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*Witness:* Gregory E. Macias

*Sponsoring Party:* MoPSC Staff

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*Case Nos.:* WR-2003-0500 AND  
WC-2004-0168

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**MISSOURI PUBLIC SERVICE COMMISSION**

**UTILITY SERVICES DIVISION**

**DIRECT TESTIMONY**

**OF**

**GREGORY E. MACIAS**

**MISSOURI-AMERICAN WATER COMPANY**


**CASE NOS. WR-2003-0500 AND WC-2004-0168**

*Jefferson City, Missouri*

*October 2003*

In the Matter of the General Rate Increase for	)	
Water and Sewer Service Provided by	)	Case No. WR-2003-0500
Missouri-American Water Company.	)	
Staff of the Missouri Public Service Commission,	)	
	)	Case No. WC-2004-0168
Complainant,	)	
	)	
v.	)	
	)	
Missouri-American Water Company,	)	
	)	
Respondent.	)	

STATE OF MISSOURI            )  
  )  
COUNTY OF COLE            )            SS.

  
Gregory E. Macias

TONI M. CHARLTON  
NOTARY PUBLIC STATE OF MISSOURI  
COUNTY OF COLE  
My Commission Expires December 28, 2004

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**GREGORY E. MACIAS**

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**DIRECT TESTIMONY**  
**OF**  
**GREGORY E. MACIAS**  
**MISSOURI-AMERICAN WATER COMPANY**  
**CASE NOS. WR-2003-0500 AND WC-2004-0168**

Q. Please state your name and business address.

A. Gregory E. Macias, P.O. Box 360, Jefferson City, MO 65102.

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

A. I am employed by the Missouri Public Service Commission (PSC or Commission) as a Utility Engineering Specialist II in the Engineering and Management Services Department.

Q. Please describe your educational background.

A. I earned a Bachelor of Science degree in Civil Engineering from the University of Missouri - Columbia.

Q. Please describe your work background.

A. I began working for the Missouri Public Service Commission in September 1997 as an Engineering Specialist in the Gas Safety Department. In December 2001, I joined the Engineering and Management Services Department in my current position.

Q. Please describe your duties while employed by the Commission.

A. I am responsible for depreciation determinations of companies regulated by the Commission.

Q. Have you previously filed testimony before this Commission?

1 A. No.

2 Q. What matters will you address in your testimony?

3 A. I will address the Commission Staff's (Staff's) recommendation regarding  
4 depreciation rates.

5 Q. What knowledge, skill, experience, training or education do you have in these  
6 matters?

7 A. I have made on-site visits to several Missouri regulated water and sewer  
8 utilities, including the majority of the Missouri-American Water Company (MAWC or  
9 Company) properties. I have gained work related experience and training from the  
10 Engineering and Management Services department's engineering staff regarding concepts of  
11 depreciation. I have completed the NARUC Utility Rate School administered by the  
12 University of Florida and The National Association of Regulatory Utility Commissioners  
13 Water Committee. I have also completed the New Mexico State University Basic NARUC  
14 Course. I have reviewed prior Commission decisions and portions of the testimony regarding  
15 this issue in previous cases.

16 **OVERVIEW**

17 Q. What is the purpose of your testimony?

18 A. The purpose of my testimony is to provide depreciation rates that will allow  
19 the Company to collect the original cost of capital investments over the life of its assets.

20 Q. What is the definition of depreciation?

21 A. In the opinion of the Supreme Court of the United States:

22 Broadly speaking, depreciation is the loss, not restored by current  
23 maintenance, which is due to all factors causing the ultimate retirement  
24 of the property. These factors embrace wear and tear, decay,

1                   inadequacy and obsolescence. Annual depreciation is the loss which  
2                   takes place in a year. [Source: In Re: Lindheimer v. Illinois Bell  
3                   Telephone Company, 292 U.S. 151, 167 (1934).]

4                   Simply stated, in a regulatory environment, depreciation expense is the full recovery  
5                   of the original cost of utility plant assets distributed over the life of the assets.

6                   Q.     What was your assignment in this case?

7                   A.     My assignment was to develop a depreciation rate for each utility plant account  
8                   that will recover the original cost of assets over their average service lives (ASL). In order to  
9                   allow MAWC to recover the original cost of plant in service over the useful life of the plant in  
10                  service, I determined the ASL of assets by utility plant account. Then, using the ASL, I  
11                  developed a depreciation rate. When the current plant balance is multiplied by the  
12                  depreciation rate, the result is an annual depreciation expense that is designed to fully recover  
13                  the original capital investment over the useful life of the assets.

14                Q.     How were you able to determine an average service life for each account?

15                A.     To determine the ASL, I performed a statistical analysis of historical  
16                  retirements, and using an empirically based model, determined the ASL of each account's  
17                  assets. This work was refined and confirmed by plant tours and meetings with Company  
18                  engineers and operations personnel who are directly involved with operations and  
19                  maintenance.

20                Q.     How do you develop a depreciation rate using the ASL?

21                A.     By dividing 100 percent (or one) by the Average Service Life. The resulting  
22                  percentage is a depreciation rate that is designed to provide full recovery of the original  
23                  capital investment of plant in service over the useful life of the plant.

24                Q.     How is an account's depreciation rate expected to recover the original cost of  
25                  capital plant in the account?

1           A.     Each account's depreciation rate is multiplied by the respective plant in service  
2 balance. The resulting dollar amount is the annual accrual. The sum of the annual accruals,  
3 over the course of the useful life of the assets, is designed to equal the original cost of the  
4 plant in service.

5           Essentially, the original cost of the plant is divided by the average service life. That  
6 portion of the original cost is collected in rates every year for as many years as the ASL at  
7 which time the original cost has been fully recovered.

8           Q.     Has this approach to appropriating depreciation expense been used by Staff  
9 before?

10          A.     Yes, Staff has consistently used this approach in the following cases:

11           Union Electric Company	GR-2000-512
12           Union Electric Company	EC-2002-1
13           Laclede Gas Company	GR-2001-621
14           Laclede Gas Company	GR-2002-356
15           St. Louis County Water	WR-2000-844
16           Empire District Electric Company	ER-2001-299
17           Empire District Electric Company	ER-2002-424
18           Utilicorp United, Inc.	ER-2001-672
19           Missouri Gas Energy Company	GR-2001-292

20          Q.     How has Staff addressed the cost of removing assets from service at the end of  
21 their useful lives?

22          A.     The recovery of the cost of removal and salvage is addressed in the testimony  
23 of Staff witness Edward F. Began.

24          **DEPRECIATION DETERMINATION**

25          Q.     How did you conduct the depreciation study for this case?

26          A.     The depreciation study consisted of three steps. Step one was the  
27 determination of the average service life for each utility plant account. The second step was

1 to use the ASL to develop a depreciation rate that would establish the annual accrual. Third, a  
2 theoretical reserve was calculated from the information acquired in the first two steps.

3 Q. Please explain the analysis that was conducted to determine the Average  
4 Service Life for each utility plant account.

5 A. The average service life for an account is determined by analyzing the  
6 historical record of plant additions and retirements, applying an empirically developed  
7 statistical model to the data record, and using engineering judgment and knowledge obtained  
8 in the field to confirm that the results are reasonable for the type of plant in question.

9 The Company provides the historical record of plant additions by year, called a  
10 vintage, and of retirements from each vintage by calendar year. From this data, a survivor  
11 plot is calculated. The survivor plot is the percentage of dollars surviving, as a function of  
12 age, for all vintages.

13 Next, an empirically developed statistical model known as the Iowa type curves is  
14 applied to the survivor plot. Curve-fitting calculations are used to determine which Iowa-type  
15 curve and average service life the survivor plot most closely resembles.

16 The Gannett Fleming Depreciation Analysis Software package was used as an  
17 engineering tool to automate the calculations, generate graphs, and format the presentation of  
18 the results.

19 Q. What are the Iowa type curves?

20 A. The Iowa curves are widely used models of the life characteristics of utility  
21 property. The system of Iowa curves is a family of curve shapes empirically derived from  
22 analysis of mortality data of 176 types of utility and industrial property. The curves were



1 developed at the Iowa Engineering Experiment Station at what is presently known as Iowa  
2 State University. The Iowa curves were first published in 1935 and reconfirmed in 1980.

3 Q. How is an account's ASL then used to develop a depreciation rate?

4 A. An account's depreciation rate is 100 percent divided by the account's ASL  
5 (100%/ASL). This depreciation rate is designed to provide the Company recovery of 100  
6 percent of the original cost of an account's assets over the period of those asset's used and  
7 useful lives. The ASL of an account is the estimation of the useful life of the assets in the  
8 account and therefore becomes the period over which the original cost of assets are to be  
9 recovered.

10 Q. How is the depreciation rate used to establish annual depreciation expense?

11 A. Depreciation expense is the sum of the capital account's annual accruals. An  
12 account's annual accrual is its plant in service balance multiplied by its depreciation rate, or  
13 the original cost of assets divided by the recovery period (ASL).

14 Q. Why is it necessary to express depreciation as a rate as opposed to a fixed  
15 annual dollar amount?

16 A. Depreciation rates are necessary because the plant in service balance is  
17 dynamic, i.e. the Company is adding and retiring plant each year. Depreciation rates provide  
18 for the appropriate adjustments to the booking of the annual accrual.

19 Q. What is the theoretical reserve, and how is it determined?

20 A. The theoretical reserve is the dollar amount that would be in the depreciation  
21 reserve (book reserve) account if plant experience was identical to the selected Iowa curve  
22 and ASL, and the corresponding depreciation rate had been applied from the plant's  
23 placement to the date of the study. The theoretical reserve is calculated from historical

1 additions and retirements, the average service life, and the selected survivor curve. Again, the  
2 computer software was used to automate the calculations and arrive at the theoretical reserve  
3 amount for each account.

4 **STUDY RESULTS**

5 Q. Did you conduct and complete a depreciation study of the St. Louis district of  
6 MAWC?

7 A. Yes, as described above. The results of the study can be found in Schedule 1.  
8 The depreciation rates determined in this study would reduce the currently ordered annual  
9 accrual for the St. Louis district from approximately \$16.5 million to approximately \$10  
10 million, a difference of approximately \$6.5 million for the plant in service balance as of  
11 December 31, 2002.

12 Q. Are any of the accounts fully depreciated?

13 A. Yes. Accounts [325.10] Electric Pumping Equipment - Prior to 1946, [325.30]  
14 Electric Pumping Equipment - Boosters, [343.30] Distribution Mains - Galvanized, [392.01]  
15 Transportation Equipment - Autos, [394.10] Shop and Garage Equipment, [395.10]  
16 Laboratory Furniture and [399.00] Other Tangible Property have accrued their original cost  
17 and their depreciation rates have been set to zero.

18 Q. How does the theoretical reserve compare to the book reserve?

19 A. For the St. Louis district, the book reserve is greater than the theoretical  
20 reserve by approximately \$72.5 million. This over accrual can be handled in one of two  
21 ways: 1) no adjustment is made at this time, and the lives and characteristics of plant in  
22 service are monitored for correlation to currently observed lives, 2) an adjustment to the

1 reserve is made by amortizing the over accrual over the period of the current ASL for all  
2 utility plant or 71 years.

3 Q. Of these two options, which does the Staff recommend?

4 A. The Staff is not proposing an adjustment. The Staff believes that this option is  
5 appropriate because the relationship of the book reserve to the plant balance is not excessive.

6 Q. Why does the depreciation reserve have an over accrual?

7 A. The depreciation reserve excess is a result of the Staff's proposed depreciation  
8 rates being lower than the existing rates. One reason Staff's rates are lower is because Staff's  
9 depreciation rates are based solely on the recovery of original cost. The basis for the existing  
10 depreciation rates has been influenced by factors such as investment policy and future cost of  
11 removal.

12 Q. Does Staff propose any other adjustments related to the level of depreciation  
13 expense?

14 A. The Company currently has two (2) active depreciation reserve deficiency  
15 amortizations ordered by the Commission. In light of the fact that Staff's calculations show a  
16 depreciation reserve excess, the two previously ordered reserve deficiency amortizations for  
17 the St. Louis district should be eliminated. The combined total of these amortizations is  
18 \$4,848,071 per year.

19 Q. Did you conduct and complete a depreciation study of the Brunswick,  
20 Jefferson City, Joplin, Mexico, Parkville, St. Charles, St. Joseph and Warrensburg districts  
21 (other districts) of MAWC?

22 A. No. The Company has not maintained complete or accurate data for the other  
23 eight districts, and therefore it is not possible to complete a life analysis with any degree of

1 accuracy. Additionally, the poor condition of data MAWC did provide precluded the Staff  
2 from calculating a reliable theoretical reserve.

3 Q. What depreciation rates do you propose for the other eight MAWC districts?

4 A. I propose using the St. Louis District depreciation rates for the other MAWC  
5 districts for all accounts except [312.00] Collecting and Impounding Reservoirs, [314.00]  
6 Wells and Springs, [390.00] Structures and Improvements Shop and Garage, [390.10]  
7 Structures and Improvements Office Buildings, [391.2] Computer Hardware and [391.25]  
8 Computer Software. For accounts [312.00], [314.00], [390.00], [390.10], [391.2] and  
9 [391.25], I recommend using the Staff's standardized water plant depreciation rates. The  
10 proposed rates for the other MAWC districts are listed in Schedule 2 and Schedule 3. The  
11 Jefferson City district appears in a separate schedule because it has ordered depreciation rates  
12 that are different from the rest of the other MAWC districts.

13 The proposed depreciation rates would reduce the currently ordered annual accrual for  
14 all districts of MAWC except the St. Louis from approximately \$7 million to approximately  
15 \$4.9 million, a difference of approximately \$2.1 million for the plant in service balance as of  
16 December 31, 2002.

17 Q. Are any of the accounts fully depreciated?

18 A. Yes. Accounts [303.00] Miscellaneous Intangible Plant - Other, [391.26]  
19 Miscellaneous Intangible Plant - Software and [392.30] Transportation Equipment - Other  
20 have accrued their original cost and their depreciation rates have been set to zero.

21 Q. Is the Staff proposing new depreciation rates for the Parkville district sewer  
22 system?

1           A.     Yes. The proposed depreciation rates are provided in Schedule 5. The  
2 proposed depreciation rates would increase the ordered annual accrual for the Parkville  
3 district sewer system from \$1,070 to \$1,443, an increase of \$373 for the plant in service  
4 balance as of December 31, 2002.

5           Q.     What is the total Staff adjustment to depreciation expense for all districts of  
6 MAWC including the elimination of amortizations?

7           A.     The Staff recommends an annual reduction to depreciation expense of  
8 approximately \$13.4 million based on December 31, 2002 plant in service balances.

9     **DATA ISSUE**

10          Q.     What data is required to conduct a depreciation study?

11          A.     The necessary data are: dollar additions per year (vintage) per account, and  
12 dollar retirements by vintage per account per year. Having a complete file of additions and  
13 retirements allows the analyst to generate a survivor plot that can then be analyzed to  
14 determine average service life.

15          Additionally, an account must have substantial history and activity (additions and  
16 retirements) to generate a survivor plot that can be fitted to a specific Iowa type curve and  
17 ASL.

18          Data that is incomplete or erroneous is difficult to analyze because the additions and  
19 retirements may not correlate, and the data may not accurately reflect the actual life  
20 experience of the plant in service. If the errors and omissions are extensive, an analysis of the  
21 data would likely determine ASLs that would produce depreciation rates that will recover  
22 more or less than the original cost of plant in service.

1           Q.     Why were you unable to determine unique depreciation rates for the districts of  
2 MAWC other than St. Louis?

3           A.     The data provided by the Company was not adequate for analysis. For the  
4 Joplin, Parkville, St. Charles, St. Joseph and Warrensburg districts, there were many years of  
5 omissions of retirements. For the Jefferson City district, there were only three recent years of  
6 usable data available. Furthermore, for the Brunswick, Mexico, Parkville, St. Charles and  
7 Warrensburg districts, there was too little activity in many of the accounts to conduct a  
8 computer based statistical analysis.

9           In addition to these problems with the data, there were various other errors that  
10 required the Company to submit the data files for seven of the MAWC districts four different  
11 times during this case proceeding, the latest of which still contained erroneous data.

12          Q.     Give an example of the missing data, and explain how it affects your ability to  
13 analyze those districts.

14          A.     The files for Joplin and St. Joseph appear to have a complete record of plant  
15 additions beginning in the 1800s, but in some accounts the files are missing over 100 years of  
16 retirements to that plant. In fact, there are no retirements posted in the Joplin district file until  
17 1983, and in the St. Joseph file until 1984 for any vintage. For example, the Joplin District  
18 Transmission and Distribution Mains (T&D Mains) account has additions in the file dating  
19 back to 1881, but there are no retirements posted until 1983. In other words, the data implies  
20 that additions of new mains were made from 1881 through 1982 without a single unit of plant  
21 being retired from any vintage until 1983.

22          The results from analyzing the data as submitted cannot be trusted to represent a true  
23 retirement pattern. The data implies there were no retirements made until 1983, which is not

1 a reasonably accurate account of what actually happened. The survivor plot for Joplin's T&D  
2 Mains fits best to an Iowa curve that has an ASL of 192 years, which is far longer than could  
3 reasonably be expected to occur.

4 Q. What other errors were found in the data the Company submitted?

5 A. The Company submitted data files with account balances that were off by as  
6 much as 548% from their book balances. Not until the Company's fourth database  
7 submission did the account balances reconcile.

8 Additionally, the database contains voluminous entries where the placement of a plant  
9 vintage is indicated to have occurred at sometime in the future. For example, in the St. Joseph  
10 Structures and Improvements – Water Treatment Equipment account, there are additions in  
11 1992 of \$43,228.20 of 1986 vintage plant. This apparent error cannot be corrected without  
12 knowing if these entries should have been additions of 1986 vintage plant in 1986, 1992  
13 vintage plant, or if these entries are incorrectly coded adjustments to errors in previous  
14 entries. While the errors are not as extensive as in the first three Company databases, they  
15 still exist in the latest database provided by the Company.

16 Q. What actions, in addition to submitting data requests, did the Staff take in order  
17 to obtain the data required to perform a depreciation analysis?

18 A. The Staff made numerous contacts with the Company, both by telephone and  
19 email, to explain its data requirements.

20 Q. Why do you propose assigning the depreciation rates you developed for the  
21 St. Louis district to the other MAWC districts?

22 A. MAWC district's data as submitted cannot be analyzed to support unique  
23 depreciation rates for the other districts. Assigning "surrogate" depreciation rates that can be

1 expected to reasonably reflect the lives, and therefore depreciation rates, of the other district's  
2 plant is the best alternative.

3 The natural choice for an analogous operation is the St. Louis district, to the extent  
4 that the St. Louis district has analogous accounts. The management, engineering and  
5 purchasing of capital plant is common for all districts in many instances. These factors  
6 should bring about a trend of commonality to the ASLs of plant in each district.

7 For the plant accounts that are used in the operation of the other MAWC districts but  
8 are not used by the St. Louis district, engineering judgment was used to determine that the  
9 Staff's standardized depreciation rates are an appropriate "surrogate". Those accounts are  
10 [390.00] Structures and Improvements Shop and Garage, [390.10] Structures and  
11 Improvements Office Buildings, [312.00] Collecting and Impounding Reservoirs, [314.00]  
12 Wells and Springs, [391.2] Computer Hardware and [391.25] Computer Software.

13 Q. Why do you propose assigning the standardized depreciation rates to accounts  
14 [390.00], [390.10], [312.00], [314.00], [391.2] and [391.25]?

15 A. The "standardized" depreciation rates were developed by the Engineering and  
16 Management Services Department engineers from observation of plant lives at many  
17 companies, technical experience and other sources including the expertise of the MoPSC  
18 Water & Sewer Department Staff.

19 Q. Why are you proposing a change to the existing, ordered depreciation rates for  
20 the other MAWC districts?

21 A. The currently ordered depreciation rates for the other MAWC districts,  
22 excluding the Jefferson City district, are a conglomeration of depreciation rates that were  
23 ordered for the two companies that merged into MAWC in 1995. Staff does not know of a



1 specific life analysis associated with the depreciation rates and no explanation has been found  
2 for how the old rates were weighted into the currently ordered depreciation rates.

3 Q. What does the Company need to do to the data so that it can be analyzed for  
4 valid depreciation determinations in the future?

5 A. The Company must “clean up” the data by doing the following:

6 1) Develop district specific historical databases of utility plant activity  
7 (additions, retirements, etc.) for all MAWC districts, including only vintages with  
8 proven retirement histories;

9 2) Use the Commission approved account numbers and descriptions set  
10 forth in the 1973 Uniform System of Accounts for Class A and B Water Utilities, as  
11 revised in 1976;

12 3) Work with Staff to assure the maximum data histories are included in  
13 databases;

14 4) Submit the completed databases to the Staff in the Gannett Fleming  
15 format within twelve (12) months after the date of the Report and Order of this case,  
16 or prior to six months before the Company files another rate case, whichever date  
17 occurs first;

18 5) Update the databases annually on a district specific basis, and make it  
19 available to Staff upon request;

20 6) Submit updated databases in the Gannett Fleming format at the time of  
21 submission of any and all future rate cases.

22 **RECOMMENDATION**

23 Q. Please summarize the Staff’s recommendations related to your testimony.

1           A.     The Staff recommends that the Commission order:

2                   1)     The depreciation rates presented in Schedule 1 for the St. Louis district;

3                   2)     The depreciation rates presented in Schedules 2 and 3 for the  
4 Brunswick, Jefferson City, Joplin, Mexico, Parkville, St. Charles, St. Joseph and  
5 Warrensburg districts;

6                   3)     The depreciation rates presented in Schedule 5 for the Parkville district  
7 sewer system;

8                   4)     The elimination of the two depreciation reserve amortizations currently  
9 ordered for the St. Louis district;

10                  5)     The opening of a new, separate docket to address the “cleaning up” of  
11 MAWC’s depreciation database as outlined previously in this testimony.

12          Q.     Does this conclude your testimony?

13          A.     Yes.