

NATURAL GAS UTILITY DEPRECIATION ACCRUAL RATES

BLACK & VEATCH PROJECT NO. 400318

PREPARED FOR

The Empire District Gas Company

FEBRUARY 2019

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1 Executive Summary

In this report we describe the analyses conducted and the results obtained for the natural gas utility property of The Empire District Gas Company (“EDG” of “Company”) with respect to its depreciation expense rates. This report is based on plant activity through December 31, 2017. The depreciation rates we recommend in this report are considered appropriate for use in the near future. We recommend these rates be reviewed at least every five years. Ultimately the appropriate level of depreciation expense rates is a management decision taking into account various factors.

EDG’s current rates went into effect in January 2010 as a result of the Missouri Public Service Commission (“MPSC”) Order Approving Partial Stipulation and Agreement and Partial Stipulation and Agreement on Transportation Tariff Issues in Case No. GR-2009-0434. If the Company concludes that a change in depreciation expense rates is appropriate in the next rate filing, we recommend the Company implement the depreciation expense rates based on the analyses set forth in Sections 4 and 5 of this report. Recommended rates are summarized on Table 5-4, column V. Implementation of these rates will decrease annual depreciation expense by approximately \$1.4 million annually, based on December 31, 2017 plant balances.

The individual accrual rates that we recommend for each account recognize average service lives and reflect the results of actuarial analysis, reserve analysis, and our experience with similar utility property. We recommend changes to average service life for the following accounts:

ACCOUNT	DESCRIPTION	AVERAGE SERVICE LIFE	
		EXISTING	RECOMMENDED
369	Transmission Measuring and Regulating Station Equipment	45	50
375	Distribution Structures and Improvements	45	50
376	Distribution Mains	45	55
378	Distribution Measuring and Regulating Station Equipment	50	55
380	Services	43	50
381	Meters	40	30
385	Industrial Measuring and Regulating Equipment	45	50
390	General Plant Structures and Improvements	45	40
391.1	Office Furniture and Equipment	15	10
391.3	Computer Equipment	7	11
392	Transportation Equipment	12	14
393	Stores Equipment	25	30
394	Tools, Shop and Garage Equipment	30	35
395	Laboratory Equipment	30	35
396	Power Operated Equipment	16	18
398	Miscellaneous Equipment	23	26

EDG is currently accruing annual net cost of removal of approximately \$1.5 million to the accumulated reserve for depreciation annually. We recommend decreasing the annual net cost of removal allowance allowed in depreciation expense to a level more consistent with EDG's actual cost of removal experience in the amount of approximately \$330,000. We note that EDG has been accruing significant depreciation expense for future cost of removal since 2010 and 82% of our recommended reduction to depreciation expense is related to collections for cost of removal.

Our recommended net salvage allowances per account are:

ACCOUNT	DESCRIPTION	RECOMMENDED NET SALVAGE ALLOWANCE
367	Transmission Mains	-\$11,000
376	Distribution Mains	-\$36,000
378	City Gate Stations	-\$1,000
380	Services	-\$300,000
390	Structures and Improvements	-\$1,500
392	Transportation Equipment	\$10,000
396	Power Operated Equipment	\$10,000
	TOTAL	-\$329,500

EDG currently has an accumulated reserve for depreciation in excess of the levels that would be consistent with our recommended average service lives and net salvage allowances of approximately \$13 million. This excess reserve is driven by the high net salvage accrual in annual depreciation expense and the trend towards longer average service lives. We believe that EDG should consider a depreciation reserve amortization to better align the Company's net plant with the findings from our study. EDG management should consider several factors prior to implementing a depreciation reserve amortization including future plans for plant investment, retirements and anticipated costs of removal associated with retirements. We recommend EDG consider implementing an amortization of the depreciation reserve of approximately \$466,000 per year.

The scope of this report includes a discussion of the practice of depreciation accounting (Section 3), the type of information examined in our analysis, the methods applied, and the results of the analyses conducted (Section 4), and a discussion of the Company's depreciation reserve, and development of our recommended accrual rates (Section 5).

2 Introduction

This report presents the results of our analysis of the depreciation expense requirements for the gas utility property of EDG. The analysis is based on plant activity through December 31, 2017. We understand that the Company has engaged Black & Veatch to prepare this report in order to meet the MPSC requirement that a depreciation study be conducted every five years [4 CSR 240-3.275(1)(B)(2)]. EDG's last depreciation study was completed by Black & Veatch in February 2014 based on EDG plant at December 31, 2012. EDG acquired its natural gas properties from Aquila, Inc. in June 2006.

The current rates went into effect in January 2010 as a result of the MPSC Order Approving Partial Stipulation and Agreement and Partial Stipulation and Agreement on Transportation Tariff Issues in Case No. GR-2009-0434. The stipulated depreciation rates reflected changes made to average service lives and a change from a requirement for EDG to book a provision for net cost of removal as expense to accruing salvage and cost of removal dollars to the depreciation reserve. The current depreciation rates are based on the MPSC Staff's recommended rates that included a net salvage calculation based on a percentage of retirements method rather than the percentage of plant method that had previously been used.

The rates recommended in this report reflect consideration of the results of actuarial analysis, salvage analysis, depreciation reserve analysis, and our experience with other utilities and judgement.

In Section 3 of this report we briefly discuss the practice of depreciation accounting. In Section 4 we discuss the type of information examined in the analysis and the methods applied to develop the depreciation rates. We also discuss in Section 4 the results of the analyses and the recommended average service lives. In Section 5 we discuss our analysis of the Company's existing depreciation reserve and the development of our recommended depreciation accrual rates.

3 Depreciation Accounting

Depreciation is the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of gas plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be considered are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand and requirements of public authorities, and in the case of natural gas companies, the exhaustion of natural resources (FERC Uniform System of Accounts).

Depreciation accounting provides a method whereby charges for the loss in service value are made against current income. By properly charging depreciation, the cost of depreciable plant less estimated salvage value (or plus estimated cost of removal) is distributed over the useful life of the asset in such a way as to equitably allocate it to the period during which service is provided through the use and consumption of such facilities.

3.1 ANNUAL DEPRECIATION EXPENSE

The annual depreciation expense represents the annual charge against income associated with the loss of service value of utility equipment. Historically, a number of different methods have been used by gas utilities to determine the level of depreciation expense to be charged against current income. Among the more common are:

1. A percentage of the investment in depreciable property.
2. A direct appropriation by management.
3. An amount equal to the original cost investment retired during the year.
4. A percentage of revenues.

The company's current practice is to calculate annual depreciation expense through the application of straight-line depreciation rates to the respective plant investment account balances. In essence, the annual depreciation expense rate is a percentage figure which, when applied to the dollar balance of investment in plant, yields a depreciation expense level that is expected to amortize the Company's investment over the life of the property.

The existing depreciation rates are based on those approved by the MPSC in 2010 in Case No. GR-2009-0434. In that case, EDG and the MPSC Staff entered a Stipulation and Agreement setting depreciation rates and the rate's components, average service life and net salvage. The net salvage components of the settled rates are based on a percentage of retirements method rather than the percentage of plant method that had been used for net salvage accrual prior to this case.

3.2 DEPRECIATION RESERVE

The depreciation reserve account is a balance sheet item which reflects accumulation of the activity related to annual depreciation expense and retirement accounting. Under the FERC Uniform System of Accounts, depreciation reserve is shown on the balance sheet as "Accumulated Provision for Depreciation."

The depreciation expense charged annually is accumulated in depreciation reserve. The original cost of investment in property retired during the year is deducted from the depreciation reserve. A further adjustment to the reserve is made by adding the salvage value credit and deducting the cost of removal associated with property retired. The use of proper annual depreciation rates to amortize investment over its useful service life will result in accruals to the depreciation reserve which equal the total investment ultimately retired, as adjusted for salvage value and cost of removal.

An illustrative example follows:

<u>Line</u>	<u>Transaction</u>	<u>Balance</u>
1	Depreciation Reserve Beginning of Period	\$ 1,000,000
2	Depreciation Charges	
3	Depreciation Expense	\$ 100,000
4	Depreciation Charges to Clearing Accounts	<u>\$ 10,000</u>
5	Total Depreciation Charges	\$ 110,000
6	Subtotal	\$ 1,110,000
7	Deductions	
8	Original Cost of Plant Retired	\$ 75,000
9	Cost of Removal of Retired Plant	\$ 10,000
10	Salvage Realized from Retired plant	<u>\$ (5,000)</u>
11	Total Deductions	\$ 80,000
12	Depreciation Reserve End of Period	\$ 1,030,000

4 Historical Information and Procedures

The determination of a reasonable annual depreciation expense rate is dependent on the average service life, cost of removal, and gross salvage of the property in question. Ideally, the determination of average service life begins with analysis of Company records which show additions by year of installation (vintage year) and retirements by vintage year, or “aged data”. We refer to this type of analysis as an actuarial method. Where historical data is not sufficient to produce reliable results using actuarial analysis, data may be sufficient to use a simulated plant balance approach. Both of these two analytical methods provide measures of historically experienced service lives. In order to reflect the prospective nature of depreciation, we consider past, present and anticipated future economic and environmental conditions; and sound engineering judgment. As a final step, the adequacy of depreciation reserve balances must be evaluated and the indicated depreciation rate adjusted so that total investment is recovered over the asset’s life.

4.1 ACTUARIAL ANALYSIS

To prepare a sound and credible survivor curve analysis, a sufficient history of retirement data must exist. Based upon historical plant activity (retirements), a survivor stub curve explains the percent of original placements remaining in service by age. Using a least squares analysis technique, we compare this experienced survivor stub curve to general survivor curve types to identify the best fitting curve type and service life based on historical retirements. These curves provide an estimate of the average service life predicted based on historical retirements. Using this method, and relying on general survivor curves, we can estimate average service life of property which has only been partially retired.

EDG maintains its continuing property record in several files. Historical depreciation data was obtained from Aquila with vintage records dating to 1924 and transaction details from 1960 through May 2006. EDG has maintained depreciation data since acquiring the gas system in June 2006. We find EDG’s depreciation database is sufficient for actuarial analysis.

4.2 RECOMMENDED AVERAGE SERVICE LIVES

In Table 4-1, we summarize the average service lives underlying EDG’s existing depreciation rates (Column C), and the average service lives we recommend for the purpose of this report (Column E). We use our recommended average service lives to develop our recommended accrual rates. We find that EDG’s assets are generally trending toward longer average service lives. Based on actuarial analysis and our experience with natural gas (and other) utility property, the following discussion explains in further detail the basis for recommending change in the average service lives for certain accounts:

- Account 369 – Transmission Measuring and Regulating Station Equipment. We recommend increasing the average service life from 45 to 50 years. A lack of retirement activity over the last several years justifies the service life extension. We find a 50-S3 Iowa curve to be the best fit of the relevant data.

- Account 375 – Distribution Structures and Improvements. We recommend increasing the average service life from 45 to 50 years. This account has experienced no retirement activity since our last study. We find a 50-R4 Iowa curve to be the best fit of the relevant data.
- Account 376 – Distribution Mains. We recommend increasing the average service life from 45 to 55 years. Our analysis indicates that mains are trending toward a longer average service life from our last study. We find a 55-R2.5 Iowa curve to be the best fit of the relevant data.
- Account 378 – Distribution Measuring and Regulating Station Equipment. We recommend increasing the average service life from 50 to 55 years. We find a 55-R2 Iowa curve to be the best fit of the relevant data.
- Account 380 – Services. We recommend increasing the average service life from 43 years to 50 years. Our analysis indicates that services are trending toward a longer average service life from our last study. We find a 50-L1 Iowa curve to be the best fit of the relevant data.
- Account 381 – Meters. We recommend decreasing the average service life from 40 years to 30 years. Empire has implemented a practice to retire and replace meters that reach 30 years of age.
- Account 385 – Industrial Measuring and Regulating Equipment. We recommend increasing the average service life from 45 to 50 years. This account has experienced no retirement activity since our last study. We find a 50-R2.5 Iowa curve to be the best fit of the relevant data.
- Account 390 – General Plant Structures and Improvements. We recommend decreasing the average service life from 45 to 40 years. We find a 40-S0 Iowa curve to be the best fit of the relevant data.
- Account 391.1 – Office Furniture and Equipment. We recommend decreasing the average service life from 15 to 10 years. We find a 10-R4 Iowa curve to be the best fit of the relevant data.
- Account 391.3 – Computer Equipment. We recommend increasing the average service life from 7 to 11 years. We find this account to be over-depreciated. We set our recommended average service life equal to the weighted age of assets in the account.
- Account 392 – Transportation Equipment. We recommend increasing the average service life from 12 to 14 years. We find a 14-L2 Iowa curve to be the best fit of the relevant data.
- Account 393 – Stores Equipment. We recommend increasing the average service life from 25 to 30 years. We find that a lack of retirements over the past several years justifies the service life extension. We find a 30-S1 Iowa curve to be the best fit of the relevant data.
- Account 394 – Tools, Shop and Garage Equipment. We recommend increasing the average service life from 30 to 35 years. We find that a lack of retirements over the past several years justifies the service life extension. We find a 35-S0.5 Iowa curve to be the best fit of the relevant data.
- Account 396 – Power Operated Equipment. We recommend increasing the average service life from 16 to 18 years. We find an 18-S3 Iowa curve to be the best fit of the relevant data.
- Account 398 – Miscellaneous Equipment. We recommend increasing the average service life from 23 to 26 years. We find a 26-L3 Iowa curve to be the best fit of the relevant data.

Table 4-1 Recommended Average Service Lives

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
Acct. No.	Account	Existing		Recommended		Change in	
		Average Service Life	Life Accrual Rate	Average Service Life	Life Accrual Rate	Average Service Life	Life Accrual Rate
		Years	1 / [C]	Years	1 / [E]	Years	[E] - [C] [F] - [D]
	Transmission Plant						
366	Structures	45	2.22%		0.00%	Fully Depreciated	
367	Mains	65	1.54%	65	1.54%	0	0.00%
369	Measuring & Regulating Stations	45	2.22%	50	2.00%	5	-0.22%
	Distribution Plant						
375	Structures	45	2.22%	50	2.00%	5	-0.22%
376	Mains	45	2.22%	55	1.82%	10	-0.40%
378	Measuring & Regulating Stations	50	2.00%	55	1.82%	5	-0.18%
379	City Gate Stations	50	2.00%	50	2.00%	0	0.00%
380	Services	43	2.33%	50	2.00%	7	-0.33%
381	Meters	40	2.50%	30	3.33%	-10	0.83%
383	Regulators	40	2.50%	40	2.50%	0	0.00%
385	Industrial Meas/Reg Equip	45	2.22%	50	2.00%	5	-0.22%
387	Other Equipment		0.00%		0.00%	Fully Depreciated	
	General Plant						
390	Structures & Improvements	45	2.22%	40	2.50%	-5	0.28%
391.1	Furniture & Equipment	15	6.67%	10	10.00%	-5	3.33%
391.3	Computer Equipment	7	14.29%	11	9.09%	4	-5.20%
392	Transportation Equipment	12	8.33%	14	7.14%	2	-1.19%
393	Stores Equipment	25	4.00%	30	3.33%	5	-0.67%
394	Tools Shop & Garage Equipment	30	3.33%	35	2.86%	5	-0.47%
395	Laboratory Equipment	30	3.33%	35	2.86%	5	-0.47%
396	Power Operated Equipment	16	6.25%	18	5.56%	2	-0.69%
397	Communication Equipment	25	4.00%	25	4.00%	0	0.00%
398	Miscellaneous Equipment	23	4.35%	26	3.85%	3	-0.50%

5 Development of Recommended Depreciation Accrual Rates

After developing our recommended average service lives, we then look at any adjustments that need to be made within the accounts for net salvage and amortization of depreciation reserve, before developing our recommended accrual rates.

5.1 NET SALVAGE ALLOWANCE

The traditional approach for incorporating allowance for net salvage is to compare annual net salvage (salvage minus cost of removal) to the original cost of the plant retired during that year over a representative historical period. The traditional approach assumes that the ratio of net salvage dollars to the original cost dollars of the retirements is representative of the allowance that will ultimately apply to all plant in service over that life of that asset. In a whole life depreciation calculation, this allowance is then added to (for a net cost of removal) or deducted from (for a net salvage) one in the numerator and then divided by the average service life.

This approach provides reasonable results where there are modest amounts of salvage or cost of removal or where the amounts are fairly consistent (such as for unit property or general plant). However, cost of removal for some natural gas distribution plant can be as much as or more than the original cost of the plant retired especially if natural gas lines that are under streets need to be relocated. In these instances, it may not be reasonable to assume that this experience applies to all plant.

Problems may result (especially with mains and services) if the net salvage allowance is large and a relatively small amount of plant is being retired. A large depreciation reserve may be accumulated in anticipation of cost of removal expenses that may or may not occur. In case number GR-2004-0072 a stipulation and agreement was reached by all parties whereby EDG was approved to use depreciation rates that had zero allowance for net salvage. Instead of including net salvage in the depreciation expense calculation, EDG recorded an annual expense for net cost of removal of up to \$90,163. EDG calculated the annual difference between net cost of removal incurred and the allowance of \$90,163 and booked that amount to the accumulated reserve for depreciation. In case number GR-2009-0434 the MPSC Staff recommended that depreciation rates include a net salvage component calculated as the ratio of net salvage dollars to the original cost of retirements. A stipulation and agreement was reached whereby EDG agreed to the Staff's level of net salvage in depreciation expense.

EDG's currently accrues \$1.5 million annually for net salvage. This annual net salvage accrual is predicated on the assumption that the Company's recent interim experience (from a 2010 study) with cost of removal will be experienced by all plant investment. This assumption is flawed because the Company's recent interim experience is primarily based on situations where natural gas facilities are relocated, however natural gas plant is generally abandoned in place when there is a final retirement. We believe that extrapolating the limited cost of removal experience associated with activities that are not reflective of what is to be expected for all facilities based on current operating practice will result in the over accrual of depreciation reserve.

We believe it is possible to accomplish the goal of matching actual cost of removal expenses and cost of removal allowances within the calculation of depreciation rates. To achieve this goal, we

analyzed EDG's gross salvage recovered and cost of removal over the period 2008 through 2017 and found the more reasonable annual net cost of removal accrual should be \$329,500. Our recommended cost of removal allowance per account is shown in Table 5-1, Column Q. To incorporate the cost of removal allowance into the depreciation rate, we divide the annual net salvage allowance (or one minus cost of removal) by the plant in service balance for each account. This percentage, shown in Table 5-2, Column G, is then added to the accrual rate related to average service life. Table 5-2, Column H shows the adjusted whole life depreciation rates including an allowance for net salvage. We believe that this method provides the best means to match cost of removal expenses with actual experience and future expectations of removal costs for a natural gas utility.

Some may view this annual allowance approach is an "impure" application of the whole life method because it is based on a rather short-term analysis of activity. As plant ages and retirement activity increases, we expect that the annual allowance may increase, but not likely to the levels based on the current type of retirements. Insufficient depreciation reserve might be accumulated if the annual allowance is not reviewed on a regular basis. However, in Missouri, depreciation rates are reviewed at least every five years as required by MPSC rule. This frequency will allow for future adjustment of the annual net salvage allowance to reflect changes in activity, if necessary.

We find that EDG is accruing significant depreciation expense for future cost of removal which accounts for 82% of our overall recommended reduction to depreciation expense as discussed further in Section 5.3.

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Table 5-1 Recommended Cost of Removal Allowance

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M]	[N]	[O]	[P]	[Q]
Acct. No.	Account	Depreciable Plant 12/31/2017	Historical Gross Salvage less Cost of Removal											10-Year Average	5-Year Average	Recommended Cost of Removal Allowance
			2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total			
		\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Transmission Plant																
366	Structures	10,880	0	0	0	0	0	0	0	0	0	0	0	0	0	0
367	Mains	10,729,200	0	58,225	0	0	0	(3,739)	(5,808)	(12,610)	(54,298)	(15,894)	(34,124)	(3,412)	(18,470)	(11,000)
369	Measuring & Regulating Stations	440,023	(152)	0	0	0	0	0	0	0	0	0	(152)	(15)	0	0
Distribution Plant																
375	Structures	249,112	0	0	0	0	0	0	0	0	0	0	0	0	0	0
376	Mains	50,810,532	(24,980)	41,974	0	(30,495)	(40,288)	0	(66,339)	(29,400)	(105,638)	(103,045)	(358,211)	(35,821)	(60,884)	(36,000)
378	Measuring & Regulating Stations	725,146	0	0	0	0	0	0	0	0	0	0	0	0	0	0
379	City Gate Stations	1,338,714	0	0	0	0	0	0	0	(5,536)	0	(3,741)	(9,277)	(928)	(1,855)	(1,000)
380	Services	29,763,769	(342,062)	(230,805)	0	(267,161)	(243,431)	0	(1,214,540)	(395,856)	(204,935)	(88,196)	(2,986,986)	(298,699)	(380,705)	(300,000)
381	Meters	11,786,816	(6,140)	(9,331)	0	0	0	0	(1,875)	(751)	0	(48)	(18,146)	(1,815)	(535)	0
383	Regulators	3,125,189	0	0	0	0	0	0	0	0	0	0	0	0	0	0
385	Industrial Meas/Reg Equip	797,789	0	0	0	0	0	0	0	0	0	0	0	0	0	0
387	Other Equipment	5,472	0	0	0	0	0	0	0	0	0	0	0	0	0	0
General Plant																
390	Structures & Improvements	2,933,295	0	0	0	0	0	0	(7,701)	0	0	(5,731)	(13,432)	(1,343)	(2,686)	(1,500)
391.1	Furniture & Equipment	299,624	0	0	0	0	0	0	0	0	0	0	0	0	0	0
391.3	Computer Equipment	330,658	0	0	0	19,435	0	0	0	0	0	0	19,435	1,944	0	0
392	Transportation Equipment	2,399,043	0	0	550	2,894	0	7,072	12,963	0	41,493	26,208	91,180	9,118	17,547	10,000
393	Stores Equipment	29,019	0	0	0	0	0	0	0	0	0	0	0	0	0	0
394	Tools Shop & Garage Equipment	1,086,550	(38)	0	0	0	0	0	0	0	0	0	(38)	(4)	0	0
395	Laboratory Equipment	98,267	0	0	0	0	0	0	0	0	0	0	0	0	0	0
396	Power Operated Equipment	1,097,388	0	0	0	0	0	0	29,500	0	57,339	0	86,839	8,684	17,368	10,000
397	Communication Equipment	5,600	0	0	0	0	0	0	0	0	0	0	0	0	0	0
398	Miscellaneous Equipment	85,962	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total		118,148,049	(373,372)	(139,937)	550	(275,327)	(283,719)	3,333	(1,253,801)	(444,154)	(266,038)	(190,446)	(3,222,911)	(322,291)	(430,221)	(329,500)

Table 5-2 Recommended Life, Cost of Removal and Depreciation Rates

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]
Acct. No.	Account	Depreciable Plant 12/31/2017	Recommended					
			Average Service Life	Life Accrual Rate	Cost of Removal Allowance	Net Salvage Rate	Whole Life Depreciation Rate	Depreciation Expense
		\$	Years	1 / [D]	\$	-[F] / [C]	[E] + [G]	[C] * [H]
Transmission Plant								
366	Structures	10,880		0.00%		0.00%	0.00%	0
367	Mains	10,729,200	65	1.54%	(11,000)	0.10%	1.64%	175,959
369	Measuring & Regulating Stations	440,023	50	2.00%	0	0.00%	2.00%	8,800
Distribution Plant								
375	Structures	249,112	50	2.00%	0	0.00%	2.00%	4,982
376	Mains	50,810,532	55	1.82%	(36,000)	0.07%	1.89%	960,319
378	Measuring & Regulating Stations	725,146	55	1.82%	0	0.00%	1.82%	13,198
379	City Gate Stations	1,338,714	50	2.00%	(1,000)	0.07%	2.07%	27,711
380	Services	29,763,769	50	2.00%	(300,000)	1.01%	3.01%	895,889
381	Meters	11,786,816	30	3.33%	0	0.00%	3.33%	392,501
383	Regulators	3,125,189	40	2.50%	0	0.00%	2.50%	78,130
385	Industrial Meas/Reg Equip	797,789	50	2.00%	0	0.00%	2.00%	15,956
387	Other Equipment	5,472		0.00%	0	0.00%	0.00%	0
General Plant								
390	Structures & Improvements	2,933,295	40	2.50%	(1,500)	0.05%	2.55%	74,799
391.1	Furniture & Equipment	299,624	10	10.00%	0	0.00%	10.00%	29,962
391.3	Computer Equipment	330,658	11	9.09%	0	0.00%	9.09%	30,057
392	Transportation Equipment	2,399,043	14	7.14%	10,000	-0.42%	6.72%	161,216
393	Stores Equipment	29,019	30	3.33%	0	0.00%	3.33%	966
394	Tools Shop & Garage Equipment	1,086,550	35	2.86%	0	0.00%	2.86%	31,075
395	Laboratory Equipment	98,267	35	2.86%	0	0.00%	2.86%	2,810
396	Power Operated Equipment	1,097,388	18	5.56%	10,000	-0.91%	4.65%	51,029
397	Communication Equipment	5,600	25	4.00%	0	0.00%	4.00%	224
398	Miscellaneous Equipment	85,962	26	3.85%	0	0.00%	3.85%	3,310
Total		118,148,049			(329,500)			2,958,894

5.2 DEPRECIATION RESERVE

After developing indicated accrual rates, we evaluate the adequacy of the depreciation reserve balance (Table 5-3). In order to correct any imbalances in the depreciation reserve accounts, we first determine a theoretical level of where depreciation reserve should be. We calculate this based on the weighted age of the assets in each account, relative to our recommended average service lives. Without adjustment, to the extent that calculated reserve, Table 5-3, Column I, is greater than or less than the book reserve, Table 5-3, Column D, the Company will under- or over-recover, respectively, its depreciable plant investment. Differences between the calculated theoretical reserve and the book reserve can usually be attributed primarily to changes in life characteristics or historical rates which have not properly reflected life characteristics or changes in life characteristics. These changing life characteristics and the degree to which these changes are recognized and reflected in the depreciation rates directly affect the book reserves. In the case of EDG, the high levels of net salvage accrual in the depreciation rates is a driving factor in the imbalance between book reserve and theoretical reserve.

By subtracting the actual depreciation reserve from calculated depreciation reserve, we determine the reserve imbalance, Column J. Any amounts that have been over- or under-recovered should be amortized over the remaining life of the asset group. We calculate a reserve excess of \$13 million at December 31, 2017. We believe that this over-recovery is largely driven by the high levels of net salvage in the depreciation rate. We note that in our prior report the depreciation reserve excess was \$1.9 million at December 31, 2012. The \$11.1 million change in depreciation reserve is a direct effect of the high level of net salvage accrual, which is approximately \$1.5 million annually, and the trend towards longer average service lives. We expect that this difference will continue to widen while the existing depreciation rates including the current cost of removal allowances continue to be used.

We believe that EDG should consider a depreciation reserve amortization to better align the Company's net plant with the findings from our study. Factors for consideration prior to implementing a depreciation reserve amortization are planned replacement programs, anticipated large scale retirements, or an expectation of significant removal costs for plant retired. While EDG has not experienced these factors in recent years, management's insight into future needs is a necessary and important component of the decision to move forward with a depreciation reserve amortization. Should a depreciation reserve amortization be proposed, we recommend the annual amortization amount to be approximately \$466,000, which is the current depreciation reserve excess of \$13 million divided by the average remaining life of all assets, or 28 years.

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Table 5-3 Depreciation Reserve Analysis

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]
Acct. No.	Account	Depreciable Plant 12/31/2017	Accumulated Depreciation Reserve 12/31/2017	Reserve Ratio	Recommended Average Service Life	Weighted Age	Calculated Reserve Ratio Based On Weighted Age	Calculated Depreciation Reserve	Reserve Deficiency (Excess)
		\$		%	Years	Years	%	\$	\$
				[D] / [C]			[G] / [F]	[H] * [C]	[I] - [D]
Transmission Plant									
366	Structures	10,880	10,880	100.00%		33.79			
367	Mains	10,729,200	6,087,694	56.74%	65	31.11	47.86%	5,134,841	(952,853)
369	Measuring & Regulating Stations	440,023	240,821	54.73%	50	24.00	48.01%	211,252	(29,569)
Total Distribution Plant		11,180,103	6,339,395	56.70%			47.82%	5,346,093	(982,422)
Distribution Plant									
375	Structures	249,112	105,586	42.38%	50	20.37	40.75%	101,504	(4,082)
376	Mains	50,810,532	31,309,556	61.62%	55	23.05	41.91%	21,293,008	(10,016,548)
378	Measuring & Regulating Stations	725,146	435,408	60.04%	55	26.60	48.36%	350,652	(84,756)
379	City Gate Stations	1,338,714	616,505	46.05%	50	21.43	42.87%	573,899	(42,605)
380	Services	29,763,769	15,875,249	53.34%	50	22.64	45.29%	13,479,995	(2,395,254)
381	Meters	11,786,816	3,637,936	30.86%	30	10.69	35.63%	4,199,723	561,787
383	Regulators	3,125,189	2,038,009	65.21%	40	26.30	65.76%	2,054,995	16,986
385	Industrial Meas/Reg Equip	797,789	321,534	40.30%	50	17.14	34.27%	273,434	(48,101)
387	Other Equipment	5,472	5,472	100.00%		33.05			
Total Distribution Plant		98,602,539	54,345,255	55.12%			42.93%	42,327,210	(12,012,573)
General Plant									
390	Structures & Improvements	2,933,295	480,445	16.38%	40	9.38	23.46%	688,077	207,632
391.1	Furniture & Equipment	299,624	148,003	49.40%	10	7.65	76.49%	229,187	81,184
391.3	Computer Equipment	330,658	357,985	108.26%	11	10.91	99.18%	327,938	(30,047)
392	Transportation Equipment	2,399,043	963,370	40.16%	14	6.47	46.24%	1,109,228	145,858
393	Stores Equipment	29,019	20,053	69.10%	30	17.68	58.93%	17,101	(2,953)
394	Tools Shop & Garage Equipment	1,086,550	917,224	84.42%	35	18.67	53.36%	579,741	(337,483)
395	Laboratory Equipment	98,267	98,717	100.46%	35	31.54	90.10%	88,542	(10,175)
396	Power Operated Equipment	1,097,388	574,117	52.32%	18	7.38	41.00%	449,898	(124,220)
397	Communication Equipment	5,600	1,422	25.40%	25	8.50	34.02%	1,905	483
398	Miscellaneous Equipment	85,962	76,357	88.83%	26	20.06	77.16%	66,330	(10,026)
Total General Plant		8,365,406	3,637,694	43.48%			42.53%	3,557,946	(79,748)
Total Depreciable Plant		118,148,049	64,322,344	54.44%			43.36%	51,231,250	(13,074,742)

5.3 RECOMMENDED DEPRECIATION ACCRUAL RATES

Table 5-4 summarizes the Company's existing and recommended accrual rates and the annual depreciation accrual incurred when each of these depreciation rates is applied to the depreciable plant balance at December 31, 2017.

We show in Table 5-4 that when our recommended average service life related depreciation accrual rates in Column M are applied to depreciable plant balances as of December 31, 2017, annual depreciation expense would decrease by approximately \$250,000 (Column S) over levels produced by the existing rates shown in Column F. Our recommended life related portion of depreciation expense is shown in Table 5-4, Column N.

Our recommended net salvage accrual is shown in Table 5-4, Column P. Our annual net salvage accrual recommendation is a decrease of approximately \$1,151,000 (Column T) over the accrual amount in the existing depreciation rates shown in Column I.

The total depreciation expense decrease under our recommended whole life depreciation rates is approximately \$1.4 million, based on December 31, 2017 plant balances, as shown in Column U of Table 5-4. The depreciation components and resulting annual accruals amounts shown in Table 5-4 do not include an adjustment for depreciation reserve imbalance.

Additionally, we recommend EDG consider implementing an amortization of the depreciation reserve of approximately \$466,000 per year. EDG management should consider several factors prior to implementing a depreciation reserve amortization including future plans for plant investment, retirements and anticipated costs of removal associated with retirements.

If EDG concludes that a change in depreciation expense rates is appropriate in the next rate filing, we recommend the Company implement the whole life depreciation rates shown in Column U of Table 5-4. If EDG concludes that a depreciation reserve amortization is appropriate in the next rate filing, we recommend an annual amount, based on the remaining life of assets, of approximately \$466,000 per year.

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Table 5-4 Summary of Recommended Depreciation Rates

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	
Acct. No.	Account	Depreciable Plant 12/31/2017	Existing							Total Depreciation Expense
			Average Service Life	Life Accrual Rate	Life Related Accrual	Net Salvage Percent	Net Salvage Rate	Net Salvage Accrual		
		\$	Years	1 / [D]	\$ [C] * [E]		[G] / [D]	\$ [C] * [H]	\$ [F] + [I]	
Transmission Plant										
366	Structures	10,880	45	2.22%	242	0.00%	0.00%	-	242	
367	Mains	10,729,200	65	1.54%	165,230	0.00%	0.00%	-	165,230	
369	Meas. & Reg. Stations	440,023	45	2.22%	9,769	0.00%	0.00%	-	9,769	
Total Distribution Plant		11,180,103		1.57%	175,240		0.00%	-	175,240	
Distribution Plant										
375	Structures	249,112	45	2.22%	5,530	0.00%	0.00%	-	5,530	
376	Mains	50,810,532	45	2.22%	1,127,994	-104.42%	2.32%	1,178,804	2,306,798	
378	Meas. & Reg. Stations	725,146	50	2.00%	14,503	0.00%	0.00%	-	14,503	
379	City Gate Stations	1,338,714	50	2.00%	26,774	0.00%	0.00%	-	26,774	
380	Services	29,763,769	43	2.33%	693,496	-42.47%	0.99%	294,661	988,157	
381	Meters	11,786,816	40	2.50%	294,670	-2.61%	0.07%	8,251	302,921	
383	Regulators	3,125,189	40	2.50%	78,130	-81.09%	2.03%	63,441	141,571	
385	Industrial Meas/Reg Equip.	797,789	45	2.22%	17,711	-21.21%	0.47%	3,750	21,461	
387	Other Equipment	5,472		0.00%	-	0.00%		-	-	
Total Distribution Plant		98,602,539		2.29%	2,258,808		1.57%	1,548,907	3,807,716	
General Plant										
390	Structures & Improvements	2,933,295	45	2.22%	65,119	-4.24%	0.09%	2,640	67,759	
391.1	Furniture & Equipment	299,624	15	6.67%	19,985	0.00%	0.00%	-	19,985	
391.3	Computer Equipment	330,658	7	14.29%	47,251	0.00%	0.00%	-	47,251	
392	Transportation Equipment	2,399,043	12	8.33%	199,840	30.69%	-2.56%	(61,416)	138,425	
393	Stores Equipment	29,019	25	4.00%	1,161	0.00%	0.00%	-	1,161	
394	Tools Shop & Garage Equip.	1,086,550	30	3.33%	36,182	0.00%	0.00%	-	36,182	
395	Laboratory Equipment	98,267	30	3.33%	3,272	0.00%	0.00%	-	3,272	
396	Power Operated Equipment	1,097,388	16	6.25%	68,587	14.35%	-0.90%	(9,876)	58,710	
397	Communication Equipment	5,600	25	4.00%	224	0.00%	0.00%	-	224	
398	Miscellaneous Equipment	85,962	23	4.35%	3,739	0.00%	0.00%	-	3,739	
Total General Plant		8,365,406		5.32%	445,361		-0.82%	(68,652)	376,709	
Total Depreciable Plant		118,148,049		2.44%	2,879,409		1.25%	1,480,255	4,359,664	

Table 5 4 Summary of Recommended Depreciation Rates (Continued)

[A]	[B]	[C]	[K]	[L]	[M]	[N]	[O]	[P]	[Q]
Acct. No.	Account	Depreciable Plant 12/31/2017	Recommended						
			Average Service Life	Iowa Curve	Life Accrual Rate	Life Related Accrual	Net Salvage Rate	Net Salvage Accrual	Total Depreciation Expense
		\$	Years		1 / [K]	\$ [C] * [M]	Table 5-2	\$ [C] * [O]	\$ [N] + [P]
Transmission Plant									
366	Structures	10,880	Fully Depreciated						
367	Mains	10,729,200	65	R4	1.54%	165,230	0.10%	10,729	175,959
369	Meas. & Reg. Stations	440,023	50	S3	2.00%	8,800	0.00%	-	8,800
Total Distribution Plant		11,180,103			1.56%	174,030	0.10%	10,729	184,759
Distribution Plant									
375	Structures	249,112	50	R4	2.00%	4,982	0.00%	-	4,982
376	Mains	50,810,532	55	R3	1.82%	924,752	0.07%	35,567	960,319
378	Meas. & Reg. Stations	725,146	55	R2	1.82%	13,198	0.00%	-	13,198
379	City Gate Stations	1,338,714	50	R3	2.00%	26,774	0.07%	937	27,711
380	Services	29,763,769	50	L1	2.00%	595,275	1.01%	300,614	895,889
381	Meters	11,786,816	30	R3	3.33%	392,501	0.00%	-	392,501
383	Regulators	3,125,189	40	R1	2.50%	78,130	0.00%	-	78,130
385	Industrial Meas/Reg Equip.	797,789	50	R2.5	2.00%	15,956	0.00%	-	15,956
387	Other Equipment	5,472	Fully Depreciated						
Total Distribution Plant		98,602,539			2.08%	2,051,568	0.34%	337,119	2,388,686
General Plant									
390	Structures & Improvements	2,933,295	40	S0	2.50%	73,332	0.05%	1,467	74,799
391.1	Furniture & Equipment	299,624	10	R4	10.00%	29,962	0.00%	-	29,962
391.3	Computer Equipment	330,658	11	-	9.09%	30,057	0.00%	-	30,057
392	Transportation Equipment	2,399,043	14	L2	7.14%	171,292	-0.42%	(10,076)	161,216
393	Stores Equipment	29,019	30	S1	3.33%	966	0.00%	-	966
394	Tools Shop & Garage Equip.	1,086,550	35	R1.5	2.86%	31,075	0.00%	-	31,075
395	Laboratory Equipment	98,267	35	S0.5	2.86%	2,810	0.00%	-	2,810
396	Power Operated Equipment	1,097,388	18	S3	5.56%	61,015	-0.91%	(9,986)	51,029
397	Communication Equipment	5,600	25	R3	4.00%	224	0.00%	-	224
398	Miscellaneous Equipment	85,962	26	L3	3.85%	3,310	0.00%	-	3,310
Total General Plant		8,365,406			4.83%	404,044	-0.22%	(18,596)	385,448
Total Depreciable Plant		118,148,049			2.23%	2,629,642	0.28%	329,252	2,958,894

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Table 5 4 Summary of Recommended Depreciation Rates (Continued)

[A]	[B]	[C]	[R]	[S]	[T]	[U]	[V]
Acct. No.	Account	Depreciable Plant 12/31/2017	Change in Depreciation				Proposed Whole Life Depreciation Rate
			Average Service Life	Life Related Accrual	Net Salvage Accrual	Total Annual Accrual	
		\$	Years	\$	\$	\$	
			[K] - [D]	[N] - [F]	[P] - [I]	[S] + [T]	[M] + [O]
Transmission Plant							
366	Structures	10,880		(242)	-	(242)	0.00%
367	Mains	10,729,200	0	-	10,729	10,729	1.64%
369	Meas. & Reg. Stations	440,023	5	(968)	-	(968)	2.00%
	Total Distribution Plant	11,180,103		(1,210)	10,729	9,520	
Distribution Plant							
375	Structures	249,112	5	(548)	-	(548)	2.00%
376	Mains	50,810,532	10	(203,242)	(1,143,237)	(1,346,479)	1.89%
378	Meas. & Reg. Stations	725,146	5	(1,305)	-	(1,305)	1.82%
379	City Gate Stations	1,338,714	0	-	937	937	2.07%
380	Services	29,763,769	7	(98,220)	5,953	(92,268)	3.01%
381	Meters	11,786,816	-10	97,831	(8,251)	89,580	3.33%
383	Regulators	3,125,189	0	-	(63,441)	(63,441)	2.50%
385	Industrial Meas/Reg Equip.	797,789	5	(1,755)	(3,750)	(5,505)	2.00%
387	Other Equipment	5,472		-	-	-	0.00%
	Total Distribution Plant	98,602,539		(207,240)	(1,211,789)	(1,419,029)	
General Plant							
390	Structures & Improvements	2,933,295	-5	8,213	(1,173)	7,040	2.55%
391.1	Furniture & Equipment	299,624	-5	9,977	-	9,977	10.00%
391.3	Computer Equipment	330,658	4	(17,194)	-	(17,194)	9.09%
392	Transportation Equipment	2,399,043	2	(28,549)	51,340	22,791	6.72%
393	Stores Equipment	29,019	5	(194)	-	(194)	3.33%
394	Tools Shop & Garage Equip.	1,086,550	5	(5,107)	-	(5,107)	2.86%
395	Laboratory Equipment	98,267	5	(462)	-	(462)	2.86%
396	Power Operated Equipment	1,097,388	2	(7,572)	(110)	(7,682)	4.65%
397	Communication Equipment	5,600	0	-	-	-	4.00%
398	Miscellaneous Equipment	85,962	3	(430)	-	(430)	3.85%
	Total General Plant	8,365,406		(41,317)	50,056	8,739	
	Total Depreciable Plant	118,148,049		(249,767)	(1,151,003)	(1,400,770)	2.50%