Public Utility

Depreciation Practices

August 1996

Compiled and Edited by

Staff Subcommittee on Depreciation of

The Finance and Technology Committee

of the

National Association of Regulatory Utility Commissioners

Published by

National Association of Regulatory Utility Commissioners
1101 Vermont Avenue, N.W., Suite 200
Washington, DC 20005
Telephone (202) 898-2200
Facsimile (202) 898-2213

CHAPTER XII

EQUAL LIFE GROUP DEPRECIATION RATES

Principles of Equal Life Grouping

The Equal Life Group (ELG) procedure is a refinement of the Vintage Group (VG) procedure whereby the vintages (generation) represented in the generation arrangement discussed in Chapter IX are subdivided using a survivor curve into subgroups having equal probable lives. ELG is not a recognized procedure in all regulated industries or by all regulatory authorities. However, it is recognized by the Federal Communications Commission (FCC), the Interstate Commerce Commission (ICC), and many state commissions.

Both the VG and ELG procedures are designed to charge to depreciation expense the cost of property installed in a single year (vintage) over the property's service life. Under the VG procedure, an average percentage rate is applied annually to the surviving property balance throughout the life of the vintage. The total cost of the vintage is fully allocated to expense when the last surviving unit in the vintage is retired.

The ELG procedure is designed to charge to depreciation expense the investment in each equal life group by the time each group is completely retired. For example, under ELG, if a group has a two-year life, its original capital costs should be allocated to expense by the end of two years, plant expected to live five years is completely expensed only at the end of five years. Under both the ELG and VG procedures, the total depreciation accruals representing 100% of the original capitalized costs are exactly the same at the end of the total life.

The ELG procedure is more sensitive than VG to retirement dispersion curves. Therefore, in order to calculate accurate depreciation accruals using the ELG procedure, detailed vintage plant mortality data must be maintained from which future mortality dispersion can be estimated. Without the long-term accumulation of data involving large numbers of units within each group, such accuracy may not be obtainable.

The ELG Procedure

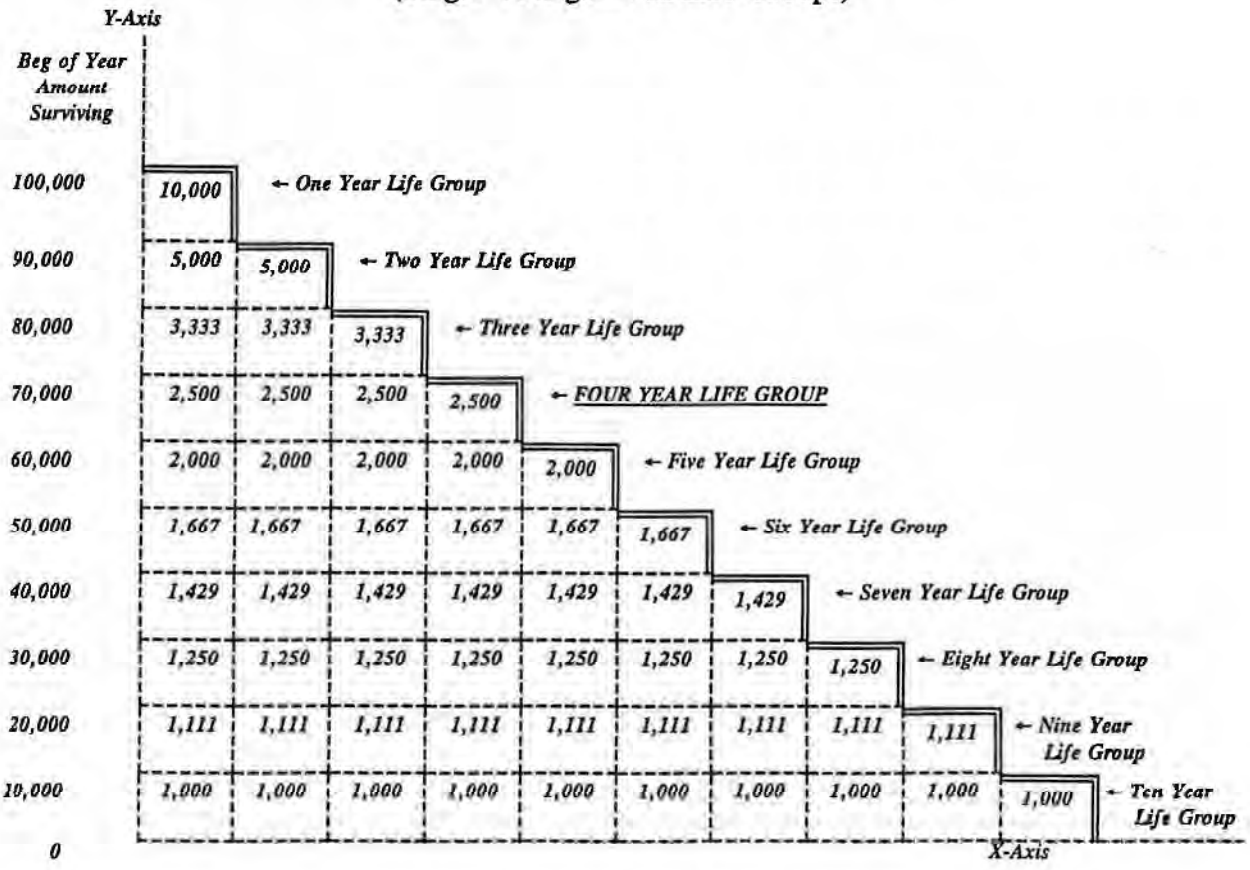
Development of Equal Life Group Depreciation Rates

In developing ELG depreciation rates, the life characteristics (average service life and survivor curve) are estimated using the same life analyses as used under the VG procedure. The initial plant investment is divided into equal life groups. While it is not possible to physically identify the individual units in each group, each group is treated as a unit of property and the total annual accrual for each vintage is the sum of the annual accrual for each equal life group remaining in service. In Table 12-5, the ELG depreciation rate for each age is the sum of each equal life group's annual accruals for the activity year divided by the vintage's amount surviving at the beginning of the year.

For example, Table 12-1 illustrates the ELG grouping and the calculation of depreciation accruals for a single vintage with ten equal life groups. The life of this table is determined by the area bounded by the x-axis, the y-axis, and the step-function.

TABLE 12-1

FIVE AND ONE-HALF YEAR STEP FUNCTION
(Single Vintage—Ten Life Groups)



AGE	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	SUM
TOTAL ACCRUALS	29,290	19,290	14,290	10,956	8,456	6,456	4,790	3,361	2,111	1,000	100,000
RATIO (ACCRUALS/ SURVIVORS)	29,290 / 100,000	19,290 / 90,000	14,290 / 80,000	10,956 / 70,000	8,456 / 60,000	6,456 / 50,000	4,790 / 40,000	3,361 / 30,000	2,111 / 20,000	1,000 / 10,000	
WL ELG Depr RATE (%)	29.3	21.4	17.9	15.7	14.1	12.9	12.0	11.2	10.6	10.0	

$$\text{Life} = (10{,}000 * \sum_{I=1}^{10} I) / 100{,}000 = 10{,}000\ (55) / 100{,}000 = 5.5 \text{ years.}$$

As shown in Table 12-1, each year 10,000 (dollars or units) is retired from the original 100,000. The items are subdivided through the use of a survivor curve into subgroups having equal probable lives. For example, consider the FOUR-YEAR LIFE GROUP near the center of Table 12-1. From this table it is observed that during the fourth year, the plant surviving declines by 10,000 from 70,000 to 60,000. Since this amount is forecast to retire after four years, the ELG procedure assigns one-fourth of the 10,000 accrual needed, or 2,500, to each of four years as shown in the boxes on Table 12-1.

Table 12-1 also details the calculation of the ELG depreciation accrual and the ELG whole life depreciation rate. While the equal life groups are determined horizontally, the accruals within each box are added vertically and the totals appear in the line designated TOTAL ACCRUALS. For example, the total accrual for the first year (age 0.5) is found by adding the first column of boxes (i.e., 10,000 + 5,000 + 3,333 + 2,500 + 2,000 + ... = 29,290). The second year accruals of 19,290 are found by adding the second column (age 1.5) of boxes (beginning with 5,000 since the group which lasted only one year has been retired). The remaining "Total Accruals" are similarly calculated. Note the sum of accruals for all ages is equal to the original 100,000. The whole life ELG rate (without salvage) is calculated by dividing the total accrual for each age by the plant surviving at that age. The quotients are shown in the RATIO row of Table 12-1 and the resulting depreciation rate is shown in the WL ELG Depr row. This row represents the WL ELG depreciation rate to be applied to the surviving vintage investment each year.

Sensitivity of ELG to Curve Shape

It should be clear from the preceding discussion and examination of Table 12-1 that the amounts to be divided into equal life groups depend directly upon the curve shape selected. To demonstrate the sensitivity of the ELG procedure to the selected curve shape, the ELG depreciation rates and accruals based on three different curve shapes, each with a five-year average life, are compared in Table 12-2; supporting calculations are in Table C.

TABLE 12-2

EFFECT OF CURVE SHAPE ON ACCRUALS

Activity Year	*Age*	*Selected Curve Shape*					
		Iowa L0		*Iowa S1*		*Iowa R5*	
		Accruals $	*Rate %*	*Accruals $*	*Rate %*	*Accruals $*	*Rate %*
1	*0.5*	*30,632*	*31.5*	*25,099*	*25.1*	*20,491*	*20.5*
2	*1.5*	*20,475*	*23.5*	*22,201*	*22.9*	*20,491*	*20.5*
3	*2.5*	*14,372*	*19.2*	*18,188*	*20.5*	*20,491*	*20.5*

The above three curves were chosen to illustrate the difference in depreciation accruals and rates resulting from using curves with significantly different shapes, from left modal to right modal and from low mode to high mode. Table 12-2 shows that the more left modal (maximum retirement frequency occurs prior to 100% of life) the curve is, the greater the accruals that occur in the early years using the ELG procedure.

Calculating Whole Life ELG Average Service Lives

In Table 12-1, the whole life ELG accruals and rates were developed by constructing a life table based on a step function and dividing each vintage into equal life groups. It is neither efficient nor convenient to construct such a life table each time an ELG rate is needed. Instead, the simple algorithm shown in Table 12-3 may be used to provide the same results as Table 12-1. Whereas a step function is useful in teaching, this function is rarely encountered. The life table values in Column B of Table 12-3 are based on the step function, but in actual practice it is more likely that an Iowa or Gompertz-Makeham (GM) curve representing the life characteristics of the plant being studied would be used.

Table 12-4 develops ELG whole life rates by age based on the 12-year GM curve used in Tables 9-1 and 9-3 of Chapter IX.

ELG True-Up Procedures

Even when a curve shape is chosen based on informed judgment, plant generally will not retire precisely at the time the projected life and dispersion patterns would suggest. Therefore, the difference between projected and actual retirement experience should be addressed. One way

to address this difference is to determine the variance between the theoretical depreciation reserve and the actual book accumulated depreciation.

In the railroad industry, this variance may be partitioned into that portion attributable to a change in life and salvage parameters and the remaining portion. The amount attributable to a change in parameters is amortized over the average remaining life of the property whereas the latter portion is recovered over the number of years between studies (prescription period). The telephone industry chooses to spread the total variance over the average remaining life by the use of the remaining life technique.

ELG Remaining Life Depreciation Technique

Under the average remaining life technique applied to individual accounts in the telephone industry, an ELG average remaining life (ELG-ARL) is developed for each ELG vintage and a VG average remaining life (VG-ARL) is developed for each VG vintage. An example of the development of the ELG-ARL is given in Column H of Table 12-6. The ELG-ARL is the ELG service life (Column G) less the age of the survivors (Column A). The ELG service life in Column G is the reciprocal of the ELG whole life rate developed in Column G of Table 12-5. The VG-ARL in Column I of Table 12-6 is the same as Column D of the generation arrangement (see Table 9-3, Chapter IX). (For additional information on development of VG-ARL, refer to Chapter IX).

The final step in the calculation of a composite VG/ELG average remaining life for each account is developed in the generation arrangement on Table 12-4. The composite VG/ELG generation arrangement is similar to Table 9-1 in Chapter IX. The remaining lives for the ELG (1984 and subsequent) vintages in Column E of Table 12-4 are obtained from Column H of Table 12-6. The remaining lives for the VG (non-ELG) vintages (1983 and prior) in Column E of Table 12-10 are obtained from Column I of Table 12-6. The composite average remaining life of 6.68 years (total line of Column E) represents the composite VG/ELG average remaining life that is used in the remaining life depreciation rate formula (Chapter V) to develop the composite VG/ELG average remaining life rate.

TABLE 12-3

DEVELOPMENT OF ELG WHOLE LIFE DEPRECIATION RATES BY AGE

Age	Amount Surviving	Amount Retired	Age of Amount Retired	Accruals		ELG Whole Life Depr. Rate
				For Each Group	For All Groups	
A	B $	C(A)= B(A)-B(A+1) $	D=A+0.5	E=C/D $	F=Sum E (A to end) $	G=F/B (%)
0.0	100,000	0	0.5	0	29,290	-
0.5	100,000	10,000	1.0	10,000	29,290	29.3
1.5	90,000	10,000	2.0	5,000	19,290	21.4
2.5	80,000	10,000	3.0	3,333	14,290	17.9
3.5	70,000	10,000	4.0	2,500	10,956	15.7
4.5	60,000	10,000	5.0	2,000	8,456	14.1
5.5	50,000	10,000	6.0	1,667	6,456	12.9
6.5	40,000	10,000	7.0	1,429	4,790	12.0
7.5	30,000	10,000	8.0	1,250	3,361	11.2
8.5	20,000	10,000	9.0	1,111	2,111	10.6
9.5	10,000	10,000	10.0	1,000	1,000	10.0
10.5	0	0	11.0	0	0	
Totals	550,000	100,000		29,290		

TABLE 12-4

GENERATION ARRANGEMENT

COMPOSITE VINTAGE GROUP/EQUAL LIFE GROUP

Vintage	Age As of 1-1-96	Experience to 12-31-95			Average Remaining Life Years	Average Life Years	Average Life Weight	Remaining Life Weight
		Amount Surviving	Proportion Surviving	Realized Life				
N	A	B	C	D	E @	F=D+C*E	G=B/F	H=E*G
* 1995	0.5	398,962	0.9974	0.50	8.03	8.53+	46,472	375,576
* 1994	1.5	357,089	0.9831	1.48	7.88	9.38+	38,069	299,985
* 1993	2.5	350,607	0.9609	2.45	7.51	10.01+	35,026	263,043
* 1992	3.5	291,323	0.9488	3.42	7.09	10.59+	27,509	195,041
* 1991	4.5	288,689	0.9217	4.34	6.65	11.15+	25,891	172,178
* 1990	5.5	127,166	0.5877	4.52	6.21	11.71+	10,860	67,438
1989	6.5	237,510	0.8995	6.30	6.98	12.58	18,882	131,798
1988	7.5	166,770	0.8626	7.14	6.37	12.63	13,199	84,080
1987	8.5	114,267	0.8312	7.97	5.79	12.78	8,939	51,758
1986	9.5	79,389	0.7895	8.83	5.26	12.98	6,115	32,165
1985	10.5	64,080	0.7227	9.45	4.76	12.89	4,971	23,663
1984	11.5	62,361	0.7044	10.17	4.30	13.20	4,725	20,316
1983	12.5	44,466	0.6279	10.45	3.87	12.88	3,452	13,361
1982	13.5	35,322	0.5919	11.08	3.48	13.14	2,688	9,355
1981	14.5	34,756	0.5893	12.29	3.12	14.13	2,460	7,675
1980	15.5	35,205	0.5176	12.44	2.79	13.88	2,536	7,074
1979	16.5	47,210	0.5112	13.51	2.50	14.79	3,192	7,981
1978	17.5	34,564	0.4098	14.82	2.23	15.73	2,197	4,899
1977	18.5	29,676	0.4470	15.88	1.98	16.77	1,770	3,505
1976	19.5	35,282	0.3824	16.50	1.77	17.18	2,054	3,636
1975	20.5	27,505	0.4241	17.57	1.57	18.24	1,508	2,368
1974	21.5	16,158	0.3731	17.95	1.40	18.47	875	1,225
1973	22.5	14,437	0.3556	18.46	1.25	18.90	764	955
1972	23.5	10,682	0.2623	19.04	1.11	19.33	553	613
1971	24.5	13,194	0.2281	20.77	0.99	21.00	628	622
1970	25.5	11,710	0.1783	20.98	0.88	21.14	554	488
1969	26.5	6,660	0.1274	21.62	0.50	21.68	307	154
Totals		2,935,040			6.68 [1]	11.01 [2]	266,497	1,780,949

*** ELG Vintages**

@ From Table 12-6: Column H for ELG Vintages, Column I for VG Vintages.

+ For ELG Vintages F = A + E

---

[1] Composite Average Remaining Life = Total of Column H/Total of Column G

[2] Composite Average Service Life = Total of Column B/Total of Column G

History and Current Use of ELG

History of the ELG Procedure

The use of ELG was discussed as early as March 1938 during an ICC hearing.[3] Robley Winfrey studied ELG during the 1930s and called it the unit summation procedure. In 1942, Winfrey published a detailed discussion of the procedure in "Depreciation of Group Properties," Bulletin 155 and considered it "the only mathematical (SIC) correct procedure."[4]

The procedure was primarily of academic interest until the early 1970s when American Telephone and Telegraph filed a petition on September 23, 1973, requesting the FCC to amend its rules and regulations to allow the use of ELG for property placed in service after December 31, 1974. Following a public notice and comments, the FCC adopted its Report and Order (Docket No. 20188) on November 6, 1980. This Order, released on December 5, 1980, ordered the use of ELG for the telephone industry on new plant additions beginning in 1981 over a three-year phase-in period.

The ICC approved the use of ELG in the railroad industry in 1986. The ELG procedure approved by the ICC was based on whole-life techniques for use on all plant—both embedded investment and future additions. The use of the ELG procedure has not been approved by the Federal Energy Regulatory Commission (FERC) for use in the gas, oil, and electric industries.

---

[3] "Telephone Engineer and Management," (1967), 55.

[4] Winfrey, R., *Depreciation of Group Properties*. Originally printed as "Bulletin 155," (Ames, Iowa: Engineering Research Institute, Iowa State University, 1942), 71.

TABLE 12-5

DEVELOPMENT OF ELG WHOLE LIFE DEPRECIATION RATES BY AGE

Age	Beg. of Year Amount Surviving	Amount Retired During Year	Age of Amount Retired	Accruals		ELG Whole Life Depr. Rate
				For Each Group	For All Groups	
A	B[1]	C(A)= B(A)-B(A+1)	D=A+0.5	E=C/D	F=Sum E (A to end)	G=F/B (%)
0.0	100,000	426	0.5	852	12,527	-
0.5	99,574	1,183	1.0	1,183	11,675	11.7
1.5	98,391	1,668	2.0	834	10,492	10.7
2.5	96,723	2,203	3.0	734	9,658	10.0
3.5	94,520	2,785	4.0	696	8,924	9.4
4.5	91,735	3,406	5.0	681	8,227	9.0
5.5	88,328	4,056	6.0	676	7,546	8.5
6.5	84,273	4,716	7.0	674	6,870	8.2
7.5	79,557	5,364	8.0	671	6,197	7.8
8.5	74,193	5,973	9.0	664	5,526	7.4
9.5	68,220	6,507	10.0	651	4,862	7.1
10.5	61,713	6,928	11.0	630	4,212	6.8
11.5	54,785	7,197	12.0	600	3,582	6.5
12.5	47,588	7,278	13,0	560	2,982	6.3
13.5	40,310	7,142	14.0	510	2,422	6.0
14.5	33,168	6,777	15.0	452	1,912	5,8
15.5	26,392	6,190	16.0	387	1,460	5.5
16.5	20,202	5,415	17.0	319	1,074	5.3
17.5	14,787	4,509	18.0	250	755	5.1
18.5	10,278	3,548	19.0	187	505	4.9
19.5	6,730	2,617	20.0	131	318	4.7
20.5	4,113	1,792	21.0	85	187	4.5
21.5	2,321	1,126	22.0	51	102	4.4
22.5	1,195	642	23.0	28	50	4.2
23.5	553	327	24.0	14	22	4.1
24.5	226	146	25.0	6	9	3.9
25.5	80	56	26.0	2	3	3.8
26.5	24	18	27.0	1	1	3.7
27.5	6	5	28.0	0	0	3.5
28.5	1	1	29.0	0	0	3.4
Totals	1,199,988	100,000		12,527		

[1] Based on 12-Year Life Table Using the following Gompertz-Makeham factors:
C=1.1550991 G= - 0.086446248 S=0.0092192171 Life=12 years

TABLE 12-6

PROJECTION LIFE TABLE

DEVELOPMENT OF ELG AND VG AVERAGE REMAINING LIVES BY AGE

Age	Beg of Year Amount Surviving	Amount Retired During Year	Age of Amount Retired	Annual Accruals		ELG Average		VG Average Remaining Life
				For Each Group	For All Groups	Service Life	Remaining Life	
A	B Life Table [1]	C(A)= B(A)-B(A+1)	D=A+0.5	E=C/D	F=Sum E (A to end)	G=B/F	H=G-A	I=Sum B (A+1 to End) /B(A)+0.5
0.0	100,000	426	0.5	852	12,527	7.98	7.98	-
0.5	99,574	1,183	1.0	1,183	11,675	8.53	8.03	11.55
1.5	98,391	1,668	2.0	834	10,492	9.38	7.88	10.68
2.5	96,723	2,203	3.0	734	9,658	10.01	7.51	9.86
3.5	94,520	2,785	4.0	696	8,924	10.59	7.09	9.08
4.5	91,735	3,406	5.0	681	8,227	11.15	6.65	8.34
5.5	88,328	4,056	6.0	676	7,546	11.71	6.21	7.64
6.5	84,273	4,716	7.0	674	6,870	12.27	5.77	6.98
7.5	79,557	5,364	8.0	671	6,197	12.84	5.34	6.37
8.5	74,193	5,973	9.0	664	5,526	13.43	4.93	5.79
9.5	68,220	6,507	10.0	651	4,862	14.03	4.53	5.26
10.5	61,713	6,928	11.0	630	4,212	14.65	4.15	4.76
11.5	54,785	7,197	12.0	600	3,582	15.29	3.79	4.30
12.5	47,588	7,278	13.0	560	2,982	15.96	3.46	3.87
13.5	40,310	7,142	14.0	510	2,422	16.64	3.14	3.48
14.5	33,168	6,777	15.0	452	1,912	17.35	2.85	3.12
15.5	26,392	6,190	16.0	387	1,460	18.07	2.57	2.79
16.5	20,202	5,415	17.0	319	1,074	18.82	2.32	2.50
17.5	14,787	4,509	18.0	250	755	19.59	2.09	2.23
18.5	10,278	3,548	19.0	187	505	20.37	1.87	1.98
19.5	6,730	2,617	20.0	131	318	21.18	1.68	1.77
20.5	4,113	1,792	21.0	85	187	22.00	1.50	1.57
21.5	2,321	1,126	22.0	51	102	22.85	1.35	1.40
22.5	1,195	642	23.0	28	50	23.71	1.21	1.25
23.5	553	327	24.0	14	22	24.58	1.08	1.11
24.5	226	146	25.0	6	9	25.47	0.97	0.99
25.5	80	56	26.0	2	3	26.38	0.88	0.89
26.5	24	18	27.0	1	1	27.29	0.79	0.50
27.5	6	5	28.0	0	0	28.20	0.70	0.50
28.5	1	1	29.0	0	0	29.00	0.50	0.50
Totals	1,199,988	100,000		12,527				

[1] Based on 12-Year Life Table Using the following Gompertz-Makeham factors:
C = 1.1550991 G = - 0.086446248 S = 0.0092192171 Life = 12 years

FERC has not approved the use of ELG since the industries regulated by it could not identify and track the units that would be placed in each equal life group. In addition, some state regulatory commissions have not approved the use of ELG for intrastate depreciation rates.

Current Use in the Telephone Industry

The initial ELG depreciation rates proposed by the telephone companies and ordered by the FCC for those companies reviewed in 1982 were individual ELG whole-life rates for each age within each plant account. The ELG depreciation rate for each age was calculated in the same manner as the depreciation rates developed in the 3-Year Life Table in TABLE B. For example, if 1982 was the first ELG year, the ELG rate in 1982 would be 45.7% for plant placed in 1982. In 1983, the ELG rate would be 45.7% for the investments placed in 1983 and 32.1% for that remaining from the 1982 year placed.

If these procedures had continued through 1991, ten separate ELG rates would have been required for the approximately 30 plant accounts. In addition, a salvage rate and a VG depreciation rate would also have been required for each account. In order to reduce the number of separate depreciation rates for each vintage, a composite ELG depreciation rate was developed for all ELG vintages within an account. Therefore, starting with the 1983 prescription year, three depreciation rates were ordered for each account:

1. A composite VG rate based on the composite VG average remaining life developed from the generation arrangement (see Chapter IX);

2. A single ELG rate representing the composite of the individual ELG whole life rates developed for each vintage within the account; and,

3. A composite net salvage rate for the account.

The use of three depreciation rates for each account was less burdensome than the prior procedure in which an ELG rate was required for each vintage. However, the composite ELG rate did not contain a true-up procedure to correct for the excesses or deficiencies in accumulated depreciation. The composite VG rate, which was based on the remaining life technique, did contain a true-up procedure since the VG remaining-life rates are periodically revised by the level of the depreciation reserve at each prescription review.

In the 1985 prescription, the FCC corrected this true-up deficiency in the composite ELG rate by prescribing a single composite remaining life rate for each plant account. The generation arrangement was used to composite the VG and ELG vintages into a single average service life and remaining life for each plant account.

Comparison of ELG and VG Procedures

In comparison with the VG procedure, the ELG procedure results in annual accruals that are higher during the early years of a vintage's life, thereby causing an increase in depreciation expense and revenue requirements during these years. In 1981, when the FCC began to permit use of ELG for new plant additions for the telephone industry, it chose a 3-year phase-in period to reduce the immediate impact on both depreciation expense and revenue requirements.

The difference between the two procedures is the timing of depreciation accruals. The VG procedure treats each unit as if its life is equal to the average-life of the group, where the group is all investment placed into service in a specific year (vintage) for a particular plant account. Using the ELG procedure, the investment in each vintage is further divided into subgroups. All of the property in a subgroup is expected to have the same life. For example, the items within a vintage which are expected to live one year are grouped together; the items expected to live two years are grouped together... In Table 12-7, three equally priced items of plant (A, B, and C) are placed in the vintage year and expected to live one, two, and three years, respectively. The average service life of the three units under the VG procedure is two years.

TABLE 12-7

Unit	*Expected Life*	*Life Weight*
a	*b (Years)*	$c = a + b$
A	*1*	*1*
B	*2*	*2*
C	*3*	*3*
Average/Total	*2*	*6*

Using the ELG procedure, item A which has a life of one year, will have a depreciation rate of 100%. Item B has a depreciation rate of 50% for each of two years and item C has a depreciation rate of 33.3% for each of three years. Under the VG procedure, the average-life of two years is used to develop the composite vintage depreciation rate of 50% which is used each year. Table 12-8 provides a comparison of the depreciation accruals under each procedure:

TABLE 12-8

EFFECT OF PROCEDURES ON ACCRUALS

Item	*Life* *a*	*ELG Procedures*			*VG Procedures*		
		Year 1 *b*	*Year 2* *c*	*Year 3* *d*	*Year 1* *e*	*Year 2* *f*	*Year 3* *g*
A	*1*	*100%*	-	-	*50%*	-	-
B	*2*	*50*	*50*	-	*50*	*50*	-
C	*3*	*33.3*	*33.3*	*33.3*	*50*	*50*	*50*
Annual Accruals		*1.83*	*0.83*	*0.33*	*1.50*	*1.00*	*0.50*
Total Accruals		*ELG = 3.0*			*VG = 3.0*		

In the example above, the three items are fully recovered at the end of the three-year period using either the ELG or VG procedures. Although this example contains only one vintage, in actual application a depreciation group generally contains many vintages, with older vintages retiring and new vintages being added annually. Table 12-9 compares the ELG and VG depreciation rate in an example containing three vintages, each with a different forecast life.

TABLE 12-9

EFFECT OF PROCEDURES ON RATES

Vintage	*Total Amount Placed*	*VG Average Life*	*VG Depr. Rate*	*ELG Depreciation Rates (See Table A for calculation)*					
				1987	*1988*	*1989*	*1990*	*1991*	*1992*
1987	*50,000*	*3.0*	*33.3%*	*45.7%*	*32.1%*	*26.1%*	*22.5%*	*20.0%*	*0.0%*
1988	*80,000*	*4.5*	*22.2*	-	*34.0*	*24.5*	*20.3*	*17.7*	*15.9*
1989	*100,000*	*5.5*	*18.2*	-	-	*29.3*	*21.4*	*17.9*	*15.7*

The Depreciation Accruals--ELG Method Table in Table A details the total depreciation accruals for all three vintages calculated under the ELG procedure for activity years 1987 through 1992 using the depreciation rates given in Table 12-7. The Depreciation Accruals—VG

Method Table in Table A details the total depreciation accruals for all three vintages calculated under the VG procedure for activity years 1987 through 1992. A comparison of the depreciation rate and accruals for each activity year using both the ELG and VG procedures is given in Table 12-10.

TABLE 12-10

EFFECT OF DIFFERENT PROCEDURES ON DEPRECIATION RATES AND ACCRUALS

Activity Year	*ELG*		*VG*	
	Depreciation		*Depreciation*	
	Rate	*Accruals*	*Rate*	*Accruals*
1987	*45.7%*	*$22,850*	*33.3%*	*$16,650*
1988	*33.4*	*40,040*	*25.9*	*31,080*
1989	*27.1*	*54,280*	*21.9*	*43,730*
1990	*21.1*	*35,940*	*21.4*	*36,360*
1991	*18.0*	*25,170*	*20.7*	*28,990*
1992	*15.8*	*17,350*	*19.7*	*21,620*

From Table 12-10 it can be seen that when plant is growing (activity years 1987 through 1989) the ELG rate and accruals will always exceed the VG rate and accruals. As the plant begins to decline (1990-1992), the VG rate and accruals will increase and eventually exceed the ELG rate and accruals. In a growing account however, a crossover point may never occur.

TABLE A

DEPRECIATION ACCRUALS – ELG METHOD

Beginning of Year	*Placements*	*Retirements*	*Depreciable Base*	*ELG Depr. Rate*	*ELG Accruals*
	($)	*($)*	*($)*	*(%)*	*($)*
1-1-1987	*50,000*				
1987 Vintage		*10,000*	*50,000*	*45.7*	*22,850*
1-1-1988	*80,000*				
1987 Vintage		*10,000*	*40,000*	*32.1*	*12,840*
1988 Vintage		*10,000*	*80,000*	*34.0*	*27,200*
1988 Composite			*120,000*	*33.4*	*40,040*
1-1-1989	*100,000*				
1987 Vintage		*10,000*	*30,000*	*26.1*	*7,830*
1988 Vintage		*10,000*	*70,000*	*24.5*	*17,150*
1989 Vintage		*10,000*	*100,000*	*29.3*	*29,300*
1989 Composite			*200,000*	*27.1*	*54,280*
1-1-1990	*0*				
1987 Vintage		*10,000*	*20,000*	*22.5*	*4,500*
1988 Vintage		*10,000*	*60,000*	*20.3*	*12,180*
1989 Vintage		*10,000*	*90,000*	*21.4*	*19,260*
1990 Composite			*170,000*	*21.1*	*35,940*
1-1-1991	*0*				
1987 Vintage		*10,000*	*10,000*	*20.0*	*2,000*
1988 Vintage		*10,000*	*50,000*	*17.7*	*8,850*
1989 Vintage		*10,000*	*80,000*	*17.9*	*14,320*
1991 Composite			*140,000*	*18.0*	*25,170*
1-1-1992	*0*				
1987 Vintage		*0*	*0*	*0.0*	*0*
1988 Vintage		*10,000*	*40,000*	*15.9*	*6,360*
1989 Vintage		*10,000*	*70,000*	*15.7*	*10,990*
1992 Composite			*110,000*	*15.8*	*17,350*

TABLE A

DEPRECIATION ACCRUALS—VG METHOD

Beginning of Year	*Placements ($)*	*Retirements ($)*	*Depreciable Base ($)*	*VG Depr. Rate (%)*	*VG Accruals ($)*
1-1-1987	*50,000*				
1987 Vintage		*10,000*	*50,000*	*33.3*	*16,650*
1-1-1988	*80,000*				
1987 Vintage		*10,000*	*40,000*	*33.3*	*13,320*
1988 Vintage		*10,000*	*80,000*	*22.2*	*17,760*
1988 Composite			*120,000*	*25.9*	*31,080*
1-1-1989	*100,000*				
1987 Vintage		*10,000*	*30,000*	*33.3*	*9,990*
1988 Vintage		*10,000*	*70,000*	*22.2*	*15,540*
1989 Vintage		*10,000*	*100,000*	*18.2*	*18,200*
1989 Composite			*200,000*	*21.9*	*43,730*
1-1-1990	*0*				
1987 Vintage		*10,000*	*20,000*	*33.3*	*6,660*
1988 Vintage		*10,000*	*60,000*	*22.2*	*13,320*
1989 Vintage		*10,000*	*90,000*	*18.2*	*16,380*
1990 Composite			*170,000*	*21.4*	*36,360*
1-1-1991	*0*				
1987 Vintage		*10,000*	*10,000*	*33.3*	*3,330*
1988 Vintage		*10,000*	*50,000*	*22.2*	*11,100*
1989 Vintage		*10,000*	*80,000*	*18.2*	*14,560*
1991 Composite			*140,000*	*20.7*	*28,990*
1-1-1992	*0*				
1987 Vintage		*0*	*0*	*0.0*	*0*
1988 Vintage		*10,000*	*40,000*	*22.2*	*8,880*
1989 Vintage		*10,000*	*70,000*	*18.2*	*12,740*
1992 Composite			*110,000*	*19.7*	*21,620*

TABLE B

THREE YEAR-LIFE TABLE

Age	Amount Surviving	Amount Retired	Age of Amount Retired	Accruals		Depreciation Rate
				Each Group	Total	
A	B	C(A)= B(A)-B(A+1)	D=A+0.5	E=C/D	F=Sum E (A to end)	G=F/B %
0.0	100,000	0	0.5	0	45,667	-
0.5	100,000	20,000	1.0	20,000	45,667	45.7
1.5	80,000	20,000	2.0	10,000	25,667	32.1
2.5	60,000	20,000	3.0	6,667	15,667	26.1
3.5	40,000	20,000	4.0	5,000	9,000	22.5
4.5	20,000	20,000	5.0	4,000	4,000	20.0
5.5	0	0	6.0	0		
Total	300,000	100,000		45,667		

TABLE B

FOUR AND ONE-HALF YEAR LIFE TABLE

Age	Amount Surviving	Amount Retired	Age of Amount Retired	Accruals		Depreciation Rate
				Each Group	Total	
A	B	C(A)= B(A)-B(A+1)	D=A+0.5	E=C/D	F=Sum E (A to end)	G=F/B %
0.0	100,000			0	33,973	-
0.5	100,000	12,500	1.0	12,500	33,973	34.0
1.5	87,500	12,500	2.0	6,250	21,473	24.5
2.5	75,000	12,500	3.0	4,167	15,223	20.3
3.5	62,500	12,500	4.0	3,125	11,057	17.7
4.5	50,000	12,500	5.0	2,500	7,932	15.9
5.5	37,500	12,500	6.0	2,083	5,432	14.5
6.5	25,000	12,500	7.0	1,786	3,348	13.4
7.5	12.500	12,500	8.0	1,563	1,563	12.5
8.5	0	0	9.0	0		
Total	450,000	100,000		33,973		

TABLE B

FIVE AND ONE-HALF YEAR LIFE TABLE

Age	Amount Surviving	Amount Retired	Age of Amount Retired	Accruals		Depreciation Rate
				Each Group	Total	
A	B	C(A)= B(A)-B(A+1)	D=A+0.5	E=C/D	F=Sum E (A to end)	G=F/B %
0.0	100,000	0	0.5	0	29,290	-
0.5	100,000	10,000	1.0	10,000	29,290	29.3
1.5	90,000	10,000	2.0	5,000	19,290	21.4
2.5	80,000	10,000	3.0	3,333	14,290	17.9
3.5	70,000	10,000	4.0	2,500	10,956	15.7
4.5	60,000	10,000	5.0	2,000	8,456	14.1
5.5	50,000	10,000	6.0	1,667	6,456	12.9
6.5	40,000	10,000	7.0	1,429	4,790	12.0
7.5	30,000	10,000	8.0	1,250	3,361	11.2
8.5	20,000	10,000	9.0	1,111	2,111	10.6
9.5	10,000	10,000	10.0	1,000	1,000	10.0
10.5	0	0	11.0	0		
Total	550,000	100,000		29,290		

TABLE C

IOWA CURVE L0–5 YEAR LIFE

Age	Amount Surviving	Amount Retired	Age of Amount Retired	Accruals		Depreciation Rate
				Each Group	Total	
A	B	C(A)= B(A)-B(A+1)	D=A+0.5	E=C/D	F=Sum E (A to end)	G=F/B %
0.0	100,000	2,895	0.5	5,790	36,422	-
0.5	97,105	10,157	1.0	10,157	30,632	31.5
1.5	86,948	12,206	2.0	6,103	20,475	23.5
2.5	74,742	12,397	3.0	4,132	14,372	19.2
3.5	62,345	11,901	4.0	2,975	10,240	16.4
4.5	50,444	10,975	5.0	2,195	7,264	14.4
5.5	39,469	9,710	6.0	1,618	5,069	12.8
6.5	29,759	8,226	7.0	1,175	3,451	11.6
7.5	21,533	6,654	8.0	832	2,276	10.6
8.5	14,879	5,119	9.0	569	1,444	9.7
9.5	9,760	3,727	10.0	373	875	9.0
10.5	6,033	2,553	11.0	232	503	8.3
11.5	3,480	1,629	12.0	136	271	7.8
12.5	1,851	957	13.0	74	135	7.3
13.5	894	511	14.0	37	61	6.9
14.5	383	242	15.0	16	25	6.5
15.5	141	98	16.0	6	9	6.1
16.5	43	33	17.0	2	2	5.8
17.5	10	8	18.0	0	1	5.5
18.5	2	2	19.0	0	0	5.3
19.5	0	0	20.0	0		
Total	499,821	100,000		36,422		

EQUAL LIFE GROUP DEPRECIATION RATES

185

TABLE C

IOWA CURVE S1–5 YEAR LIFE

Age	Amount Surviving	Amount Retired	Age of Amount Retired	Accruals		Depreciation Rate
				Each Group	Total	
A	B	C(A)= B(A)-B(A+1)	D=A+0.5	E=C/D	F=Sum E (A to end)	G=F/B %
0.0	100,000	158	0.5	316	25,415	-
0.5	99,842	2,898	1.0	2,898	25,099	25.1
1.5	96,944	8,026	2.0	4,013	22,201	22.9
2.5	88,918	13,138	3.0	4,379	18,188	20.5
3.5	75,780	16,755	4.0	4,189	13,809	18.2
4.5	59,025	18,050	5.0	3,610	9,620	16.3
5.5	40,975	16,755	6.0	2,793	6,010	14.7
6.5	24,220	13,138	7.0	1,877	3,218	13.3
7.5	11,082	8,026	8.0	1,003	1,341	12.1
8.5	3,056	2,898	9.0	322	338	11.1
9.5	158	158	10.0	16	16	10.0
10.5	0	0	11.0	0		
Total	500,000	100,000		25,415		

TABLE C

IOWA CURVE R5–5 YEAR LIFE

(Approximates Square Curve)

Age	Amount Surviving	Amount Retired	Age of Amount Retired	Accruals		Depreciation Rate
				Each Group	Total	
A	B	C(A)= B(A)-B(A+1)	D=A+0.5	E=C/D	F=Sum E (A to end)	G=F/B %
0.0	100,000	0	0.5	0	20,491	-
0.5	100,000	0	1.0	0	20,491	20.5
1.5	100,000	49	2.0	25	20,491	20.5
2.5	99,951	2,417	3.0	806	20,467	20.5
3.5	97,534	18,999	4.0	4,750	19,661	20.2
4.5	78,535	54,891	5.0	10,978	14,911	19.0
5.5	23,644	23,349	6.0	3,892	3,933	16.6
6.5	295	254	7.0	36	41	14.0
7.5	41	41	8.0	5	5	12.5
8.5	0	0	9.0	0		
Total	500,000	100,000		20,491		