Reconciliation

The above data was reviewed and reconciled to Company control schedules to ensure accuracy and reasonableness in use of the calculations developed in this Update. These checks include:

- that the surviving investment by account equals (or can be reconciled to) the Company's gross plant in service and accumulated depreciation ledger balances;
- that the surviving investment in each vintage is not negative. In other words, this check confirms that the sum of retirements from any given vintage have not exceeded the amount of plant additions to the vintage; and
- that this report reflects the consolidation of the "Mains" and "Services" plant accounts.

SECTION 3

3 DEVELOPMENT OF THE REQUIRED DEPRECIATION RATES

3.1 Depreciation

The development of the depreciation calculations requires the input of an Average Service Life, Iowa curve and Net Salvage recommendations (the "depreciation parameters"). Additionally, to complete the depreciation calculations, the calculation methods must be established. Specifically, the selection of the depreciation method must establish three types of additional input:

1. the choice of a depreciation method;
2. a basis upon which to apply the method, and
3. in the case of group assets, a procedure to use in grouping the assets.

In this Update, the depreciation rates for GPNG have been calculated in accordance with the Straight-Line method, the Average Life Group procedure and applied using the Remaining Life technique.

Depreciation in public utility regulation, is the loss in service value not restored by current maintenance, incurred with the consumption or prospective retirement of utility plant in service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among causes to be given consideration are: wear and tear; deterioration; action of the elements; inadequacy; obsolescence; changes in the art; changes in demand; and the requirements of public authorities. When considering the action of the elements, the average service life calculations have considered large catastrophic events that have occurred and impacted the life estimates of utilities across North America. The average service life of utilities has been influenced by events including forest fires, earthquakes, tornadoes, ice storms, wind storms, large scale flooding, fires, intentional actions of third parties and other natural forces of nature.

Depreciation, as used in accounting, is a method of distributing fixed capital costs less net salvage over a time period, by allocating annual amounts to expense. Each annual amount of such depreciation expense is part of that year's total cost of providing natural gas utility service. Normally, the time over which the fixed capital cost is allocated to the cost of service, is equal to the time over which an item renders service, that is the item's service life. The most prevalent method of allocation is to distribute an equal amount of cost to each year of service life. This method is known as the Straight-Line method of depreciation.

The calculation of annual and accrued depreciation based on the Straight-Line method requires the estimation of survivor curves and is described in the following sections of this Update. The development of the proposed depreciation rates also requires the selection of group depreciation procedures, as discussed below.

This Update uses the estimates as approved in the last full GPNG depreciation study. Imbedded in the remaining life calculations, the variances between the calculated accrued depreciation and the book accumulated depreciation are amortized over the composite remaining life of each account.

SECTION 4

4 RESULTS OF UPDATE

4.1 Qualification of Results

The calculated annual and accrued depreciation are the principal results of the update. Continued surveillance and periodic revisions are normally required to maintain continued use of appropriate annual depreciation accrual rates. An assumption that accrual rates can remain unchanged over a long period of time implies a disregard for the inherent variability in service lives and salvage, and for the change of the composition of property in service. The annual accrual rates and the accrued depreciation were calculated in accordance with the Straight-line method, using the ALG procedure based on estimates which reflect considerations of current historical evidence and expected future conditions.

4.2 Description of Detailed Tabulations

The following tables provides summaries by account of the original cost of investment, calculated and booked accumulated depreciation amounts, the required amount of annual depreciation expense, the required depreciation rate to be applied against the original cost of the account and the estimated composite remaining life of the surviving plant in service.

The detailed calculations of annual depreciation applicable to depreciable assets, as of December 31, 2017, are presented in account sequence starting in Section 5. The tables indicate the estimated average survivor curves used in the calculations. The tables set forth (for each installation year) the original cost, calculated accrued depreciation and the calculated annual accrual.

GREAT PLAINS NATURAL GAS CO.

TABLE 1. REVISED SUMMARY OF SERVICE LIFE AND NET SALVAGE ESTIMATES AND CALCULATED ANNUAL AND ACCRUED DEPRECIATION RELATED TO THE RECOVERY OF AVERAGE ORIGINAL COST IN GAS PLANT AS OF DECEMBER 31, 2017

- TOTAL -

ACCOUNT	DESCRIPTION	ESTIMATED SURVIVOR CURVE	NET SALVAGE PERCENT	SURVIVING ORIGINAL COST AS OF 12/31/2017	CALCULATED ACCRUED DEPRECIATION	BOOK RESERVE	ANNUAL ACCRUAL AMOUNT		RATE	REMAINING LIFE
TRANSMISSION PLANT										
365.2	RIGHTS OF WAY	50-R2.5	0	158,152	100,231	124,001	1,228		0.78	18.3
367.0	TRANSMISSION MAINS	50-R3	-20	1,541,179	1,163,374	1,461,591	8,838		0.57	18.6
369.0	MEAS & REG STATION EQUIPMENT	40-R0.5	-10	855,908	158,200	206,134	21,492		2.51	33.3
TOTAL TRANSMISSION PLANT				**2,555,239**	**1,421,805**	**1,791,726**	**31,558**		**1.24**	
DISTRIBUTION PLANT										
374.2	RIGHTS OF WAY	50-R2.5	0	17,654	9,171	8,791	373		2.11	24.0
375.0	DISTR. MEAS & REG STATION STRUCTURES	N/A	-5	32,251	N/A	27,085	916	1	2.84	N/A
376.0	MAINS	46-R3	-55	19,426,616	9,205,986	9,867,471	604,015		3.11	31.9
378.0	MEAS & REG STATION EQUIP-GENERAL	N/A	-25	511,305	N/A	351,279	64,169	2	12.55	N/A
379.0	MEAS & REG STATION EQUIP-CITY GATE	28-R3	-5	484,883	129,199	113,979	19,539		4.03	20.9
380.0	SERVICES	39-R3	-75	15,937,760	8,149,111	9,392,445	609,125		3.82	27.6
381.0	METERS & METER INSTALLATIONS	N/A	-25	6,438,021	N/A	3,905,077	638,008	3	9.91	N/A
383.0	HOUSE REGULATORS	N/A	-5	774,939	N/A	439,509	51,301	3	6.62	N/A
385.0	INDUSTRIAL MEAS. & REG. STATION EQUIPMENT	40-S4	0	162,784	14,248	13,804	4,091		2.51	36.5
387.1	CATHODIC PROTECTION EQUIPMENT	25-R3	0	9,235	3,661	3,249	410		4.44	15.1
387.2	OTHER EQUIPMENT	30-R3	0	11,498	9,594	11,498	-		-	5.0
TOTAL DISTRIBUTION PLANT				**43,806,947**	**17,520,970**	**24,134,187**	**1,991,946**		**4.55**	
GENERAL PLANT										
390.0	GENERAL STRUCTURES & IMPROVEMENTS	45-R4	0	2,528,697	650,371	973,232	42,387		1.68	33.4
391.1	OFFICE FURNITURE & EQUIPMENT	16-SQ	0	95,317	59,254	58,979	5,814		6.10	6.1
391.3	COMPUTER & ELECTRONIC EQUIPMENT	4-SQ	0	61,617	38,511	26,529	23,392		37.96	1.5
392.1	TRANSPORTATION EQUIPMENT - TRAILERS	12-R1	10	31,167	19,560	25,947	280		0.90	3.6
392.2	TRANSPORTATION EQUIPMENT	7-L2	20	1,380,893	490,542	648,860	107,138		7.76	3.9
394.0	TOOLS, SHOP, & GARAGE EQUIPMENT	20-SQ	0	628,270	227,794	222,312	32,474		5.17	12.8
396.1	POWER OPERATED EQUIPMENT - TRAILERS	6-L0	65	151,442	13,851	33,224	3,535		2.33	4.4
396.2	POWER OPERATED EQUIPMENT	6-L0	65	1,101,925	100,782	300,745	15,068		1.37	4.4
397.0	COMMUNICATION EQUIPMENT	18-SQ	0	303,583	195,944	194,381	17,108		5.64	6.4
398.0	MISCELLANEOUS EQUIPMENT	25-SQ	0	51,339	20,175	18,341	2,175		4.24	15.2
TOTAL GENERAL PLANT				**6,334,250**	**1,816,784**	**2,502,550**	**249,371**		**3.94**	
TOTAL GAS PLANT STUDIED				**52,696,436**	**20,759,559**	**28,428,463**	**2,272,875**		**4.31**	
PLANT NOT STUDIED										
301.0	ORGANIZATION COSTS			5,006						
302.0	FRANCHISE COSTS			73,680						
303.0	INTANGIABLE ASSETS			2,783,783						
365.0	LAND			5,585						
374.0	LAND			2,978						
389.0	LAND & LAND RIGHTS GENERAL			48,658.66						
TOTAL PLANT				55,616,128						

Notes:

1 Interim Retirement Rate. Service lives vary.
2 Based upon anticipated district regulator change out / eliminations.
3 Based upon 20 ERT battery life and remaining PVC program term 2016 - 2026.

All currently approved rates include salvage portion.

GREAT PLAINS NATURAL GAS CO.

TABLE 1A. REVISED SUMMARY OF SERVICE LIFE AND NET SALVAGE ESTIMATES AND CALCULATED ANNUAL AND ACCRUED DEPRECIATION RELATED TO THE RECOVERY OF AVERAGE ORIGINAL COST IN GAS PLANT AS OF DECEMBER 31, 2017

- LIFE -

ACCOUNT	DESCRIPTION	ESTIMATED SURVIVOR CURVE	NET SALVAGE PERCENT	SURVIVING ORIGINAL COST AS OF 12/31/2017	CALCULATED ACCRUED DEPRECIATION	BOOK RESERVE	ANNUAL ACCRUAL AMOUNT		RATE	REMAINING LIFE
TRANSMISSION PLANT										
365.2	RIGHTS OF WAY	50-R2.5	-	158,152	100,231	124,001	1,228		0.78	18.31
367.0	TRANSMISSION MAINS	50-R3	-	1,541,179	969,478	1,164,039	11,217		0.73	18.55
369.0	MEAS & REG STATION EQUIPMENT	40-R0.5	-	855,908	143,818	215,507	18,408		2.15	33.28
TOTAL TRANSMISSION PLANT				**2,555,239**	**1,213,527**	**1,503,547**	**30,853**		**1.21**	
DISTRIBUTION PLANT										
374.2	RIGHTS OF WAY	50-R2.5	-	17,654	9,171	8,791	373		2.11	24.02
375.0	DISTR. MEAS & REG STATION STRUCTURES	N/A	-	32,251	N/A	25,820	826	1	2.69	N/A
376.0	MAINS	46-R3	-	19,426,616	5,939,346	6,778,294	358,249		1.84	31.94
378.0	MEAS & REG STATION EQUIP-GENERAL	N/A	-	511,305	N/A	308,692	35,955	2	8.79	N/A
379.0	MEAS & REG STATION EQUIP-CITY GATE	28-R3	-	484,883	123,046	136,559	16,119		3.32	20.89
380.0	SERVICES	39-R3	-	15,937,760	4,656,635	5,280,476	353,948		2.22	27.61
381.0	METERS & METER INSTALLATIONS	N/A	-	6,438,021	N/A	3,460,968	362,074	3	7.03	N/A
383.0	HOUSE REGULATORS	N/A	-	774,939	N/A	439,509	43,618	3	5.91	N/A
385.0	INDUSTRIAL MEAS. & REG. STATION EQUIPMENT	40-S4	-	162,784	14,248	13,804	4,091		2.51	36.50
387.1	CATHODIC PROTECTION EQUIPMENT	25-R3	-	9,235	3,661	3,249	410		4.44	15.09
387.2	OTHER EQUIPMENT	30-R3	-	11,498	9,594	11,498	-		-	4.97
TOTAL DISTRIBUTION PLANT				**43,806,948**	**10,755,701**	**16,467,660**	**1,175,663**		**2.68**	
GENERAL PLANT										
390.0	GENERAL STRUCTURES & IMPROVEMENTS	45-R4	-	2,528,697	650,371	973,232	42,387		1.68	33.43
391.1	OFFICE FURNITURE & EQUIPMENT	16-SQ	-	95,317	59,254	58,979	5,814		6.10	6.05
391.3	COMPUTER & ELECTRONIC EQUIPMENT	4-SQ	-	61,617	38,511	26,529	23,392		37.96	1.50
392.1	TRANSPORTATION EQUIPMENT - TRAILERS	12-R1	-	31,167	21,733	25,947	754		2.42	3.63
392.2	TRANSPORTATION EQUIPMENT	7-L2	-	1,380,893	613,177	648,860	185,443		13.43	3.89
394.0	TOOLS, SHOP, & GARAGE EQUIPMENT	20-SQ	-	628,270	227,794	222,312	32,474		5.17	12.75
396.1	POWER OPERATED EQUIPMENT - TRAILERS	6-L0	-	151,442	39,574	33,224	27,437		18.12	4.43
396.2	POWER OPERATED EQUIPMENT	6-L0	-	1,101,925	287,949	300,745	172,519		15.66	4.43
397.0	COMMUNICATION EQUIPMENT	18-SQ	-	303,583	195,944	194,381	17,108		5.64	6.38
398.0	MISCELLANEOUS EQUIPMENT	25-SQ	-	51,339	20,175	18,341	2,175		4.24	15.18
TOTAL GENERAL PLANT				**6,334,250**	**2,154,482**	**2,502,550**	**509,503**		**8.04**	
TOTAL GAS PLANT STUDIED				**52,696,437**	**14,123,710**	**20,473,757**	**1,716,019**		**3.26**	
PLANT NOT STUDIED										
301.0	ORGANIZATION COSTS			5,006						
302.0	FRANCHISE COSTS			73,680						
303.0	INTANGIABLE ASSETS			2,783,783						
365.0	LAND			5,585						
375.0	LAND			2,978						
389.0	LAND & LAND RIGHTS GENERAL			48,658.66						
TOTAL PLANT				55,616,128						

Notes:

1 Interim Retirement Rate. Service lives vary.
2 Based upon anticipated district regulator change out / eliminations.
3 Based upon 20 ERT battery life and remaining PVC program term 2016 - 2026.

All currently approved rates include salvage portion.

GREAT PLAINS NATURAL GAS CO.

TABLE 1B. REVISED SUMMARY OF SERVICE LIFE AND NET SALVAGE ESTIMATES AND CALCULATED ANNUAL AND ACCRUED DEPRECIATION RELATED TO THE RECOVERY OF AVERAGE ORIGINAL COST IN GAS PLANT AS OF DECEMBER 31, 2017

- NET SALVAGE -

ACCOUNT	DESCRIPTION	ESTIMATED SURVIVOR CURVE	NET SALVAGE PERCENT	SURVIVING ORIGINAL COST AS OF 12/31/2017	CALCULATED ACCRUED DEPRECIATION	BOOK RESERVE	ANNUAL ACCRUAL AMOUNT	RATE
TRANSMISSION PLANT								
365.2	RIGHTS OF WAY	50-R2.5	-	158,152.03	-	-	-	-
367.0	TRANSMISSION MAINS	50-R3	-20	1,541,178.76	193,896	297,552	(2,379)	(0.16)
369.0	MEAS & REG STATION EQUIPMENT	40-R0.5	-10	855,907.98	14,382	(9,373)	3,084	0.36
TOTAL TRANSMISSION PLANT				**2,555,239**	**208,278**	**288,179**	**705**	**0.03**
DISTRIBUTION PLANT								
374.2	RIGHTS OF WAY	50-R2.5	-	17,653.59	-	-	-	-
375.0	DISTR. MEAS & REG STATION STRUCTURES	N/A	-5	32,251	N/A	1,265	90	0.15
376.0	MAINS	46-R3	-55	19,426,616.45	3,266,640	3,089,177	245,765	1.27
378.0	MEAS & REG STATION EQUIP-GENERAL	N/A	-25	511,305	N/A	42,587	28,214	3.76
379.0	MEAS & REG STATION EQUIP-CITY GATE	28-R3	-5	484,883.13	6,153	(22,580)	3,421	0.71
380.0	SERVICES	39-R3	-75	15,937,760.04	3,492,476	4,111,969	255,177	1.60
381.0	METERS & METER INSTALLATIONS	N/A	-25	6,438,021	N/A	444,109	275,934	2.88
383.0	HOUSE REGULATORS	N/A	-5	774,939	N/A	-	7,683	0.71
385.0	INDUSTRIAL MEAS. & REG. STATION EQUIPMENT	40-S4	-	162,784.41	-	-	-	-
387.1	CATHODIC PROTECTION EQUIPMENT	25-R3	-	9,235.11	-	-	-	-
387.2	OTHER EQUIPMENT	30-R3	-	11,498	-	-	-	-
TOTAL DISTRIBUTION PLANT				**43,806,948**	**6,765,269**	**7,666,527**	**816,283**	**1.87**
GENERAL PLANT								
390.0	GENERAL STRUCTURES & IMPROVEMENTS	45-R4	-	2,528,697.41	-	-	-	-
391.1	OFFICE FURNITURE & EQUIPMENT	16-SQ	-	95,317.30	-	-	-	-
391.3	COMPUTER & ELECTRONIC EQUIPMENT	4-SQ	-	61,616.92	-	-	-	-
392.1	TRANSPORTATION EQUIPMENT - TRAILERS	12-R1	10	31,167.46	(2,173)	-	(474)	(1.52)
392.2	TRANSPORTATION EQUIPMENT	7-L2	20	1,380,893.11	(122,635)	-	(78,305)	(5.67)
394.0	TOOLS, SHOP, & GARAGE EQUIPMENT	20-SQ	-	628,269.65	-	-	-	-
396.1	POWER OPERATED EQUIPMENT - TRAILERS	6-L0	65	151,442.08	(25,723)	-	(23,901)	(15.79)
396.2	POWER OPERATED EQUIPMENT	6-L0	65	1,101,925.11	(187,167)	-	(157,452)	(14.29)
397.0	COMMUNICATION EQUIPMENT	18-SQ	-	303,582.84	-	-	-	-
398.0	MISCELLANEOUS EQUIPMENT	25-SQ	-	51,338.57	-	-	-	-
TOTAL GENERAL PLANT				**6,334,250**	**(337,698)**	**-**	**(260,132)**	**(4.10)**
TOTAL GAS PLANT STUDIED				**52,696,437**	**6,635,849**	**7,954,706**	**556,856**	**1.05**
PLANT NOT STUDIED								
301.0	ORGANIZATION COSTS			5,006				
302.0	FRANCHISE COSTS			73,680				
303.0	INTANGIABLE ASSETS			2,783,783				
365.0	LAND			5,585				
375.0	LAND			2,978				
389.0	LAND & LAND RIGHTS GENERAL			48,658.66				
TOTAL PLANT				55,616,128				

SECTION 5

5 DETAILED DEPRECIATION CALCULATIONS

GREAT PLAINS NATURAL GAS CO.

Account #: 365.2 - TRANSMISSION - RIGHTS OF WAY

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R2.5
ASL: 50
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1965	4,066.02	3,183	3,938	0.9685	128	10.86	12	52.5
1966	107,419.75	83,183	102,910	0.9580	4,510	11.28	400	51.5
1967	2,490.06	1,906	2,358	0.9471	132	11.72	11	50.5
1976	3.00	2	2	0.8298	1	16.46	0	41.5
1981	297.10	180	223	0.7515	74	19.63	4	36.5
1985	61.73	34	42	0.6831	20	22.39	1	32.5
2000	2,732.55	865	1,070	0.3915	1,663	34.18	49	17.5
2003	41,081.82	10,877	13,457	0.3276	27,625	36.76	751	14.5
TOTAL	158,152.03	100,231	124,001		34,151		1,228	

COMPOSITE ANNUAL ACCRUAL RATE	0.78%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.78
COMPOSITE AVERAGE AGE (YEARS)	41.28
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	18.31

GREAT PLAINS NATURAL GAS CO.

Account #: 367 - TRANSMISSION - MAINS

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R3
ASL: 50
Net Salvage: -20%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1966	1,086,313.43	1,058,298	1,303,576	1.2000	0	9.41	0	51.5
1970	8,044.40	7,467	9,653	1.2000	0	11.32	0	47.5
1971	18,005.73	16,486	21,607	1.2000	0	11.85	0	46.5
1972	4,225.53	3,814	5,071	1.2000	0	12.40	0	45.5
1976	1,809.24	1,530	2,171	1.2000	0	14.76	0	41.5
1977	2,658.13	2,208	3,190	1.2000	0	15.39	0	40.5
1978	122.93	100	148	1.2000	0	16.04	0	39.5
1981	7.50	6	9	1.2000	0	18.07	0	36.5
1986	3,413.47	2,317	3,663	1.0732	433	21.72	20	31.5
1987	84.97	56	89	1.0441	13	22.49	1	30.5
1988	15,177.96	9,739	15,399	1.0146	2,814	23.27	121	29.5
1990	7,026.13	4,240	6,705	0.9543	1,726	24.85	69	27.5
1991	805.75	471	744	0.9236	223	25.66	9	26.5
1993	510.97	278	440	0.8610	173	27.31	6	24.5
1994	4,189.75	2,197	3,474	0.8291	1,554	28.15	55	23.5
1996	654.99	317	501	0.7643	285	29.86	10	21.5
1997	34.74	16	25	0.7314	16	30.73	1	20.5
1998	705.65	312	493	0.6982	354	31.60	11	19.5
2003	73,092.92	24,373	38,540	0.5273	49,171	36.11	1,362	14.5
2013	227,018.27	24,007	37,962	0.1672	234,460	45.59	5,142	4.5
2015	87,276.30	5,143	8,132	0.0932	96,600	47.54	2,032	2.5

GREAT PLAINS NATURAL GAS CO.

Account #: 367 - TRANSMISSION - MAINS

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R3
ASL: 50
Net Salvage: -20%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
TOTAL	1,541,178.76	1,163,374	1,461,591		387,824		8,838	

COMPOSITE ANNUAL ACCRUAL RATE	0.57%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.95
COMPOSITE AVERAGE AGE (YEARS)	39.42
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	18.55

GREAT PLAINS NATURAL GAS CO.

Account #: 369 - TRANSMISSION - MEAS. & REG. STATION EQUIP

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R0.5
ASL: 40
Net Salvage: -10%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1966	31,450.57	24,116	31,423	0.9991	3,173	12.12	262	51.5
1967	2,421.95	1,829	2,383	0.9840	281	12.54	22	50.5
1970	3,945.54	2,839	3,699	0.9376	641	13.83	46	47.5
1972	1,939.04	1,348	1,756	0.9058	377	14.72	26	45.5
1975	467.11	307	400	0.8567	114	16.09	7	42.5
1976	1,565.23	1,009	1,315	0.8399	407	16.56	25	41.5
1978	3,150.24	1,948	2,538	0.8057	927	17.51	53	39.5
1982	913.24	515	671	0.7349	333	19.49	17	35.5
1983	451.82	249	324	0.7167	173	20.00	9	34.5
1984	233.70	125	163	0.6983	94	20.51	5	33.5
1987	602.12	297	386	0.6418	276	22.09	12	30.5
1988	3,731.27	1,783	2,323	0.6226	1,781	22.63	79	29.5
1991	26,085.44	11,286	14,706	0.5638	13,988	24.27	576	26.5
1992	3,977.45	1,660	2,163	0.5438	2,212	24.82	89	25.5
1993	9,293.25	3,735	4,867	0.5237	5,356	25.38	211	24.5
1994	46,177.86	17,842	23,248	0.5034	27,548	25.95	1,062	23.5
1995	771.37	286	373	0.4830	476	26.52	18	22.5
1996	40,220.96	14,275	18,601	0.4625	25,642	27.09	946	21.5
1997	5,766.13	1,955	2,547	0.4418	3,795	27.67	137	20.5
1998	1,757.64	568	740	0.4210	1,193	28.25	42	19.5
1999	9,401.27	2,886	3,761	0.4001	6,580	28.84	228	18.5
2003	18,967.71	4,592	5,984	0.3155	14,881	31.20	477	14.5
2010	352,403.98	44,599	58,112	0.1649	329,532	35.40	9,309	7.5
2012	121,221.49	11,287	14,707	0.1213	118,637	36.61	3,240	5.5
2013	13,188.03	1,006	1,311	0.0994	13,196	37.23	354	4.5
2014	24,893.47	1,480	1,928	0.0775	25,455	37.84	673	3.5
2015	95,971.70	4,081	5,317	0.0554	100,252	38.45	2,607	2.5
2017	34,938.40	297	387	0.0111	38,045	39.69	959	0.5

GREAT PLAINS NATURAL GAS CO.

Account #: 369 - TRANSMISSION - MEAS. & REG. STATION EQUIP

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R0.5
ASL: 40
Net Salvage: -10%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
TOTAL	855,907.98	158,200	206,134		735,365		21,492	

COMPOSITE ANNUAL ACCRUAL RATE	2.51%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.24
COMPOSITE AVERAGE AGE (YEARS)	11.35
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	33.28

GREAT PLAINS NATURAL GAS CO.

Account #: 374.2 - DISTRIBUTION - RIGHTS OF WAY

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R2.5
ASL: 50
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1969	2,371.92	1,771	1,698	0.7159	674	12.66	53	48.5
1970	24.30	18	17	0.7064	7	13.15	1	47.5
1974	385.40	268	256	0.6653	129	15.29	8	43.5
1975	160.20	109	105	0.6543	55	15.87	3	42.5
1978	2,137.36	1,381	1,324	0.6194	813	17.69	46	39.5
1979	10.00	6	6	0.6073	4	18.32	0	38.5
1980	23.00	14	14	0.5949	9	18.97	0	37.5
1981	1,005.00	610	585	0.5822	420	19.63	21	36.5
1982	25.00	15	14	0.5693	11	20.30	1	35.5
1983	4.00	2	2	0.5562	2	20.99	0	34.5
1984	2.00	1	1	0.5428	1	21.68	0	33.5
1985	5,449.84	3,009	2,884	0.5293	2,565	22.39	115	32.5
1986	3.00	2	2	0.5155	1	23.11	0	31.5
1987	11.00	6	6	0.5015	5	23.84	0	30.5
1988	10.00	5	5	0.4874	5	24.58	0	29.5
1990	12.00	6	6	0.4584	6	26.09	0	27.5
1991	437.00	202	194	0.4437	243	26.86	9	26.5
1992	712.30	319	305	0.4288	407	27.63	15	25.5
1994	42.00	17	17	0.3984	25	29.22	1	23.5
1995	1,474.25	589	565	0.3829	910	30.02	30	22.5
1996	19.50	7	7	0.3673	12	30.84	0	21.5
1997	226.50	83	80	0.3516	147	31.66	5	20.5
1998	60.00	21	20	0.3356	40	32.49	1	19.5
1999	821.72	274	263	0.3196	559	33.33	17	18.5
2000	19.50	6	6	0.3033	14	34.18	0	17.5
2007	2,206.80	428	410	0.1859	1,796	40.30	45	10.5

GREAT PLAINS NATURAL GAS CO.

Account #: 374.2 - DISTRIBUTION - RIGHTS OF WAY

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R2.5
ASL: 50
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
TOTAL	17,653.59	9,171	8,791		8,863		373	

COMPOSITE ANNUAL ACCRUAL RATE	2.11%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.50
COMPOSITE AVERAGE AGE (YEARS)	31.17
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	24.02

GREAT PLAINS NATURAL GAS CO.

Account #: 376 - DISTRIBUTION - STEEL MAINS

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R3
ASL: 46
Net Salvage: -55%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1960	45,803.96	63,097	67,631	1.4765	3,365	5.12	657	57.5
1966	695,419.32	913,648	979,297	1.4082	98,603	7.01	14,067	51.5
1967	1,436,335.63	1,869,164	2,003,471	1.3948	222,849	7.38	30,198	50.5
1968	36,396.60	46,888	50,257	1.3808	6,158	7.77	793	49.5
1969	90,140.99	114,884	123,138	1.3661	16,580	8.18	2,028	48.5
1970	49,919.32	62,901	67,421	1.3506	9,954	8.60	1,157	47.5
1971	23,240.90	28,934	31,013	1.3344	5,011	9.05	554	46.5
1972	35,439.27	43,559	46,689	1.3174	8,241	9.52	865	45.5
1973	51,056.56	61,912	66,360	1.2997	12,778	10.01	1,276	44.5
1974	23,853.32	28,514	30,563	1.2813	6,410	10.52	609	43.5
1975	190,620.94	224,453	240,581	1.2621	54,881	11.06	4,964	42.5
1976	49,770.53	57,679	61,824	1.2422	15,320	11.61	1,320	41.5
1977	16,608.62	18,928	20,288	1.2216	5,455	12.18	448	40.5
1978	55,385.38	62,018	66,475	1.2002	19,373	12.77	1,517	39.5
1979	63,030.82	69,285	74,264	1.1782	23,434	13.38	1,752	38.5
1980	43,224.25	46,600	49,948	1.1556	17,049	14.00	1,217	37.5
1981	80,857.82	85,417	91,554	1.1323	33,776	14.65	2,306	36.5
1982	35,946.91	37,173	39,844	1.1084	15,874	15.31	1,037	35.5
1983	107,259.77	108,473	116,267	1.0840	49,986	15.99	3,127	34.5
1984	109,651.40	108,332	116,116	1.0590	53,844	16.68	3,228	33.5
1985	993,281.89	957,661	1,026,473	1.0334	513,114	17.39	29,512	32.5
1986	213,541.46	200,694	215,115	1.0074	115,874	18.11	6,399	31.5
1987	174,683.41	159,850	171,336	0.9808	99,423	18.84	5,276	30.5
1988	110,089.22	97,968	105,007	0.9538	65,631	19.59	3,350	29.5
1989	59,632.72	51,539	55,242	0.9264	37,189	20.35	1,827	28.5
1990	86,365.92	72,394	77,596	0.8985	56,272	21.12	2,664	27.5
1991	219,197.68	177,939	190,724	0.8701	149,032	21.91	6,802	26.5
1992	194,289.26	152,505	163,463	0.8413	137,685	22.71	6,064	25.5

GREAT PLAINS NATURAL GAS CO.

Account #: 376 - DISTRIBUTION - STEEL MAINS

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R3
ASL: 46
Net Salvage: -55%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1993	204,363.79	154,851	165,977	0.8122	150,787	23.51	6,413	24.5
1994	137,414.33	100,331	107,540	0.7826	105,452	24.33	4,334	23.5
1995	312,311.27	219,297	235,055	0.7526	249,028	25.16	9,897	22.5
1996	103,532.51	69,766	74,779	0.7223	85,697	26.00	3,296	21.5
1997	591,717.83	381,770	409,202	0.6915	507,961	26.85	18,917	20.5
1998	197,008.12	121,394	130,117	0.6605	175,246	27.71	6,324	19.5
1999	168,983.87	99,170	106,296	0.6290	155,629	28.58	5,445	18.5
2000	13,027.77	7,259	7,781	0.5973	12,412	29.46	421	17.5
2001	194,688.38	102,651	110,027	0.5651	191,740	30.35	6,317	16.5
2002	40,121.00	19,940	21,373	0.5327	40,814	31.25	1,306	15.5
2003	283,066.50	132,040	141,528	0.5000	297,225	32.16	9,243	14.5
2004	582,937.82	253,960	272,208	0.4670	631,345	33.07	19,091	13.5
2005	333,012.03	134,733	144,415	0.4337	371,754	33.99	10,936	12.5
2006	222,111.67	82,910	88,867	0.4001	255,406	34.92	7,314	11.5
2007	298,349.61	101,955	109,281	0.3663	353,161	35.86	9,849	10.5
2008	657,890.17	203,923	218,575	0.3322	801,154	36.80	21,770	9.5
2009	249,071.36	69,241	74,216	0.2980	311,844	37.75	8,261	8.5
2010	685,233.85	168,459	180,564	0.2635	881,549	38.70	22,777	7.5
2011	753,610.63	160,905	172,467	0.2289	995,630	39.66	25,102	6.5
2012	959,857.37	173,753	186,238	0.1940	1,301,541	40.63	32,036	5.5
2013	910,468.07	135,092	144,798	0.1590	1,266,427	41.60	30,445	4.5
2014	1,500,404.18	173,445	185,907	0.1239	2,139,719	42.57	50,264	3.5
2015	1,430,196.33	118,277	126,776	0.0886	2,090,029	43.55	47,996	2.5
2016	1,317,490.68	65,469	70,173	0.0533	1,971,938	44.53	44,288	1.5
2017	1,988,703.44	32,984	35,354	0.0178	3,047,136	45.51	66,959	0.5

GREAT PLAINS NATURAL GAS CO.

Account #: 376 - DISTRIBUTION - STEEL MAINS

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R3
ASL: 46
Net Salvage: -55%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
TOTAL	19,426,616.45	9,205,986	9,867,471		20,243,784		604,015	

COMPOSITE ANNUAL ACCRUAL RATE	3.11%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.51
COMPOSITE AVERAGE AGE (YEARS)	16.40
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	31.94

GREAT PLAINS NATURAL GAS CO.

Account #: 379 - MEAS & REG STATION EQUIP-CITY GATE

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R3
ASL: 28
Net Salvage: -5%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1977	260.06	256	226	0.8699	47	1.70	28	40.5
1985	17,563.08	15,887	14,015	0.7980	4,426	3.88	1,141	32.5
1995	285.91	207	182	0.6373	118	8.74	14	22.5
1997	31,122.11	20,916	18,452	0.5929	14,226	10.08	1,412	20.5
1998	59.59	38	34	0.5694	29	10.79	3	19.5
1999	31,161.24	19,259	16,990	0.5452	15,729	11.52	1,366	18.5
2004	32,490.96	15,255	13,458	0.4142	20,658	15.48	1,335	13.5
2009	6,781.83	2,067	1,824	0.2689	5,297	19.87	267	8.5
2011	24,489.78	5,763	5,084	0.2076	20,630	21.72	950	6.5
2012	200,929.99	40,173	35,440	0.1764	175,536	22.67	7,744	5.5
2015	92,705.87	8,510	7,508	0.0810	89,833	25.55	3,516	2.5
2017	47,032.71	868	766	0.0163	48,619	27.51	1,767	0.5
TOTAL	484,883.13	129,199	113,979		395,148		19,539	

COMPOSITE ANNUAL ACCRUAL RATE	4.03%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.24
COMPOSITE AVERAGE AGE (YEARS)	7.88
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	20.89

GREAT PLAINS NATURAL GAS CO.

Account #: 380 - SERVICES

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R3
ASL: 39
Net Salvage: -75%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1966	138,264.98	219,585	241,964	1.7500	0	3.61	0	51.5
1967	338,196.07	533,151	591,843	1.7500	0	3.87	0	50.5
1968	41,822.01	65,426	73,189	1.7500	0	4.14	0	49.5
1969	47,990.01	74,482	83,983	1.7500	0	4.41	0	48.5
1970	71,071.32	109,388	124,375	1.7500	0	4.70	0	47.5
1971	53,128.55	81,055	92,975	1.7500	0	5.00	0	46.5
1972	60,299.03	91,139	105,523	1.7500	0	5.32	0	45.5
1973	63,387.12	94,855	109,865	1.7332	1,062	5.65	188	44.5
1974	41,452.80	61,374	71,086	1.7149	1,457	6.00	243	43.5
1975	36,660.26	53,661	62,153	1.6954	2,003	6.38	314	42.5
1976	32,695.44	47,275	54,755	1.6747	2,462	6.78	363	41.5
1977	17,794.28	25,393	29,411	1.6528	1,729	7.20	240	40.5
1978	67,818.95	95,426	110,526	1.6297	8,157	7.64	1,067	39.5
1979	132,477.67	183,616	212,671	1.6053	19,165	8.11	2,363	38.5
1980	138,476.04	188,862	218,748	1.5797	23,585	8.61	2,741	37.5
1981	147,865.77	198,230	229,598	1.5527	29,168	9.12	3,197	36.5
1982	95,071.58	125,143	144,945	1.5246	21,430	9.67	2,217	35.5
1983	89,682.53	115,771	134,090	1.4952	22,854	10.23	2,234	34.5
1984	106,484.05	134,649	155,956	1.4646	30,391	10.82	2,809	33.5
1985	324,887.36	401,917	465,517	1.4329	103,036	11.43	9,014	32.5
1986	191,698.33	231,718	268,385	1.4000	67,087	12.06	5,562	31.5
1987	181,448.85	214,023	247,890	1.3662	69,646	12.71	5,478	30.5
1988	173,496.82	199,419	230,975	1.3313	72,644	13.38	5,427	29.5
1989	179,043.90	200,261	231,950	1.2955	81,377	14.07	5,782	28.5
1990	189,153.84	205,568	238,098	1.2588	92,922	14.78	6,287	27.5
1991	202,106.86	213,090	246,810	1.2212	106,877	15.50	6,894	26.5
1992	204,934.57	209,272	242,387	1.1828	116,248	16.24	7,157	25.5
1993	234,962.80	231,984	268,693	1.1436	142,492	17.00	8,383	24.5

GREAT PLAINS NATURAL GAS CO.

Account #: 380 - SERVICES

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R3
ASL: 39
Net Salvage: -75%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1994	229,748.33	218,907	253,547	1.1036	148,513	17.77	8,359	23.5
1995	217,609.26	199,692	231,292	1.0629	149,524	18.55	8,061	22.5
1996	224,485.11	197,976	229,303	1.0215	163,546	19.35	8,454	21.5
1997	281,682.75	238,174	275,862	0.9793	217,082	20.16	10,770	20.5
1998	349,785.53	282,840	327,596	0.9366	284,528	20.98	13,562	19.5
1999	290,678.35	224,137	259,604	0.8931	249,083	21.82	11,418	18.5
2000	96,273.00	70,571	81,738	0.8490	86,740	22.66	3,827	17.5
2001	186,952.55	129,825	150,368	0.8043	176,799	23.52	7,516	16.5
2002	205,317.51	134,548	155,839	0.7590	203,467	24.40	8,340	15.5
2003	191,072.72	117,645	136,261	0.7131	198,116	25.28	7,837	14.5
2004	183,123.98	105,410	122,090	0.6667	198,377	26.17	7,580	13.5
2005	207,217.89	110,879	128,425	0.6198	234,206	27.08	8,650	12.5
2006	175,552.07	86,741	100,467	0.5723	206,749	27.99	7,387	11.5
2007	167,021.31	75,616	87,581	0.5244	204,706	28.91	7,081	10.5
2008	263,266.90	108,192	125,313	0.4760	335,405	29.84	11,240	9.5
2009	175,893.71	64,877	75,143	0.4272	232,671	30.78	7,559	8.5
2010	348,626.52	113,787	131,793	0.3780	478,304	31.73	15,076	7.5
2011	376,392.22	106,755	123,648	0.3285	535,038	32.68	16,372	6.5
2012	1,046,148.79	251,695	291,523	0.2787	1,539,237	33.64	45,759	5.5
2013	976,236.21	192,609	223,087	0.2285	1,485,326	34.60	42,925	4.5
2014	1,391,418.89	213,974	247,834	0.1781	2,187,149	35.57	61,484	3.5
2015	1,393,328.37	153,340	177,605	0.1275	2,260,720	36.55	61,857	2.5
2016	1,612,293.12	106,652	123,528	0.0766	2,697,984	37.53	71,897	1.5
2017	1,745,263.16	38,540	44,638	0.0256	3,009,572	38.51	78,155	0.5

GREAT PLAINS NATURAL GAS CO.

Account #: 380 - SERVICES

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R3
ASL: 39
Net Salvage: -75%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
TOTAL	15,937,760.04	8,149,111	9,392,445		18,498,635		609,125	

COMPOSITE ANNUAL ACCRUAL RATE	3.82%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.59
COMPOSITE AVERAGE AGE (YEARS)	13.25
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	27.61

GREAT PLAINS NATURAL GAS CO.

Account #: 385 - INDUSTRIAL MEAS. & REG. STATION EQUIPMENT

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: S4
ASL: 40
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1985	4,977.47	3,815	3,696	0.7425	1,282	9.34	137	32.5
2000	110.66	48	47	0.4238	64	22.50	3	17.5
2014	21,162.64	1,852	1,794	0.0848	19,369	36.50	531	3.5
2015	136,533.64	8,533	8,267	0.0606	128,266	37.50	3,420	2.5
TOTAL	162,784.41	14,248	13,804		148,980		4,091	

COMPOSITE ANNUAL ACCRUAL RATE	2.51%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.08
COMPOSITE AVERAGE AGE (YEARS)	3.56
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	36.50

GREAT PLAINS NATURAL GAS CO.

Account #: 387.1 - CATHODIC PROTECTION EQUIPMENT

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R3
ASL: 25
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
2000	5,307.90	3,277	2,908	0.5479	2,400	9.57	251	17.5
2015	3,927.21	384	341	0.0868	3,586	22.55	159	2.5
TOTAL	9,235.11	3,661	3,249		5,986		410	

COMPOSITE ANNUAL ACCRUAL RATE	4.44%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.35
COMPOSITE AVERAGE AGE (YEARS)	11.12
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	15.09

GREAT PLAINS NATURAL GAS CO.

Account #: 387.2 - OTHER EQUIPMENT

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R3
ASL: 30
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1972	51.96	50	52	1.0000	0	1.30	0	45.5
1985	11,446.52	9,544	11,446	1.0000	0	4.99	0	32.5
TOTAL	11,498.48	9,594	11,498		0		0	

COMPOSITE ANNUAL ACCRUAL RATE	0.00%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	1.00
COMPOSITE AVERAGE AGE (YEARS)	32.56
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	4.97

GREAT PLAINS NATURAL GAS CO.

Account #: 390 - GENERAL STRUCTURES & IMPROVEMENTS

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R4
ASL: 45
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1966	162.04	147	162	1.0000	0	4.18	0	51.5
1967	63,684.77	57,327	63,685	1.0000	0	4.49	0	50.5
1971	1,043.27	906	1,043	1.0000	0	5.93	0	46.5
1972	3,961.15	3,401	3,961	1.0000	0	6.36	0	45.5
1973	5,277.90	4,477	5,278	1.0000	0	6.83	0	44.5
1974	15,038.59	12,589	15,039	1.0000	0	7.33	0	43.5
1975	1,406.22	1,160	1,406	1.0000	0	7.87	0	42.5
1978	450.00	353	450	1.0000	0	9.68	0	39.5
1980	394.59	298	395	1.0000	0	11.01	0	37.5
1982	3,395.31	2,459	3,395	1.0000	0	12.41	0	35.5
1983	1,470.36	1,041	1,470	1.0000	0	13.13	0	34.5
1985	71,695.66	48,401	71,696	1.0000	0	14.62	0	32.5
1989	71,935.28	43,471	67,602	0.9398	4,334	17.81	243	28.5
1990	97,496.83	57,105	88,804	0.9108	8,692	18.64	466	27.5
1991	5,549.42	3,145	4,891	0.8814	658	19.50	34	26.5
1993	3,055.00	1,613	2,508	0.8210	547	21.24	26	24.5
1995	2,965.78	1,447	2,251	0.7589	715	23.04	31	22.5
1996	8,137.66	3,805	5,917	0.7272	2,220	23.96	93	21.5
2000	226,436.98	86,947	135,212	0.5971	91,225	27.72	3,291	17.5
2001	17,578.74	6,375	9,913	0.5639	7,665	28.68	267	16.5
2002	9,172.24	3,129	4,866	0.5306	4,306	29.65	145	15.5
2003	1,099.87	351	547	0.4970	553	30.62	18	14.5
2004	6,757.20	2,013	3,130	0.4632	3,627	31.60	115	13.5
2006	236,722.27	60,183	93,591	0.3954	143,131	33.56	4,265	11.5
2008	954,062.70	200,659	312,046	0.3271	642,017	35.54	18,067	9.5
2010	76,867.95	12,777	19,869	0.2585	56,999	37.52	1,519	7.5
2012	218,292.29	26,628	41,410	0.1897	176,883	39.51	4,477	5.5
2014	38,164.50	2,964	4,610	0.1208	33,555	41.50	808	3.5

GREAT PLAINS NATURAL GAS CO.

Account #: 390 - GENERAL STRUCTURES & IMPROVEMENTS

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R4
ASL: 45
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
2015	18,348.29	1,018	1,583	0.0863	16,765	42.50	394	2.5
2016	4,336.44	144	225	0.0518	4,112	43.50	95	1.5
2017	363,738.11	4,036	6,277	0.0173	357,461	44.50	8,033	0.5
TOTAL	2,528,697.41	650,371	973,232		1,555,465		42,387	

COMPOSITE ANNUAL ACCRUAL RATE	1.68%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.38
COMPOSITE AVERAGE AGE (YEARS)	12.09
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	33.43

GREAT PLAINS NATURAL GAS CO.

Account #: 391.1 - OFFICE FURNITURE & EQUIPMENT

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: SQ
ASL: 16
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
2002	7,641.54	7,403	7,368	0.9643	273	0.50	273	15.5
2003	8,738.97	7,920	7,883	0.9020	856	1.50	571	14.5
2004	548.36	463	461	0.8398	88	2.50	35	13.5
2005	8,405.76	6,567	6,537	0.7776	1,869	3.50	534	12.5
2006	1,020.83	734	730	0.7154	291	4.50	65	11.5
2007	29,164.21	19,139	19,050	0.6532	10,114	5.50	1,839	10.5
2008	15,785.78	9,373	9,329	0.5910	6,456	6.50	993	9.5
2009	1,449.56	770	767	0.5288	683	7.50	91	8.5
2010	2,389.63	1,120	1,115	0.4666	1,275	8.50	150	7.5
2011	5,149.75	2,092	2,082	0.4044	3,067	9.50	323	6.5
2012	5,179.29	1,780	1,772	0.3422	3,407	10.50	324	5.5
2014	8,457.23	1,850	1,841	0.2177	6,616	12.50	529	3.5
2017	1,386.39	43	43	0.0311	1,343	15.50	87	0.5
TOTAL	95,317.30	59,254	58,979		36,338		5,814	

COMPOSITE ANNUAL ACCRUAL RATE	6.10%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.62
COMPOSITE AVERAGE AGE (YEARS)	9.95
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	6.05

GREAT PLAINS NATURAL GAS CO.

Account #: 391.3 - COMPUTER & ELECTRONIC EQUIPMENT

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: SQ
ASL: 4
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
2015	61,616.92	38,511	26,529	0.4305	35,088	1.50	23,392	2.5
TOTAL	61,616.92	38,511	26,529		35,088		23,392	

COMPOSITE ANNUAL ACCRUAL RATE	37.96%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.43
COMPOSITE AVERAGE AGE (YEARS)	2.50
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	1.50

GREAT PLAINS NATURAL GAS CO.

Account #: 392.1 - TRANSPORTATION EQUIPMENT - TRAILERS

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: R1
ASL: 12
Net Salvage: 10%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1991	8,118.60	7,307	7,307	0.9000	0	0.00	0	27.5
1992	700.00	630	630	0.9000	0	0.00	0	26.5
1999	7,625.30	5,826	6,863	0.9000	0	1.81	0	18.5
2008	6,263.88	2,951	5,637	0.9000	0	5.72	0	9.5
2011	8,459.68	2,846	5,510	0.6513	2,104	7.51	280	6.5
TOTAL	31,167.46	19,560	25,947		2,104		280	

COMPOSITE ANNUAL ACCRUAL RATE	0.90%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.83
COMPOSITE AVERAGE AGE (YEARS)	15.96
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	3.63

GREAT PLAINS NATURAL GAS CO.

Account #: 392.2 - TRANSPORTATION EQUIPMENT

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: L2
ASL: 7
Net Salvage: 20%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
2001	4,102.12	2,944	3,282	0.8000	0	0.72	0	16.5
2002	4,633.79	3,241	3,707	0.8000	0	0.88	0	15.5
2004	2,548.66	1,677	2,039	0.8000	0	1.24	0	13.5
2006	2,792.17	1,704	2,234	0.8000	0	1.66	0	11.5
2007	8,225.76	4,800	6,364	0.7736	217	1.89	115	10.5
2008	6,139.41	3,411	4,522	0.7365	390	2.14	182	9.5
2009	134,582.74	70,958	94,064	0.6989	13,602	2.39	5,699	8.5
2010	148,421.83	74,148	98,293	0.6623	20,445	2.63	7,778	7.5
2011	107,654.57	50,842	67,398	0.6261	18,726	2.87	6,530	6.5
2012	168,795.26	74,596	98,887	0.5858	36,150	3.13	11,538	5.5
2013	160,107.38	64,340	85,291	0.5327	42,795	3.48	12,284	4.5
2014	40,184.30	13,806	18,302	0.4555	13,845	3.99	3,467	3.5
2015	343,742.27	90,084	119,418	0.3474	155,576	4.71	33,053	2.5
2016	183,897.73	30,295	40,161	0.2184	106,957	5.56	19,242	1.5
2017	65,065.12	3,696	4,899	0.0753	47,153	6.50	7,251	0.5
TOTAL	1,380,893.11	490,542	648,860		455,854		107,138	

COMPOSITE ANNUAL ACCRUAL RATE	7.76%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.47
COMPOSITE AVERAGE AGE (YEARS)	4.54
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	3.89

GREAT PLAINS NATURAL GAS CO.

Account #: 394.0 - TOOLS, SHOP, & GARAGE EQUIPMENT

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: SQ
ASL: 20
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
2000	53,370.43	46,699	45,575	0.8539	7,795	2.50	3,118	17.5
2001	19,329.73	15,947	15,563	0.8051	3,766	3.50	1,076	16.5
2002	22,549.99	17,476	17,056	0.7564	5,494	4.50	1,221	15.5
2003	43,960.29	31,871	31,104	0.7076	12,856	5.50	2,337	14.5
2004	16,735.02	11,296	11,024	0.6588	5,711	6.50	879	13.5
2005	33,532.87	20,958	20,454	0.6100	13,079	7.50	1,744	12.5
2006	17,480.80	10,051	9,810	0.5612	7,671	8.50	902	11.5
2007	13,031.67	6,842	6,677	0.5124	6,355	9.50	669	10.5
2008	13,260.15	6,299	6,147	0.4636	7,113	10.50	677	9.5
2009	10,100.22	4,293	4,189	0.4148	5,911	11.50	514	8.5
2010	17,250.11	6,469	6,313	0.3660	10,937	12.50	875	7.5
2011	33,124.55	10,765	10,506	0.3172	22,618	13.50	1,675	6.5
2012	61,302.98	16,858	16,453	0.2684	44,850	14.50	3,093	5.5
2013	12,834.35	2,888	2,818	0.2196	10,016	15.50	646	4.5
2014	51,798.37	9,065	8,847	0.1708	42,952	16.50	2,603	3.5
2015	20,004.03	2,501	2,440	0.1220	17,564	17.50	1,004	2.5
2016	56,019.22	4,201	4,100	0.0732	51,919	18.50	2,806	1.5
2017	132,584.87	3,315	3,235	0.0244	129,350	19.50	6,633	0.5
TOTAL	628,269.65	227,794	222,312		405,958		32,474	

COMPOSITE ANNUAL ACCRUAL RATE	5.17%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.35
COMPOSITE AVERAGE AGE (YEARS)	7.25
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	12.75

GREAT PLAINS NATURAL GAS CO.

Account #: 396.1 - POWER OPERATED EQUIPMENT - TRAILERS

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: L0
ASL: 6
Net Salvage: 65%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1973	4.81	2	2	0.3500	0	0.00	0	45.5
1979	663.62	232	232	0.3500	0	0.00	0	39.5
1980	119.48	42	42	0.3500	0	0.00	0	38.5
1982	264.06	92	92	0.3500	0	0.00	0	36.5
1987	346.87	121	121	0.3500	0	0.00	0	31.5
1988	609.29	213	213	0.3500	0	0.00	0	30.5
1989	967.99	339	339	0.3500	0	0.00	0	29.5
1991	260.29	91	91	0.3500	0	0.00	0	27.5
1994	544.85	175	191	0.3500	0	0.50	0	23.5
1995	829.30	261	290	0.3500	0	0.61	0	22.5
1996	2,821.57	872	988	0.3500	0	0.70	0	21.5
1997	138.86	42	49	0.3500	0	0.81	0	20.5
1998	274.65	81	96	0.3500	0	0.92	0	19.5
1999	549.17	159	192	0.3500	0	1.04	0	18.5
2000	1,765.30	497	618	0.3500	0	1.17	0	17.5
2002	2,391.45	634	837	0.3500	0	1.46	0	15.5
2005	32.06	8	11	0.3500	0	1.96	0	12.5
2007	8,243.55	1,757	2,885	0.3500	0	2.35	0	10.5
2008	2,843.96	570	995	0.3500	0	2.56	0	9.5
2009	3,646.99	682	1,276	0.3500	0	2.80	0	8.5
2010	11,436.97	1,970	4,003	0.3500	0	3.05	0	7.5
2013	4,862.98	587	1,702	0.3500	0	3.93	0	4.5
2014	18,641.36	1,871	6,524	0.3500	0	4.28	0	3.5
2015	4,810.86	376	1,684	0.3500	0	4.66	0	2.5
2016	12,251.91	649	2,904	0.2370	1,384	5.09	272	1.5
2017	72,119.88	1,529	6,845	0.0949	18,396	5.64	3,264	0.5

GREAT PLAINS NATURAL GAS CO.

Account #: 396.1 - POWER OPERATED EQUIPMENT - TRAILERS

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: L0
ASL: 6
Net Salvage: 65%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
TOTAL	151,442.08	13,851	33,224		19,781		3,535	

COMPOSITE ANNUAL ACCRUAL RATE	2.33%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.22
COMPOSITE AVERAGE AGE (YEARS)	4.42
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	4.43

GREAT PLAINS NATURAL GAS CO.

Account #: 396.2 - POWER OPERATED EQUIPMENT

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: L0
ASL: 6
Net Salvage: 65%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
1973	35.00	12	12	0.3500	0	0.00	0	45.5
1979	4,828.59	1,690	1,690	0.3500	0	0.00	0	39.5
1980	869.36	304	304	0.3500	0	0.00	0	38.5
1982	1,921.35	672	672	0.3500	0	0.00	0	36.5
1987	2,523.82	883	883	0.3500	0	0.00	0	31.5
1988	4,433.26	1,552	1,552	0.3500	0	0.00	0	30.5
1989	7,043.15	2,465	2,465	0.3500	0	0.00	0	29.5
1991	1,893.92	663	663	0.3500	0	0.00	0	27.5
1994	3,964.35	1,272	1,388	0.3500	0	0.50	0	23.5
1995	6,034.03	1,897	2,112	0.3500	0	0.61	0	22.5
1996	20,530.01	6,345	7,186	0.3500	0	0.70	0	21.5
1997	1,010.37	306	354	0.3500	0	0.81	0	20.5
1998	1,998.41	592	699	0.3500	0	0.92	0	19.5
1999	3,995.83	1,156	1,399	0.3500	0	1.04	0	18.5
2000	12,844.49	3,619	4,496	0.3500	0	1.17	0	17.5
2002	17,400.41	4,612	6,090	0.3500	0	1.46	0	15.5
2005	233.31	55	82	0.3500	0	1.96	0	12.5
2007	59,980.82	12,782	20,993	0.3500	0	2.35	0	10.5
2008	20,692.87	4,148	7,243	0.3500	0	2.56	0	9.5
2009	26,535.81	4,959	9,288	0.3500	0	2.80	0	8.5
2010	83,216.40	14,332	29,126	0.3500	0	3.05	0	7.5
2013	35,383.52	4,268	12,384	0.3500	0	3.93	0	4.5
2014	135,636.22	13,613	47,473	0.3500	0	4.28	0	3.5
2015	35,004.26	2,739	12,251	0.3500	0	4.66	0	2.5
2016	89,145.99	4,720	31,201	0.3500	0	5.09	0	1.5
2017	524,769.56	11,126	98,741	0.1882	84,929	5.64	15,068	0.5

GREAT PLAINS NATURAL GAS CO.

Account #: 396.2 - POWER OPERATED EQUIPMENT

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: L0
ASL: 6
Net Salvage: 65%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
TOTAL	1,101,925.11	100,782	300,745		84,929		15,068	

COMPOSITE ANNUAL ACCRUAL RATE	1.37%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.27
COMPOSITE AVERAGE AGE (YEARS)	4.42
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	4.43

GREAT PLAINS NATURAL GAS CO.

Account #: 397 - COMMUNICATIONS EQUIPMENT

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: SQ
ASL: 18
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
2000	5,175.22	5,031	4,991	0.9645	184	0.50	184	17.5
2001	7,624.07	6,989	6,933	0.9094	691	1.50	461	16.5
2002	11,369.56	9,790	9,712	0.8542	1,657	2.50	663	15.5
2003	5,701.24	4,593	4,556	0.7991	1,145	3.50	327	14.5
2004	183,273.60	137,455	136,359	0.7440	46,915	4.50	10,426	13.5
2008	15,081.38	7,960	7,896	0.5236	7,185	8.50	845	9.5
2010	9,894.78	4,123	4,090	0.4133	5,805	10.50	553	7.5
2012	65,462.99	20,003	19,843	0.3031	45,620	12.50	3,650	5.5
TOTAL	303,582.84	195,944	194,381		109,202		17,108	

COMPOSITE ANNUAL ACCRUAL RATE	5.64%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.64
COMPOSITE AVERAGE AGE (YEARS)	11.62
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	6.38

GREAT PLAINS NATURAL GAS CO.

Account #: 398 - MISCELLANEOUS EQUIPMENT

CALCULATED ANNUAL ACCRUAL AND ACCRUED DEPRECIATION

BASED ON ORIGINAL COST AS OF DECEMBER 31, 2017

ALG - Remaining Life
Survivor Curve: SQ
ASL: 25
Net Salvage: 0%
Truncation Year:

Year	Original Cost	Calculated Accumulated Depreciation	Allocated Actual Booked Amount	Accumulated Depreciation Factor	Net Book Value	ALG Remaining Life	Annual Accrual	Average Age
2006	8,332.68	3,833	3,485	0.4182	4,848	13.50	359	11.5
2008	43,005.89	16,342	14,856	0.3455	28,149	15.50	1,816	9.5
TOTAL	51,338.57	20,175	18,341		32,998		2,175	

COMPOSITE ANNUAL ACCRUAL RATE	4.24%
THEORETICAL ACCUMULATED DEPRECIATION FACTOR	0.36
COMPOSITE AVERAGE AGE (YEARS)	9.82
DIRECTED WEIGHTED ALG COMPOSITE REMAINING LIFE (YEARS)	15.18