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Issue: Depreciation Rates
Witness: Thomas J. Sullivan
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Sponsoring Party: Empire District Electric
Case No. ER-2016-0023
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BEFORE THE
MISSOURI PUBLIC SERVICE COMMISSION

Case No. ER-2016-0023

The Empire District Electric Company

Rebuttal Testimony of

Thomas J. Sullivan

Issues:

Depreciation Rates

Empire Exhibit No. 18
Date 6-2-16 Reporter KKF
File No. ER-2016-0023

REBUTTAL TESTIMONY
OF THOMAS J. SULLIVAN
BEFORE THE
MISSOURI PUBLIC SERVICE COMMISSION
CASE NO. ER-2016-0023

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. Thomas J. Sullivan, 15898 Millville Road, Richmond, Missouri 64085.

Q. ARE YOU THE SAME THOMAS J. SULLIVAN WHO FILED DIRECT TESTIMONY IN THIS MATTER BEFORE THE MISSOURI PUBLIC SERVICE COMMISSION ("COMMISSION") ON BEHALF OF THE EMPIRE DISTRICT ELECTRIC COMPANY ("EMPIRE" OR "COMPANY")?

A. Yes, I am.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. I will address the depreciation recommendations of the Missouri Public Service Commission Staff ("Staff") contained on Pages 91 through 97 of the Staff Report – Cost of Service – Revenue Requirement dated March 25, 2016 ("Staff Report"). The Staff's recommended depreciation rates are contained in Appendix 3, Schedule JAR(DEP)-d1 to the Staff Report.

Q. PLEASE SUMMARIZE THE ISSUES YOU HAVE WITH THE STAFF'S PROPOSED DEPRECIATION RATES.

A. I will address the following issues with Staff's depreciation rates and their explanation of those rates in the Staff Report:

1. The Staff fails to recognize that the remaining lives of Empire's generating facilities cannot be achieved without retirement of current assets and the capital additions required in order to realize those lives

prior to the final retirement of the asset, thus significantly understating the depreciation rates necessary to recover Empire's investment in these facilities over the remaining life of these assets.

2. The Staff's transfer of the unrecovered reserve and cost of removal for the Riverton 7 and 8 units is arbitrary and fails to reasonably align the cost of those facilities with the customers who received the benefit of those facilities thus creating intergenerational subsidy.

3. The Staff has arbitrarily reduced Empire's estimate of the cost of removal associated with the Riverton 7 and 8 units by almost $1 million.

4. The Staff has gone back to 2005 (and even recommends going back farther) to impute depreciation expense that was not accrued and makes an inappropriate and unreasonable adjustment to Empire's depreciation reserve for this imputed depreciation expense.

INTERIM RETIREMENTS AND ADDITIONS

Q. WHAT IS THE PRINCIPAL DIFFERENCE BETWEEN THE DEPRECIATION RATES THAT YOU ARE RECOMMENDING FOR EMPIRE'S PRODUCTION PLANTS (UNIT PROPERTY) AND THOSE RECOMMENDED BY THE STAFF?

A. The Staff's depreciation rates are based on the same estimated retirement dates for Empire's generating units that are used in Schedule TJS-1 (the Depreciation Study) that forms the basis for the depreciation rates I recommend. Also, the Staff and I both recommend using the remaining life method to calculate depreciation rates for Empire's generating units. The Staff uses a "test period"

that ends September 30, 2015 rather than the test period used in Empire's filing which is the 12 months ended June 30, 2015.

The principal difference is that the Staff's calculation of depreciation rates for Empire's production plants does not reflect that there will be retirements and capital additions over the remaining life of Empire's generating units. It is clear from Empire's historical experience that not only are assets retired and replaced over the life of its generating units, but large capital improvements are also required to achieve the lifespan of the units and meet regulatory requirements such that these plants can continue to operate over this lifespan.

Q. WHAT IMPACT DOES THE FAILURE TO INCLUDE THESE INTERIM RETIREMENTS AND ADDITIONS HAVE ON THE RESULTING REMAINING LIFE DEPRECIATION RATES?

A. The failure to consider the impact of future interim retirements and additions results in depreciation rates that are low during the early years of the generating units' lifespan and higher during the later years. This happens primarily for the following reasons:

1. Failure to recognize that many of the component assets have an average service life that is less than the entire lifespan of the generating units.
2. Failure to recognize that capital improvements that are made after the initial in-service date of the asset will have service lives that are less than the entire lifespan of the generating units.

3. Failure to recognize that in order for the generating units to achieve the relatively long lifespans historically experienced, significant capital improvements are made to extend the assets life and/or to bring the units up to current technology and regulations such that the plants can continue to economically provide service. These relatively large capital additions usually have service lives much less than the lifespan of the generating unit.

Q. CAN THE PHENOMENA YOU DESCRIBE BE SEEN IN THE DEPRECIATION RATES OF EMPIRE'S GENERATING UNITS?

A. Yes, it is demonstrated in the existing depreciation rates for Empire's steam production units. The lowest current depreciation rate is 2.10 percent for Iatan II (2010) which is Empire's newest stream production unit. Plum Point (2010) is roughly the same age but has a shorter estimated life, so its current depreciation rate is 2.33 percent. Iatan 1 (1980) is the next oldest unit and is significantly older than Iatan 2 and it has a current depreciation rate of 3.12 percent. The Company's oldest steam production unit is Asbury (1970) and it has a depreciation rate of 4.73 percent. Asbury best demonstrates the phenomena I discuss above, as shown in the Appendix to the Depreciation Study, particularly on Page A-6.

Q. WHAT IS THE NET EFFECT OF FAILING TO CONSIDER THE IMPACT OF INTERIM RETIREMENTS AND ADDITIONS?

A. The net effect is loading most of the depreciation expense near the end of, and even beyond, the useful life of the generating unit. This creates a huge

disconnect between the recovery of the cost of the facility and the value received by the customers who most benefit from the facility. This is further exacerbated when one also takes into account that base load generating units tend to be used less and less as they approach the end of their useful life, because newer units tend to be more efficient and economical to dispatch, and are therefore utilized more.

Q. HAVE YOU PREPARED AN EXAMPLE TO DEMONSTRATE THE EFFECT OF NOT CONSIDERING INTERIM RETIREMENTS AND ADDITIONS FOR UNIT PROPERTY REMAINING LIFE DEPRECIATION RATES?

A. Yes, Schedule TJS-3 shows a comparison of depreciation rates, depreciation expense, and depreciation reserve with and without interim activity consideration over the life of a 50 year asset. For this demonstrative example, I have made the simplifying assumptions that the asset has a 50-year lifespan, its original cost is $10 million, depreciation rates are adjusted (re-calculated) every 5 years, interim additions are equal to 1% of plant annually, interim retirements are equal to 0.05% of plant annually, and forecasted interim activity equals actual interim activity.

Q. PLEASE EXPLAIN THE CALCULATIONS IN SCHEDULE TJS-3.

A. Column A of Schedule TJS-3 shows the years that the asset is assumed to be in service. The beginning of year plant in service balances, interim additions, interim retirements and year end plant balances are shown in Columns B, C, D and E, respectively. The initial original cost of the asset is shown on Schedule TJS-3 in Column E at the end of year zero.

The depreciation rates calculated with interim activity included, as I have done in my study for the Company, are shown in Column F of Schedule TJS-3. The associated depreciation expense and reserve accrual are shown in Columns G and H, respectively, of Schedule TJS-3.

The depreciation rates calculated without consideration of interim activity, as Staff has proposed, are shown in Column I of Schedule TJS-3, and the associated depreciation expense and reserve accrual are shown in Columns J and K, respectively.

Q. WHAT DOES THE ANALYSIS IN SCHEDULE TJS-3 DEMONSTRATE?

A. As shown in Column F of ScheduleTJS-3, the depreciation rate remains consistent throughout the lifespan of the asset. Depreciation expense increases as the plant in service balance increases. This differs greatly from the depreciation rates in Column I of Schedule TJS-3 (Staff's method) where the recovery of the depreciation rate is lower early in the life of the asset (2%) and more than doubles by the end of the life of the asset (4.15%). Annual depreciation expense increases by more than 150 percent (or 2.5 times) over the same time period. Additionally, there remains a reserve under accrual of approximately 5% of total plant in service, primarily due to the interim activity since the prior depreciation study when interim activity is not considered (Staff's method).

Q. WHAT HAPPENS WHEN YOU INCLUDE SIGNIFICANT CAPITAL ADDITIONS TO THE ANALYSIS IN SCHEDULE TJS-3?

A. In Schedule TJS-4, I have added large capital additions in years 25 and 35. This is similar to the situation that has occurred with Asbury. In this example, the problems discussed above are exacerbated even further with higher end of life depreciation rates, higher expense in the later years of the asset's life, and a higher undepreciated balance at the end of the asset's life.

Q. DOES YOUR RECOMMENDED METHOD ACCELERATE DEPRECIATION EXPENSE ACCRUAL?

A. No. As Schedules TJS-3 and TJS-4 demonstrate, the deprecation accrual rates are stable throughout the entire service life of the asset.

Q. DOES YOUR RECOMMENDED METHOD COLLECT DEPRECIATION EXPENSE ON FUTURE COSTS THAT ARE NOT IN SERVICE AND USED AND USEFUL?

A. No. The depreciation rates are applied to the current period actual plant in service balance, the same balance as the depreciation rates developed using the Staff's approach. There are not any future dollars in the calculation of depreciation expense (depreciation rate times current plant in service balance).

Q. DOES THE INCLUSION OF ESTIMATES OF INTERIM RETIREMENTS AND ADDITIONS RESULT IN A CLOSER MATCH BETWEEN THE RECOVERY OF THE COST OF THE FACILITY AND THE VALUE RECEIVED BY THE CUSTOMERS WHO MOST BENEFIT FROM THE FACILITY?

A. Yes. While there is still higher depreciation expense at the end of the asset's life using the approach I am recommending, a more stable depreciation rate results if forecasted interim retirements and additions are included in the determination of

the depreciation rate than if they are not included (as suggested by Staff). The approach I am recommending is a reasonable compromise between the Staff's approach which defers significant amounts of depreciation expense to the later years of (and even beyond) the generating facility's life, and a unit of production approach which would seek to directly match the investment in the facility with the use (i.e. output) of the facility.

RIVERTON 7 AND 8 RESERVE DEFICIENCY

Q. PLEASE SUMMARIZE YOUR RECOMMENDED TREATMENT OF THE RIVERTON 7 AND 8 RESERVE DEFICIENCY.

A. In my direct testimony on Pages 5 through 7, I recommended that the undepreciated plant balance associated with Riverton 7 and 8 and the estimated cost of removal for these facilities be amortized over a five year period. In Empire's last rate case (Case No. ER-2012-0345), I had recommended that the rate for Riverton 7 and 8 be increased, with the goal of collecting the remaining investment in these facilities over the remaining useful life of those facilities. As stated on Page 7, Lines 1 through 7 of my direct testimony:

> "It is always preferable to recover costs from the ratepayers who are receiving the benefits of the facilities. Deferring costs beyond the retirement of the assets can result in an inter-generational subsidy. In other words, current and future ratepayers will pay costs that should have been borne by past rate payers. However, Empire is entitled to full recovery of these assets, and the 5-year amortization is a reasonable time frame to recover the investment and yet mitigate the potential inter-generational subsidy."

Q. PLEASE SUMMARIZE THE STAFF'S POSITION REGARDING THE TREATMENT OF THE RIVERTON 7 AND 8 RESERVE DEFICIENCY.

A. As discussed on Page 95 of the Staff Report, the Staff is recommending that the reserve deficiency be transferred to various accounts associated with latan 1, Energy Center, State Line Unit 1 and State Line combined cycle. The Staff's recommendation results in the unrecovered investment associated with Riverton 7 and 8 being recovered over various time periods ranging from 10 to 35 years.

Q. WHAT IS THE BASIS FOR STAFF'S RECOMMENDATION?

A. The Staff's recommendation is based on an unreasonable application and interpretation of the following language in the settlement in the Company's previous rate case:

> "Should the retirement of Riverton 7 or 8 create a reserve deficiency under Generally Accepted Accounting Principles (GAAP), the signatories agree to support a reasonable request by Empire for accounting authority pursuant to Accounting Standard 980 (FAS 71) to reallocate the depreciation reserve to cover the cost of removal of such plant."

The intent of this agreement was to make the Company whole for its investment in the Riverton 7 and 8 plants should the settled upon depreciation rates fail to recover that investment prior to the ultimate retirement of the plants. The intent was not to redistribute the costs of Riverton 7 and 8 to other generating units. Nor was the intent to continue this practice in a future rate case when there is an opportunity to closely align the cost recovery to the customers who received the benefit of Riverton 7 and 8.

Q. PLEASE HIGHLIGHT THE FLAWS IN THE STAFF'S RECOMMENDED TREATMENT OF THE RIVERTON 7 AND 8 RESERVE DEFICIENCY.

A. The following are the principal flaws in the Staff's recommendation:

1. Nowhere in the previous case agreement did the parties agree to transfer the depreciation reserve deficiency to other power plants.
2. The Staff's transfer of reserve is arbitrary, and Staff provides no support for how it determined which power plants and to which accounts it transferred reserve dollars. Furthermore, the Staff provides no support for the amounts it transferred to those power plants.
3. Recovering the reserve deficiency for a plant that is no longer in service over the next 10 to 35 years is not reasonable.
4. Staff's recommendation creates an explicit inter-generational subsidy.

Q. IS YOUR RECOMMENDED TREATMENT CONSISTENT WITH THE SETTLEMENT IN THE PREVIOUS CASE?

A. Yes. My recommendation represents a reasonable request by Empire to recover the deficiency over a reasonable period of time. Implicit in my recommendation is that the undepreciated balance (plus any cost of removal) be transferred to an asset which is amortized over a five year period. The Company's principal concern in the previous case's settlement negotiations was that if Riverton 7 and 8 were retired prior to the Company's next rate case, the Staff would make a recommendation that the undepreciated balance not be recovered at all. The Company was compromising from its filed position that all of the investment in Riverton 7 and 8 be recovered over the plants' remaining useful life to a settled position that would allow them to recover any undepreciated balance over a reasonable period of time after the plants were retired.

RIVERTON 7 AND 8 COST OF REMOVAL

Q. PLEASE SUMMARIZE THE STAFF'S RECOMMENDATION REGARDING THE COST OF REMOVAL ASSOCIATED WITH RIVERTON 7 AND 8.

A. On Page 96 of the Staff Report, the Staff states the following:

> "Empire's depreciation study estimated the cost of removal for Riverton Units 7, 8, and 9 to be approximately $3 million. Staff's recommended transfer of reserves does not cover the full estimated cost of removal for Riverton Units 7, 8, and 9. Hopefully between the transfer of reserves and the continued depreciation or remaining steam assets, the reserve totals will contain close to the final costs to remove the retired plants."

Q. IS THE STAFF'S RECOMMENDATION REASONABLE?

A. No. First of all, the Depreciation Study does not estimate the cost of removal for Riverton 7, 8, and 9 at "approximately $3 million". As shown on Page 20 of Schedule TJS-2 (the Depreciation Study) in Table 5-5, the actual estimate is $3,966,659. Second, the Staff freely admits that their "recommended transfer of reserves does not cover the full estimated cost of removal." Third, the actual amount included in the Staff's transfer appears to be $2.2 million. The total transfer shown on Line 12 of Page 95 of the Staff Report equals $10 million (presumable the $7.8 million reserve deficiency plus $2.2 million in cost of removal). Finally, the last sentence in the above quotation is nonsensical and appears to virtually assure that Empire will never recover the full cost of removal of these facilities.

Q. HOW SHOULD THE COST OF REMOVAL BE RECOVERED?

A. It is preferable that all of the costs of Riverton 7 and 8 (and 9) be recovered over the useful life of those assets, including the investment in facilities and cost of

removal. Whatever costs are not recovered over the useful life should be recovered over a relatively short period of time in order to mitigate inter-generational subsidy. The five year period I am recommending represents a reasonable period of time. The 35 years recommended by the Staff (or possibly never for the cost of removal exceeding $2.2 million) is not a reasonable period of time.

IMPUTING DEPRECIATION EXPENSE

Q. PLEASE SUMMARIZE THE FOUNDATION FOR STAFF'S POSITION REGARDING "STOPPED DEPRECIATION" AND 0% DEPRECIATION RATES.

A. On Page 92 of the Staff Report, Staff states the following:

> "In Staff's review of Empire's depreciation study, Staff found depreciation rate recommendations of 0 percent for five accounts on a going-forward basis. These accounts are: State Line Combined Cycle plant account 342 Fuel Holders, State Line Combustion Turbine account 341 Structures and Improvements, Energy Center Units 1 and 2 accounts 342 Fuel Holders, account 344 Generators, and account 346 Miscellaneous Power Equipment. Staff submitted nine data requests related to the recommendation of 0 percent depreciation rates. Empire's responses indicate that it is setting depreciation rates to 0 percent for accounts where reserves are equal to or higher than original cost. This is not the first time Staff has found that Empire has prematurely stopped depreciation accrual on an account or specific asset."

Q. DO YOU AGREE WITH THIS STATEMENT?

A. In part. The first three sentences of this statement correctly describe the basis for my recommendations for those accounts. The final sentence of the statement, however, appears to have no relationship to the first three sentences. Setting the depreciation rate of an asset that is fully depreciated at 0 percent is not the same thing as stopping depreciation on an asset that has a depreciation rate of

something other than zero, when it is fully depreciated. My Depreciation Study makes no mention of discontinuing the application of a depreciation rate (that is not equal to 0) once an asset is fully depreciated. The issue that Staff introduces on Page 92 of the Staff Report does not relate to my Depreciation Study.

The accounts for which I am recommending a depreciation rate of 0 percent is based on a proper application of the remaining life formula. In the remaining life formula, the undepreciated balance is divided by the remaining life of the asset to determine the amount of depreciation accrual. If there is no undepreciated balance, the depreciation rate equals 0 percent. If, at some future point in time, additional investment is added to that account, then at the time of the next rate case the depreciation rate would be reset to a level that recovers that investment over the remaining life of that asset. An instance where depreciation accrual would "automatically" stop is when an asset is fully retired and there is no plant in service against which to apply a depreciation rate.

Q. WHAT IS THE ISSUE THE STAFF APPEARS TO BE ACTUALLY ADDRESSING?

A. The Staff's issue is summarized on Page 93, Lines 19 through 31, of the Staff Report. On Page 93, the Staff lists various accounts, primarily related to generating plant where the Company has stopped accruing depreciation expense for some period since 2005, presumably when the asset is fully depreciated but not retired and a depreciation rate equal to 0 percent has not been explicitly stated in an Order from a rate case.

Q. WHERE DOES THE STAFF STATE THAT IT WOULD LIKE TO GO BACK EVEN FURTHER THAN 2005?

A. On Page 93, Lines 14 and 15, the Staff states: "the investigation is ongoing and Staff may update its position regarding these accounts following its completion."

Q. IS THE STAFF'S POSITION REASONABLE?

A. No. It is unreasonable for two principal reasons. First, since 1990 the Company has been relying upon a Commission order in Case No. ER-90-138 to not accrue depreciation expense for an asset that is fully depreciated even though the stated depreciation rate is not equal to 0. In Appendix B to the order in that case, there are two accounts with depreciation rates that are not zero (they are 1.84 and 1.69 percent) that are footnoted as follows: "Account fully accrued and no depreciation expense to be taken until the Plant Balance exceeds the Reserve for Depreciation." Since 1990, the Company has been following this Order.

Second, the Staff has had numerous opportunities to revisit this issue since 2005 (and 1990) each time the Company has filed a rate case. By introducing this issue in a 2015 rate case, the Staff is seeking to re-examine a position it essentially agreed to by its silence. It is completely unreasonable for Staff to go back beyond rate cases that were already settled or litigated and impute depreciation expense as though it were calculated based on the position it wants to take today.

Q. DOES THIS COMPLETE YOUR PREPARED REBUTTAL TESTIMONY?

A. Yes, it does.

Empire District Electric
Interim activity example

Schedule TJS-3

Assumptions:
Original cost of asset is $10 million
50 year lifespan for asset
Depreciation rate updated every 5 years
Simplifying assumption - actual interim activity equals forecasted

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]
					Depreciation rates with interim activity included			Depreciation rates without interim activity consideration		
Year	Plant in Service Balance	Interim Additions	Interim Retirements	Year End Balance	Depreciation Rate	Depreciation Expense	Depreciation Reserve	Depreciation Rate	Depreciation Expense	Depreciation Reserve
		1%	-0.50%							
0	-			10,000,000						-
1	10,000,000	100,000	(50,000)	10,050,000	**2.75%**	275,850	225,850	**2.00%**	200,500	150,500
2	10,050,000	100,500	(50,250)	10,100,250	2.75%	277,229	452,829	2.00%	201,503	301,753
3	10,100,250	101,003	(50,501)	10,150,751	2.75%	278,615	680,942	2.00%	202,510	453,761
4	10,150,751	101,508	(50,754)	10,201,505	2.75%	280,008	910,197	2.00%	203,523	606,530
5	10,201,505	102,015	(51,008)	10,252,513	2.75%	281,408	1,140,597	2.00%	204,540	760,063
6	10,252,513	102,525	(51,263)	10,303,775	**2.75%**	282,884	1,372,219	**2.06%**	211,471	920,271
7	10,303,775	103,038	(51,519)	10,355,294	2.75%	284,299	1,604,999	2.06%	212,528	1,081,280
8	10,355,294	103,553	(51,776)	10,407,070	2.75%	285,720	1,838,942	2.06%	213,591	1,243,094
9	10,407,070	104,071	(52,035)	10,459,106	2.75%	287,149	2,074,055	2.06%	214,659	1,405,718
10	10,459,106	104,591	(52,296)	10,511,401	2.75%	288,584	2,310,344	2.06%	215,732	1,569,154
11	10,511,401	105,114	(52,557)	10,563,958	**2.75%**	290,108	2,547,895	**2.13%**	224,115	1,740,712
12	10,563,958	105,640	(52,820)	10,616,778	2.75%	291,558	2,786,633	2.13%	225,236	1,913,128
13	10,616,778	106,168	(53,084)	10,669,862	2.75%	293,016	3,026,566	2.13%	226,362	2,086,406
14	10,669,862	106,699	(53,349)	10,723,211	2.75%	294,481	3,267,697	2.13%	227,494	2,260,550
15	10,723,211	107,232	(53,616)	10,776,827	2.75%	295,954	3,510,035	2.13%	228,631	2,435,565
16	10,776,827	107,768	(53,884)	10,830,712	**2.75%**	297,529	3,753,680	**2.21%**	238,918	2,620,599
17	10,830,712	108,307	(54,154)	10,884,865	2.75%	299,017	3,998,543	2.21%	240,112	2,806,557
18	10,884,865	108,849	(54,424)	10,939,289	2.75%	300,512	4,244,630	2.21%	241,313	2,993,446
19	10,939,289	109,393	(54,696)	10,993,986	2.75%	302,014	4,491,948	2.21%	242,519	3,181,268
20	10,993,986	109,940	(54,970)	11,048,956	2.75%	303,524	4,740,502	2.21%	243,732	3,370,030
21	11,048,956	110,490	(55,245)	11,104,201	**2.75%**	305,158	4,990,415	**2.32%**	256,604	3,571,390
22	11,104,201	111,042	(55,521)	11,159,722	2.75%	306,683	5,241,577	2.32%	257,887	3,773,756
23	11,159,722	111,597	(55,799)	11,215,520	2.75%	308,217	5,493,995	2.32%	259,177	3,977,134
24	11,215,520	112,155	(56,078)	11,271,598	2.75%	309,758	5,747,676	2.32%	260,472	4,181,529
25	11,271,598	112,716	(56,358)	11,327,956	2.75%	311,307	6,002,625	2.32%	261,775	4,386,945
26	11,327,956	113,280	(56,640)	11,384,596	**2.76%**	313,008	6,258,992	**2.45%**	278,335	4,608,640
27	11,384,596	113,846	(56,923)	11,441,519	2.76%	314,573	6,516,642	2.45%	279,726	4,831,443
28	11,441,519	114,415	(57,208)	11,498,726	2.76%	316,145	6,775,580	2.45%	281,125	5,055,361
29	11,498,726	114,987	(57,494)	11,556,220	2.76%	317,726	7,035,813	2.45%	282,530	5,280,397
30	11,556,220	115,562	(57,781)	11,614,001	2.76%	319,315	7,297,346	2.45%	283,943	5,506,559
31	11,614,001	116,140	(58,070)	11,672,071	**2.76%**	321,099	7,560,375	**2.63%**	306,136	5,754,625
32	11,672,071	116,721	(58,360)	11,730,431	2.76%	322,704	7,824,719	2.63%	307,666	6,003,931
33	11,730,431	117,304	(58,652)	11,789,083	2.76%	324,318	8,090,385	2.63%	309,205	6,254,483
34	11,789,083	117,891	(58,945)	11,848,029	2.76%	325,939	8,357,379	2.63%	310,751	6,506,288
35	11,848,029	118,480	(59,240)	11,907,269	2.76%	327,569	8,625,708	2.63%	312,304	6,759,352
36	11,907,269	119,073	(59,536)	11,966,805	**2.76%**	329,467	8,895,638	**2.88%**	344,052	7,043,868
37	11,966,805	119,668	(59,834)	12,026,639	2.76%	331,114	9,166,918	2.88%	345,773	7,329,807
38	12,026,639	120,266	(60,133)	12,086,772	2.76%	332,770	9,439,555	2.88%	347,502	7,617,175
39	12,086,772	120,868	(60,434)	12,147,206	2.76%	334,433	9,713,554	2.88%	349,239	7,905,981
40	12,147,206	121,472	(60,736)	12,207,942	2.76%	336,106	9,988,924	2.88%	350,985	8,196,230
41	12,207,942	122,079	(61,040)	12,268,982	**2.76%**	338,191	10,266,075	**3.29%**	402,174	8,537,364
42	12,268,982	122,690	(61,345)	12,330,327	2.76%	339,882	10,544,612	3.29%	404,185	8,880,204
43	12,330,327	123,303	(61,652)	12,391,979	2.76%	341,581	10,824,541	3.29%	406,206	9,224,759
44	12,391,979	123,920	(61,960)	12,453,939	2.76%	343,289	11,105,870	3.29%	408,237	9,571,036
45	12,453,939	124,539	(62,270)	12,516,208	2.76%	345,005	11,388,606	3.29%	410,278	9,919,044
46	12,516,208	125,162	(62,581)	12,578,789	**2.77%**	347,572	11,673,597	**4.15%**	520,731	10,377,195
47	12,578,789	125,788	(62,894)	12,641,683	2.77%	349,310	11,960,013	4.15%	523,335	10,837,636
48	12,641,683	126,417	(63,208)	12,704,892	2.77%	351,056	12,247,860	4.15%	525,952	11,300,379
49	12,704,892	127,049	(63,524)	12,768,416	2.77%	352,811	12,537,147	4.15%	528,581	11,765,436
50	12,768,416	127,684	(63,842)	12,832,258	2.77%	354,576	12,827,881	4.15%	531,224	12,232,818
51	-	-	-	-			(4,377)			(599,440)

Empire District Electric
Interim activity example with Capital Improvements

Schedule TJS-4

Assumptions:
Original cost of asset is $10 million
50 year lifespan for asset
Depreciation rate updated every 5 years
Simplifying assumption - actual interim activity equals forecasted
Large Capital Improvements in Years 25 and 35

[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]
					Depreciation rates with interim activity included			Depreciation rates without interim activity consideration		
Year	Plant in Service Balance	Interim Additions	Interim Retirements	Year End Balance	Depreciation Rate	Depreciation Expense	Depreciation Reserve	Depreciation Rate	Depreciation Expense	Depreciation Reserve
		1%	-0.50%							
0	-			10,000,000						-
1	10,000,000	100,000	(50,000)	10,050,000	**3.32%**	332,895	282,895	**2.00%**	200,500	150,500
2	10,050,000	100,500	(50,250)	10,100,250	3.32%	334,559	567,204	2.00%	201,503	301,753
3	10,100,250	101,003	(50,501)	10,150,751	3.32%	336,232	852,934	2.00%	202,510	453,761
4	10,150,751	101,508	(50,754)	10,201,505	3.32%	337,913	1,140,093	2.00%	203,523	606,530
5	10,201,505	102,015	(51,008)	10,252,513	3.32%	339,603	1,428,688	2.00%	204,540	760,063
6	10,252,513	102,525	(51,263)	10,303,775	**3.32%**	341,362	1,718,788	**2.06%**	211,471	920,271
7	10,303,775	103,038	(51,519)	10,355,294	3.32%	343,069	2,010,338	2.06%	212,528	1,081,280
8	10,355,294	103,553	(51,776)	10,407,070	3.32%	344,784	2,303,346	2.06%	213,591	1,243,094
9	10,407,070	104,071	(52,035)	10,459,106	3.32%	346,508	2,597,819	2.06%	214,659	1,405,718
10	10,459,106	104,591	(52,296)	10,511,401	3.32%	348,241	2,893,764	2.06%	215,732	1,569,154
11	10,511,401	105,114	(52,557)	10,563,958	**3.32%**	350,052	3,191,259	**2.13%**	224,115	1,740,712
12	10,563,958	105,640	(52,820)	10,616,778	3.32%	351,802	3,490,242	2.13%	225,236	1,913,128
13	10,616,778	106,168	(53,084)	10,669,862	3.32%	353,561	3,790,719	2.13%	226,362	2,086,406
14	10,669,862	106,699	(53,349)	10,723,211	3.32%	355,329	4,092,699	2.13%	227,494	2,260,550
15	10,723,211	107,232	(53,616)	10,776,827	3.32%	357,106	4,396,189	2.13%	228,631	2,435,565
16	10,776,827	107,768	(53,884)	10,830,712	**3.32%**	358,972	4,701,277	**2.21%**	238,918	2,620,599
17	10,830,712	108,307	(54,154)	10,884,865	3.32%	360,767	5,007,890	2.21%	240,112	2,806,557
18	10,884,865	108,849	(54,424)	10,939,289	3.32%	362,570	5,316,036	2.21%	241,313	2,993,446
19	10,939,289	109,393	(54,696)	10,993,986	3.32%	364,383	5,625,722	2.21%	242,519	3,181,268
20	10,993,986	109,940	(54,970)	11,048,956	3.32%	366,205	5,936,958	2.21%	243,732	3,370,030
21	11,048,956	110,490	(55,245)	11,104,201	**3.32%**	368,129	6,249,842	**2.32%**	256,604	3,571,390
22	11,104,201	111,042	(55,521)	11,159,722	3.32%	369,970	6,564,291	2.32%	257,887	3,773,756
23	11,159,722	111,597	(55,799)	11,215,520	3.32%	371,820	6,880,312	2.32%	259,177	3,977,134
24	11,215,520	112,155	(56,078)	11,271,598	3.32%	373,679	7,197,913	2.32%	260,472	4,181,529
25	11,271,598	5,112,716	(56,358)	16,327,956	3.32%	458,634	7,600,189	2.32%	319,691	4,444,861
26	16,327,956	163,280	(81,640)	16,409,596	**3.34%**	547,023	8,065,573	**2.91%**	476,512	4,839,734
27	16,409,596	164,096	(82,048)	16,491,644	3.34%	549,758	8,533,283	2.91%	478,895	5,236,580
28	16,491,644	164,916	(82,458)	16,574,102	3.34%	552,507	9,003,331	2.91%	481,289	5,635,411
29	16,574,102	165,741	(82,871)	16,656,972	3.34%	555,269	9,475,730	2.91%	483,696	6,036,236
30	16,656,972	166,570	(83,285)	16,740,257	3.34%	558,046	9,950,491	2.91%	486,114	6,439,065
31	16,740,257	167,403	(83,701)	16,823,958	**3.34%**	561,129	10,427,919	**3.08%**	516,347	6,871,711
32	16,823,958	168,240	(84,120)	16,908,078	3.34%	563,935	10,907,734	3.08%	518,929	7,306,521
33	16,908,078	169,081	(84,540)	16,992,619	3.34%	566,754	11,389,948	3.08%	521,524	7,743,504
34	16,992,619	169,926	(84,963)	17,077,582	3.34%	569,588	11,874,573	3.08%	524,131	8,182,672
35	17,077,582	2,670,776	(85,388)	19,662,970	3.34%	614,231	12,403,416	3.08%	565,212	8,662,496
36	19,662,970	196,630	(98,315)	19,761,284	**3.36%**	662,235	12,967,336	**3.73%**	735,198	9,299,379
37	19,761,284	197,613	(98,806)	19,860,091	3.36%	665,546	13,534,076	3.73%	738,874	9,939,447
38	19,860,091	198,601	(99,300)	19,959,391	3.36%	668,874	14,103,649	3.73%	742,569	10,582,715
39	19,959,391	199,594	(99,797)	20,059,188	3.36%	672,218	14,676,070	3.73%	746,282	11,229,200
40	20,059,188	200,592	(100,296)	20,159,484	3.36%	675,579	15,251,353	3.73%	750,013	11,878,917
41	20,159,484	201,595	(100,797)	20,260,282	**3.36%**	679,770	15,830,326	**4.11%**	830,127	12,608,246
42	20,260,282	202,603	(101,301)	20,361,583	3.36%	683,169	16,412,194	4.11%	834,278	13,341,222
43	20,361,583	203,616	(101,808)	20,463,391	3.36%	686,585	16,996,971	4.11%	838,449	14,077,863
44	20,463,391	204,634	(102,317)	20,565,708	3.36%	690,018	17,584,672	4.11%	842,641	14,818,188
45	20,565,708	205,657	(102,829)	20,668,536	3.36%	693,468	18,175,312	4.11%	846,854	15,562,213
46	20,668,536	206,685	(103,343)	20,771,879	**3.37%**	698,626	18,770,596	**4.94%**	1,023,818	16,482,688
47	20,771,879	207,719	(103,859)	20,875,739	3.37%	702,120	19,368,856	4.94%	1,028,937	17,407,766
48	20,875,739	208,757	(104,379)	20,980,117	3.37%	705,630	19,970,107	4.94%	1,034,082	18,337,469
49	20,980,117	209,801	(104,901)	21,085,018	3.37%	709,158	20,574,365	4.94%	1,039,252	19,271,820
50	21,085,018	210,850	(105,425)	21,190,443	3.37%	712,704	21,181,644	4.94%	1,044,448	20,210,843
51	-	-	-	-			(8,799)			(979,600)

AFFIDAVIT OF THOMAS J. SULLIVAN

STATE OF MISSOURI)
) ss
COUNTY OF RAY)

On the 19th day of April, 2016, before me appeared Thomas J. Sullivan, to me personally known, who, being by me first duly sworn, states that he is President of Navillus Utility Consulting, LLC and acknowledged that he has read the above and foregoing document and believes that the statements therein are true and correct to the best of his information, knowledge and belief.

Thomas J. Sullivan

Subscribed and sworn to before me this 19th day of April, 2016

Notary Public

My commission expires: 4-3-20

PATRICIA A. McQUEEN
Notary Public - Notary Seal
State of Missouri
Commissioned for Ray County
My Commission Expires: April 03, 2020
Commission Number: 12414456