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BEFORE THE

TENNESSEE REGULATORY AUTHORITY

DOCKET NO. 05-00258

DIRECT TESTIMONY

OF

DONALD S. ROFF

ON BEHALF

OF

ATMOS ENERGY CORPORATION

Q. **Please state your name, occupation and business address.**

A. My name is Donald S. Roff and I am President of Depreciation Specialty Resources ("DSR"). My business address is 2832 Gainesborough Drive, Dallas, TX 75287-3483.

Q. **Please describe your background and experience.**

A. My background and experience are described on Exhibit DSR-1.

Q. **Have you ever testified before this or any other regulatory body?**

A. Yes. A list of my regulatory appearances is contained on Exhibit DSR-2.

Q. **What is the purpose of your testimony?**

A. I have been asked by Atmos Energy Corporation ("Atmos" or "the Company") to present the results of a depreciation study of its General Office Properties ("Shared Services") and to provide recommendations regarding depreciation rates and depreciation accounting practices. Exhibit DSR-3 is the report of my findings and recommendations prepared by me or under my supervision. This study and report were prepared while I was employed by Deloitte & Touche LLP.

Q. Please describe exhibit DSR-3.

A. Exhibit DSR-3 presents a discussion of depreciation accounting principles, presents the depreciation study methodology, summarizes the results and itemizes recommendations.

Q. What were your findings and recommendations?

A. I found that changes were needed to the mortality characteristics (average service life, retirement dispersion and net salvage allowance) of a number of asset categories resulting in revised depreciation rates. A summary comparison of the existing and recommended depreciation rates follows:

Function	Existing %	Recommended %
General	9.06	16.49

Q. Have you quantified the impact on annual depreciation expense due to your recommended changes?

A. Yes. The above summary is taken from Schedule 1 of Exhibit DSR-3. Using September 30, 2002 depreciable plant in service balances, the effect of the above changes in depreciation rates results in an increase in annual depreciation of about $11,424,506 or about 82%.

Q. What are the primary forces that drive this change in annual depreciation expense?

A. The increase in annual depreciation expense is affected by changes in average service life; by changes in retirement dispersion; by the depreciation procedure utilized; by changes in net salvage allowances; and the respective reserve position for each asset category. The General Plant functional category is impacted by a combination of these factors.

Q. Have you attempted to quantify the effect of each of these factors on annual depreciation expense?

A. Yes. Exhibit DSR-4 has been prepared to summarize the various components of the depreciation rate changes and the effect on annual depreciation amounts.

Q. Please explain Exhibits DSR-4.

A. Exhibit DSR-4 summarizes at the functional level the various components of a depreciation rate and their effect on the annual depreciation amount. There are four primary elements shown respectively in Columns [8], [9], [10], and [11], change in average service life ("ASL"), change in net salvage, change in depreciation procedure and the effect of reserve position. The final Column, labeled "Inter-relations", indicates that separate parameters interact.

As shown in Column [11], the greatest change in annual depreciation is due to the effect of reserve position. This indicates to me that past depreciation has been inadequate relative to the study parameters.

Q. Can you explain the column entitled "Inter-Relations"?

A. Yes. Assume that we have an asset category with a balance of $1,000. Assume that my recommendation is an average service life of 25 years and the existing average service life is 20 years. Further assume that I recommend a positive 10% net salvage factor and the existing net salvage factor is positive 20%. The difference in annual depreciation due to the increase in average service life is ($1,000/25 = $40) minus ($1,000/20 = ($50), for a decrease of $10. The difference due to the change in net salvage would be calculated as ((100%-10%)/25 = 3.2%) minus ((100%-20%)/25 = 3.6%), times the $1,000 balance, or an increase of $4. The existing depreciation rate would be ((100%-20%)/20), or 4.00%. My recommended depreciation rate (in this example) would be ((100%-10%)/25), or 3.60%. The total change in depreciation expense is a decrease of $4. Therefore, the components of the depreciation change are: a decrease of $10, for an increase average service life; an increase of $4 for less positive net salvage; a total decrease of $4; and an inter-relationship effect of positive $2, representing the combination of change in life and change in net salvage. The inter-relationships magnify as the number of changing elements increases.

Q. What does the column entitled "Change in Procedure" refer to?

A. The depreciation procedure refers to the grouping of assets for depreciation rate calculation purposes. The nature of the group varies with the form of the depreciable base. The most basic depreciable group is a single item. Because utilities have thousands of items, group procedures are utilized. In the past a broad group procedure or Average Life Group ("ALG") procedure has been used. Other types of groups include vintage group and Equal Life Group ("ELG"). The ELG procedure will be discussed in detail later in my testimony.

Q. What are mortality characteristics?

A. Mortality characteristics are the basic parameters necessary to calculate depreciation rates. They encompass average service life, retirement dispersion (the various ages at which assets within a group retire) defined by Iowa type curves, and net salvage allowance. Net salvage is the difference between salvage and cost of removal. If cost of removal exceeds salvage, negative net salvage occurs.

Q. What is depreciation?

A. The most widely recognized accounting definition of depreciation is that of the American Institute of Certified Public Accountants, which states:

> Depreciation accounting is a system of accounting which aims to distribute the cost or other basic value of tangible capital assets, less salvage (if any), over the estimated useful life of the unit (which may be a group of assets) in a systematic and rational manner. It is a process of allocation, not of valuation.[1]

Q. What is the significance of this definition?

A. This definition of depreciation accounting forms the accounting framework under which my depreciation study was conducted. Several aspects of this definition are particularly significant. Salvage (net salvage) is to be recognized. The allocation of costs is over the useful life of the assets. Grouping of assets is permissible. Depreciation accounting is not a valuation process. And the cost allocation must be both systematic and rational.

Q. Please explain the importance of the terms "Systematic and Rational".

A. Systematic implies the use of a formula. The formula used for calculating the recommended depreciation rates is shown on Page 10 of Exhibit 3. Rational means that the pattern of depreciation, in this case, the depreciation rate itself, must match either the pattern of revenues produced by the asset, or match the

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[1] Accounting Research Bulletin No. 43, Chapter 9, Paragraph 5 (June 1953).

consumption of the asset. Since revenues are determined through regulation (versus produced by the asset), asset consumption is directly measured and reflected in the calculation of depreciation rates. This measurement of asset consumption is accomplished by conducting a depreciation study.

Q. Are there other definitions of depreciation?

A. Yes. The Federal Energy Regulatory Commission ("FERC") Uniform System of Accounts provides a series of definitions related to depreciation as shown on Page 4 of Exhibit DSR-3. These definitions of depreciation make reference to asset consumption, and therefore relate very well to the accounting framework for depreciation. These definitions form the regulatory framework under which my depreciation study was conducted.

Q. Why are you recommending remaining life depreciation rates?

A. Remaining life depreciation rates are recommended because such depreciation rates provide for full recovery of net investment adjusted for net salvage over the future useful life of each asset category. Use of the remaining life technique is consistent with the technique utilized in developing the existing depreciation rates.

Q. How does your depreciation study recognize asset consumption?

A. Asset consumption (retirement dispersion) is defined by the use of Iowa type curves and related average service lives.

Q. What is retirement dispersion?

A. Retirement dispersion merely recognizes that groups of assets have individual assets of different lives, i.e., each asset retires at differing ages. Retirement dispersion is the scattering of retirements by age around the average service life for each group of assets.

Q. Please describe how these elements were determined and utilized in your depreciation study.

A. A depreciation study consists of four distinct, yet related phases - data collection, analysis, evaluation and rate calculation. Data collection refers to the gathering of historical accounting information for use in the other phases. Company personnel were responsible for this effort. Analysis refers to the statistical processing of the data collected in the first phase. There are two separate analysis procedures, one for life, and one for salvage and cost of removal, and was conducted by Deloitte personnel. The evaluation phase incorporates the information developed in the data collection and analysis phases to determine the applicability of the historical relationships developed in these phases to the future, and was conducted jointly by Deloitte personnel and Company personnel. The rate calculation phase merely utilizes the parameters developed in the other phases in the computation of the recommended depreciation rates, and was accomplished by Deloitte personnel.

Q. Please discuss the life analysis process utilized for general plant.

A. Life analysis was conducted using two different approaches, depending upon the type of data available. Where the age of retirements was known, the Actuarial Method of Life analysis was employed. In general, for actuarial analysis, retirement experience was collected for the period 1986 through 2002 updating the historical data files used for the prior depreciation study. These data were arrayed into a format suitable for life analysis. Life tables were developed and Iowa type curves were fitted to the historical summaries.

Q. Please describe the life analysis phase of your depreciation study for general plant.

A. Life analysis measures history and results in the determination of an estimate of average service life for each asset category. The actual analysis involves "converting" historical accounting data into mortality tables. In very simple terms, one is looking at the portion (or percent) surviving at each age for every asset category. This is true for which aged accounting data are available.

Q. How is this "Conversion" accomplished?

A. Because the age of retirement is known, as well as the age of the surviving balances, retirements of like ages are related to the asset amounts available to be retired at the same age. These retirement ratios are then related to the portion (percent) surviving at the beginning of each successive age, thus building what is known as the observed life table. When converted to a graphical format, this plot becomes the observed survivor curve. For example, let us assume that ten items are all placed in service in the same year. Further assume that one item is retired every year for the next ten years. The observed life table would be developed as follows:

Age	Retirements	Exposures	Retirement Ratio	Survivor Ratio	Life Table
0					
1	1	10	10.0%	90.0%	100.%
2	1	9	11.1%	88.9%	90.0%

3	1	8	12.5%	87.5%	80.0%
4	1	7	14.3%	85.7%	70.0%
5	1	6	16.7%	83.3%	60.0%
6	1	5	20.0%	80.0%	50.0%
7	1	4	25.0%	75.0%	40.0%
8	1	3	33.3%	66.7%	30.0%
9	1	2	50.0%	50.0%	20.0%
10	1	1	100.0%	0.0%	10.0%
					0.0%
			ASL =	5.50	

Q. What is an observed survivor curve?

A. An observed survivor curve is a plot, or graph of the recorded retirement and survivor history as a function of age. This observed curve is essentially a graphical representation of history and is developed from the observed life table shown above.

Q. How is the observed curve useful?

A. The observed curve is useful for two reasons. The area underneath the survivor curve is, by definition, equal to average service life. First, if one could find a matching empirical curve, such as the Iowa-type curves, an estimate of average service life can be made. Second, this estimate then becomes the starting point in the evaluation phase of a depreciation study.

Q. Why do you say that this observed curve is only the starting point in the evaluation process?

A. The observed curve is only the starting point in the evaluation process because it only represents a pictorial view of history. In order to develop appropriate average service lives for depreciation rate calculation purposes, this history must be understood, and combined with expectations for the future.

Q. How is the survivor curve used in your study?

A. The observed survivor curve derived from the Company history is matched to generalized known curves, such as the Iowa-type curves to provide an estimate of average service life. Survivor curves were also utilized in the Simulated Plant Balances Method analysis process.

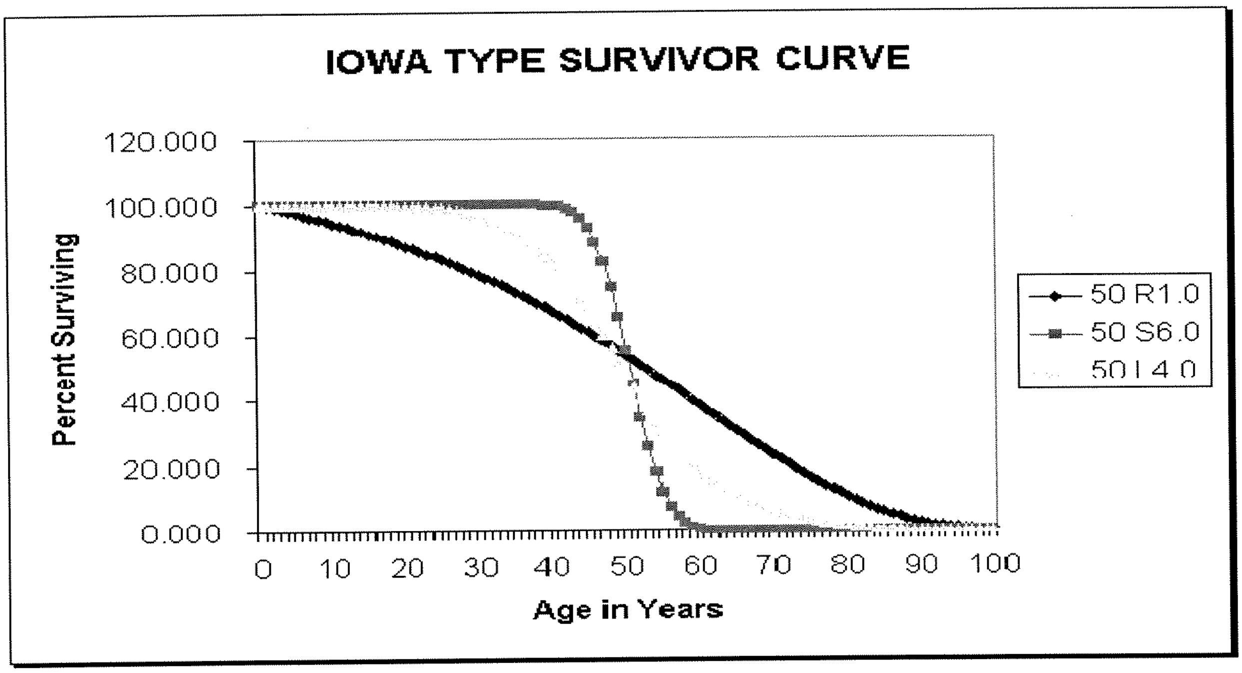
Q. What are Iowa-Type curves?

A. The Iowa-type curves were devised empirically over 70 years ago by the Engineering Research Institute at what is now Iowa State University to provide a set of standard definitions of retirement dispersion. Retirement dispersion merely recognizes that groups of assets have individual assets of different lives, i.e., each asset retires at differing ages. Retirement dispersion is the scattering of retirements by age around the average service life for each group of assets. Standard dispersion patterns are useful because they make calculations of the remaining life of existing property possible and allow life characteristics to be compared.

The Engineering Research Institute collected dated retirement information on many types of industrial and utility property and devised empirical curves that matched the range of patterns found. A total of 18 curves were defined. There were six left-skewed, seven symmetrical and five right-skewed curves, varying from wide to narrow dispersion patterns. The Iowa-curve naming convention allows the analyst to relate easily to the patterns. The left-skewed curves are known as the "L series", the symmetrical as the "S series" and the right-skewed as the "R series." A number identifies the range of dispersion. A low number represents a wide pattern and a high number a narrow pattern. The combination of one letter and one number defines a unique dispersion pattern.

Q. How do Iowa-Type curves provide an estimate of average service life?

A. Iowa-type curves and average service lives are inseparable. That is, the shape of the survivor curve defines the average service life. As mentioned above, the area underneath the survivor curve is equal to average service life. Thus the average service life cannot be described without also defining an Iowa-type curve, i.e., shape. An example is shown below:



Q. What does this chart illustrate?

A. This chart illustrates that Iowa type survivor curves are composed of two elements, the curve shape and the average service life. Each of the above survivor curves (R1, S6 and L4) has the same average service life, in this case 50 years.

Q. How were the Iowa curve shapes and average service life selections made?

A. Summaries of the individual asset category life analysis indications were prepared and discussed with Atmos personnel. Anomalies and trends were identified and engineering and operations input were requested where necessary. A single average service life and Iowa curve was selected for each asset category reflecting the combination of the historical results and the additional information obtained from the engineering, accounting and operations personnel. This process is a part of the evaluation phase of the depreciation study.

Q. What is the evaluation phase of a depreciation study?

A. The evaluation phase of a depreciation study combines the results of historical analyses with information regarding the age of property retired, the age of property surviving, knowledge of the types of assets surviving and being retired, and Company experience and expectations, all coupled with the knowledge, experience and judgment of the depreciation analyst. The goal is to give recognition to these factors and their influence upon historical indications and the applicability of such historical indications to plant surviving into the future. Both Atmos and Deloitte personnel participated in this process.

Q. What types of information are discerned in this phase of the depreciation study?

A. Information discerned includes the specific types of equipment being retired and added, the relative age of property surviving and retiring and Company plans and expectations regarding the property being evaluated, as well as forces influencing the salvage obtainable and removal costs associated with retired assets.

Q. How was net salvage determined for general plant?

A. Historical retirement, salvage and cost of removal activity was collected and analyzed for the period 1993-2002 for each asset category. Both salvage and cost of removal were divided by retirements on an annual basis to develop salvage and cost of removal percentages. Shrinking and rolling band analyses were also conducted to illustrate any trends that might exist. A single net salvage percentage was developed for each asset category reflecting the history, trends and Company expectations.

Q. What are shrinking and rolling band analyses?

A. There are two techniques to help discern trends in the historical data. A shrinking band begins with the full experience period and successively eliminates the oldest year's activity, thus illustrating trends as one moves through time. Rolling bands are useful because salvage, cost of removal and retirements are not always recorded in the same accounting period. Rolling band analysis combines activity for fixed periods, in the case of this study, three years. Three years was selected because virtually all salvage and cost of removal activity occurs within three years of the recording of the retirement. These three-year combined activities are then "rolled" forward one year at a time, and similarly aid in identifying trends as with the shrinking bands. Examples of rolling bands would be 1999-2001, 2000-2002, etc.

Q. Were there any trends evident from the data contained in the salvage and cost of removal analysis?

A. In general, salvage is declining.

Q. What are your depreciation study results for general plant?

A. The composite depreciation rate increases from 9.06% to 16.49%. In general, average service lives have been shortened. The impact of the change in rate is an increase in annual depreciation expense of approximately $11,424,506.

Q. What depreciation procedure are you recommending in this proceeding?

A. I am recommending the use of the ELG procedure.

Q. Why are you recommending the ELG procedure?

A. There are three reasons for recommending the ELG procedure. First, the ELG procedure provides the best matching of the recording of depreciation with the consumption of the depreciable assets. Such a matching is desirable from both an accounting and a regulatory perspective. The second reason is to provide consistency with the methodology used by Atmos in other jurisdictions, including Texas. The third reason is to provide consistency with proposed accounting requirement changes relative to Property, Plant and Equipment ("PP&E"). The actual decision regarding the use of the ELG procedure was made by Atmos management, after careful review and consideration of the concepts, advantages and shortcomings of various depreciation methodologies.

Q. Please briefly explain the ELG procedure.

A. Certainly. The ELG procedure merely recognizes that assets within a group have different service lives. The ELG calculation procedure divides each category of assets into components of estimated equal life and depreciates these components over their respective lives.

Q. Can you provide a simple example of the difference between the ELG procedure and the existing procedure?

A. Yes, I can. But first let me describe the existing procedure. The existing procedure is referred to as the broad group procedure or average life group ("ALG") procedure. The broad group is generally the primary asset account, e.g., Account 376, Mains. This procedure effectively treats all the assets within the group as if they have the same life, that is, the average life.

Let us assume that we have a two unit asset group. Each unit costs $10 and was installed in the same period. Unit 1 has a life of 2 years and Unit 2 has a life of 8 years. The average service life of this group is 5 years. The ALG depreciation rate is 20.00% (100% / 5 years). For purposes of this example, we shall ignore salvage and/or cost of removal. The following Table illustrates the difference between the ALG procedure and the ELG procedure:

	ALG				ELG			
	Accrual		EOY Reserve		Accrual		EOY Reserve	
Period	Asset "A"	Asset "B"	Asset "A"	Asset "B"	Asset "A"	Asset "B"	Asset "A"	Asset "B"
1	2	2	2	2	5	1.25	5	1.25
2	2	2	-6	4	5	1.25	0	2.50
3	0	2	-6	6	0	1.25	0	3.75
4	0	2	-6	8	0	1.25	0	5.00
5	0	2	-6	10	0	1.25	0	6.25
6	0	2	-6	12	0	1.25	0	7.50
7	0	2	-6	14	0	1.25	0	8.75
8	0	2	-6	6	0	1.25	0	-

Q. What does this example illustrate?

A. This example illustrates a number of facts. First, there is retirement dispersion, which is recognized in the determination of the average service life. Second, neither asset has a life equal to the average service life. Third, and most important, there is a deferral of depreciation under the ALG procedure. The longer lived asset must over-accrue to make up for the under-accrual on the shorter lived asset. This is evident by the reserve position at the end of period two for the ALG procedure. It is negative! Fourth, the depreciation under the ELG procedure reflects the life of each asset appropriately and effectively replicates item depreciation. Fifth, the ELG depreciation rate declines over time and changes to match the mix of assets surviving.

Q. Does the use of the ELG procedure versus the ALG procedure have any impact on revenue requirements?

A. Yes. The above example is expanded below to include the impact on revenue requirements due strictly to depreciation expense and return:

	ALG			ELG		
Period	Rate Base	Return @ 12%	Rev. Reqs.	Rate Base	Return @ 12%	Rev. Reqs.
1	20.00	2.40	6.40	20.00	2.40	8.65
2	16.00	1.92	5.92	13.75	1.65	7.90
3	12.00	1.44	3.44	7.50	0.90	2.15
4	10.00	1.20	3.20	6.25	0.75	2.00
5	8.00	0.96	2.96	5.00	0.60	1.85
6	6.00	0.72	2.72	3.75	0.45	1.70
7	4.00	0.48	2.48	2.50	0.30	1.55
8	2.00	0.24	2.24	1.25	0.15	1.40
Totals			29.36			27.20

Thus, the ELG procedure produces a lower, total-life revenue requirement of approximately 7.5% in this example.

Q. What are the benefits of the ELG procedure?

A. First and foremost, the individual asset categories are depreciated over their respective lives. This is consistent with item depreciation, and this allocation of cost provides the most appropriate matching between the recording of depreciation and asset consumption. Second, the ELG procedure gives appropriate recognition to the fact that assets within a group retire at different ages. Third, the ELG procedure produces a lower total life revenue requirement to the benefit of customers. Fourth, the ELG procedure produces a systematic and rational allocation of cost in a straight-line method over the life of each asset, consistent with generally accepted accounting principles ("GAAP").

Q. Are there criticisms of the ELG procedure?

A. Yes, there are, but in my view these criticisms are either misplaced or asserted due to a lack of understanding of the ELG procedure.

Q. What are these criticisms and why are they misplaced or asserted due to misunderstanding?

A. One common criticism is that the ELG procedure is not widely accepted. This may be true for certain segments of the utility environment, but should certainly **not** be used as a basis for denying its use. Atmos has ELG approved depreciation rates in roughly ¼ of its jurisdictions. The beneficial features of the ELG procedure as described above should be the basis for its acceptance and approval. A second common criticism is that the ELG procedure results in accelerated depreciation. This is patently incorrect and is demonstrated in the above example. While the ELG depreciation rate in early years may be higher than the ALG depreciation rate, this does not equate to accelerated depreciation. In fact, the ELG rate in later years is less than the ALG rate. Using the same logic, this would say that the ALG procedure produces accelerated depreciation. I believe that the ELG procedure produces the correct depreciation expense.

Q. Are there other features of the ELG procedure that are desirable?

A. Yes. Robley Winfrey, the "father" of the Iowa curves, in a letter dated February 1, 1975 to Dr. W. Chester Fitch, Center for Depreciation Studies, Western Michigan University, wrote:

> "In the 43 years, 1932 to 1975, that have passed since I developed the concepts and procedures that led to the publication in 1942 of *Depreciation of Group Properties*, I have continued to have faith that the unit summation procedure of applying the concept of the so-called average life method of computing annual depreciation cost for accounting purposes would someday prevail. Now, the discussion and publications of the past ten years are giving evidence that my 1932 expectations are being upheld.
>
> The beginning of my study of group property depreciation was undertaken in the belief that the commonly applied method of applying the straight line method to group properties, as contrasted to single units of property in which terms the method is usually defined and explained, results in inappropriate answers. But the analysts and accountants were not aware of the true character of their results and their effects on the depreciation reserve balance. But the publication in 1942 created no awareness and made no impression on the legal and business actions involving depreciation within the subjects of accounting, property valuation, utility rate making, income tax, and depreciation reserves.

What kept me on course 1928 to 1932 was the firm conviction that any depreciation procedure using a zero discount rate and the concept of average life as applied to single units of property, should produce for a fully stabilized property, a depreciation reserve credit balance of 50 percent of the cost new (depreciation base) of the surviving property. The unit summation procedure (**ELG**) (emphasis by Mr. Roff) gives that 50 percent result for all properties regardless of the character of the distribution of the retirement over total life of a vintage group.

I think of no reasons why the unit summation method should not be used by public utilities, private industries, for income tax returns, and other uses. On the other hand, I can think of good reasons for using the unit summation procedure in cost accounting applications to the preference of other methods and procedures. Now that we are in the computer age, the details of the calculation can no longer be supported as an administrative objection to using the unit summation procedure.

The Portland (Oregon) General Electric Court Case and the recent proposal by the American Telephone and Telegraph Company of their equal life group (a different name for unit summation) procedure are evidence that the unit summation procedure is now an accepted and legally approved method of cost accounting for depreciation expense. We can look ahead for wider adoption of the procedure in public utility regulation and in private business."[2]

Q. Please summarize again why the Company is seeking the approval of the use of the ELG procedure.

A. First, Atmos Energy believes that the ELG procedure provides the best matching between the recording of depreciation with asset consumption. This was the finding before the Railroad Commission of Texas in the Lone Star Pipeline Case (Docket No. GUD 8664). Second, Atmos Energy desires consistency in depreciation methodology for each of its jurisdictions. Third, Atmos Energy and I believe that the ELG procedure more correctly allocates cost over the life of the assets

Q. Please summarize your recommendations.

A. I recommend that Atmos adopt the depreciation rates shown on Schedule 1 of Exhibit DSR-3 and that this Authority approves their use. I base this recommendation on the fact that I have conducted a comprehensive depreciation study, giving appropriate recognition to historical experience, recent trends and Company expectations. My study results in a fair and reasonable level of depreciation expense which, when incorporated into a revenue stream, will provide the Company with adequate capital recovery until such time as a new depreciation study indicates a need for change.

Q. Does this complete your direct testimony?

A. Yes, it does.

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2 *The Estimation of Depreciation*, Fitch, Wolf and Bissinger, Center for Depreciation Studies, Western Michigan

University, 1975, pages 45 and 46.

Academic Background

Donald S. Roff graduated from Rensselaer Polytechnic Institute with a Bachelor of Science degree in Management Engineering in 1972.

Mr. Roff has also received specialized training in the area of depreciation from Western Michigan University's Institute of Technological Studies. This training involved three forty-hour seminars on depreciation entitled "Fundamentals of Depreciation", "Fundamentals of Service Life Forecasting" and "Making a Depreciation Study" and included such topics as accounting for depreciation, estimating service life, and estimating salvage and cost of removal.

Employment and Professional Experience

Following graduation, Mr. Roff was employed for eleven and one-half years by Gilbert Associates, Inc., as an engineer in the Management Consulting Division. In this capacity, he held positions of increasing responsibility related to the conduct and preparation of various capital recovery and valuation assignments.

In 1984, Mr. Roff was employed by Ernst & Whinney and was involved in several depreciation rate studies and utility consulting assignments.

In 1985, Mr. Roff joined Deloitte Haskins & Sells (DH&S), which, in 1989, merged with Touche Ross & Co. to form Deloitte & Touche. In 1995, Mr. Roff was appointed as a Director with Deloitte & Touche.

In November, 2005, Mr. Roff formed Depreciation Specialty Resources to serve the utility industry.

During his tenure with Gilbert Associates, Inc., Ernst & Whinney, DH&S and Deloitte & Touche, Mr. Roff has participated in or directed depreciation studies for electric, gas, water and steam heat utilities, pipelines, railroad and telecommunication companies in over 30 states, several Canadian provinces and Puerto Rico. This work requires an in-depth knowledge of depreciation accounting and regulatory principles, mortality analysis techniques and financial practices. At these firms, Mr. Roff has had varying degrees of responsibility for valuation studies, development of depreciation accrual rates, consultation on the unitization of property records, and other studies concerned with the inspection and appraisals of utility property, preparation of rate case testimony and support exhibits, data responses and rebuttal testimony, in addition to appearing as an expert witness.

Industry and Technical Affiliations

Mr. Roff is a registered Professional Engineer in Pennsylvania (by examination).

Mr. Roff is a member of the Society of Depreciation Professionals and a Certified Depreciation Professional, and a Technical Associate of the American Gas Association (A.G.A.) Depreciation Committee. He currently serves as the lead instructor for the A.G.A.'s Principles of Depreciation Course.

DONALD S. ROFF

TESTIMONY EXPERIENCE

CASE NO.	DATE	COMPANY	JURISDICTION	SUBJECT
Docket No. 93-3005	July 1993	Southwest Gas Corporation	Nevada	Gas Depreciation Rates
Docket No. 93-3025	July 1993	Southwest Gas Corporation	Nevada	Gas Depreciation Rates
Docket No. 12820	June 1994	Central Power and Light Company	Texas	Electric Depreciation Rates
Case No. U-10380	Dec 1994	Consumers Power Company	Michigan	Gas Depreciation Rates and Accounting
Cause No. 39938	April 1995	Indianapolis Power & Light Company	Indiana	Electric Depreciation Rates
Case No. U-10754	July 1995	Consumers Power Company	Michigan	Electric Depreciation Rates and Accounting
Docket No. 13369	Aug 1995	West Texas Utilities Company	Texas	Electric Depreciation Rates
Docket No. 95-02116	Sept 1995	Chattanooga Gas Company	Tennessee	Gas Depreciation Rates
Docket No. 95-715-G	Oct 1995	Piedmont Natural Gas Company	South Carolina	Gas Depreciation Rates
Docket No. 14965	Dec 1995	Central Power and Light Company	Texas	Electric Depreciation Rates
Cause No. 40395 (I)	Feb 1996	Wabash Valley Power Association, Inc.	Indiana	Electric Depreciation Rates
GUD NO. 8664	Oct 1996	Lone Star Pipeline Company	Texas	Gas Depreciation Rates
Docket No. 96-360-U	Nov 1996	Entergy Arkansas Inc.	Arkansas	Electric Depreciation Rates
Docket No. 16705	Nov 1996	Entergy Gulf States Inc.	Texas	Electric Depreciation Rates/Competitive Issues
Docket No. ER-97-394	Mar 1997	Missouri Public Service	Missouri	Electric Depreciation Rates/Competitive Issues
Docket No. U-22092	Mar 1997	Entergy Gulf States Inc.	Louisiana	Electric Depreciation Rates/Competitive Issues
Docket No. 97-00982	May 1997	Chattanooga Gas Company	Tennessee	Gas Depreciation Rates
Cause No. 40395 (II)	June 1997	Wabash Valley Power Association, Inc.	Indiana	Electric Depreciation Rates
Case No. U-11509	Sept 1997	Consumers Energy Company	Michigan	Gas Depreciation Rates and Accounting
Docket No. ER98-11	Sept 1997	Long Island Lighting Company	FERC	Electric Depreciation Rates
Docket No. 8390-U	Dec 1997	Atlanta Gas Light Company	Georgia	Gas Depreciation Rates and Accounting
Cause No. 41118	Mar 1998	Wabash Valley Power Association, Inc.	Indiana	Electric Depreciation Rates
Case No. U-11722	Oct 1998	Detroit Edison Company	Michigan	Electric Depreciation Rates
Docket No. 98-2035-03	Nov 1998	PacifiCorp	Utah	Electric Depreciation Rates
Docket No. 99-4006	April 1999	Nevada Power Company	Nevada	Electric Depreciation Rates
GUD Docket No. 9030	March 2000	Atmos Energy Corporation	Texas	Gas Depreciation Rates and Accounting
GUD Docket No. 9145	April 2000	TXU Gas Distribution	Texas	Gas Depreciation Rates
City of Tyler	Dec 2000	Reliant Energy Entex	Texas	Gas Depreciation Rates and Accounting
Docket No. U-24993	March 2001	Entergy Gulf States Inc.	Louisiana	Electric Depreciation Rates and Accounting
Docket Nos. GR01050328/GR0105029;	May 2001	Public Service Electric & Gas	New Jersey	Gas Depreciation Rates and Accounting
Case No. U-12999	July 2001	Consumers Energy Company	Michigan	Gas Depreciation Rates and Accounting
Docket No. 01-10002	Oct 2001	Nevada Power Company	Nevada	Electric Depreciation Rates
Docket No. 14618-U	Nov 2001	Savannah Electric and Power Company	Georgia	Electric Depreciation Rates
Docket No. 01-11031	Dec 2001	Sierra Pacific Power Company	Nevada	Electric Depreciation Rates
Docket No. 010949-EL	Jan 2002	Gulf Power Company	Florida	Electric Depreciation Rates
Docket No. 14311-U	Jan 2002	Atlanta Gas Light Company	Georgia	Gas Depreciation Rates and Accounting
Docket No. UD-00-2	March 2002	Entergy New Orleans, Inc.	New Orleans	Electric Depreciation Accounting
Cause No. PUD200200166	May 2002	Reliant Energy Entex	Oklahoma	Gas Depreciation Rates and Accounting
Docket No. 01-243-U	June 2002	Reliant Energy Entex	Arkansas	Gas Depreciation Rates and Accounting
Docket No. 02-035-12	Oct 2002	PacifiCorp	Utah	Electric Depreciation Rates
Docket No. 20000-ER-2-192	Oct 2002	PacifiCorp	Wyoming	Electric Depreciation Rates
Docket No. UE-021271	Oct 2002	PacifiCorp	Washington	Electric Depreciation Rates
Docket No. UM-1064	Oct 2002	PacifiCorp	Oregon	Electric Depreciation Rates
Docket No. PAC-E-02-5	Oct 2002	PacifiCorp	Idaho	Electric Depreciation Rates
Docket No. 02-0391	Oct 2002	Hawaiian Electric Company, Inc.	Hawaii	Electric Depreciation Rates and Accounting
Docket No. 03-ATMG-1036-RTS	June 2003	Atmos Energy Corporation	Kansas	Gas Depreciation Rates and Accounting
Docket No. 02-0391	Aug 2003	Hawaiian Electric Company, Inc.	Hawaii	Electric Depreciation Rates and Accounting
Cause No. 42458	Sept 2003	Wabash Valley Power Association, Inc.	Indiana	Electric Depreciation Rates and Accounting
Docket No. 03-ATMG-1036-RTS	Nov 2003	Atmos Energy Corporation	Kansas	Gas Depreciation Rates and Accounting
Case No. 12999	Dec 2003	Consumers Energy Company	Michigan	Gas Depreciation Rates and Accounting
Case No. 12999	Feb 2004	Consumers Energy Company	Michigan	Gas Depreciation Rates and Accounting
Docket No. ER-2004-0570	Apr 2004	The Empire District Electric Company	Missouri	Electric Depreciation Rates and Accounting
Docket No. 04-100-U	Apr 2004	The Empire District Electric Company	Arkansas	Electric Depreciation Rates and Accounting
Docket No. PUE 2003-00597	Aug 2004	Atmos Energy Corporation	Virginia	Gas Depreciation Rates and Accounting
Docket No. 18638-U	Oct 2004	Atlanta Gas Light Company	Georgia	Gas Depreciation Rates and Accounting
Docket No. ER-2004-0570	Nov 2004	The Empire District Electric Company	Missouri	Electric Depreciation Rates and Accounting
Docket No. ER-2004-0570	Nov 2004	The Empire District Electric Company	Missouri	Electric Depreciation Rates and Accounting
Cause No. 200400610	Jan 2005	Oklahoma Natural Gas Company	Oklahoma	Gas Depreciation Rates and Accounting
Docket No. 18638-U	March 2005	Atlanta Gas Light Company	Georgia	Gas Depreciation Rates and Accounting
Docket No. 20298	May 2005	Atmos Energy Corporation	Georgia	Gas Depreciation Rates and Accounting
Cause No. 200400610	June 2005	Oklahoma Natural Gas Company	Oklahoma	Gas Depreciation Rates and Accounting
Docket No. 20298	Oct 2005	Atmos Energy Corporation	Georgia	Gas Depreciation Rates and Accounting
Case No. GR-2006-0387	Apr 2006	Atmos Energy Corporation	Missouri	Gas Depreciation Rates and Accounting

Atmos Energy Corporation

Depreciation Study of General Office Property as of September 30, 2002

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Deloitte & Touche

October 2002

Atmos Energy Corporation
P.O. Box 650205
Dallas, Texas 75265

Attention: Mr. Thomas Petersen

In accordance with your request and with the cooperation and participation of your staff, a book depreciation study of General Office property has been conducted. The study covered all depreciable property and recognized addition and retirement experience through September 30, 2002. The purpose of the study was to determine if the existing depreciation rates remain appropriate for the property, and, if not, to recommend changes. Changes are recommended.

A comparison of the effect of the existing account rates and the recommended account rates is shown below, based on depreciable plant balances as of September 30, 2002:

	Composite Depreciation Rate	
Function	Existing	Recommended
General Office	9.06%	16.49%

The above summary is taken from Schedule 1, which shows the annual depreciation provisions calculated from the existing and recommended rates and differences for the General Office. Based on September 30, 2002 depreciable balances, the recommended rates will result in an annual increase in depreciation provisions of $11,424,506. The increase can be attributed to both shorter average service lives and reserve position. The mortality characteristics for the existing and recommended rates are shown on Schedule 2.

The recommended rates are calculated using the remaining life technique, coupled with the equal life group procedure.

The following sections of this report describe the methods of analysis used, the bases for the conclusions reached and recommendations for both immediate and future action by Atmos Energy Corporation (the "Company").

We appreciate this opportunity to serve Atmos Energy Corporation and would be pleased to meet with you to discuss further the matters presented in this report, if you desire.

Yours truly,

Deloitte & Touche LLP

PURPOSE OF DEPRECIATION

Book depreciation accounting is the process of recognizing in financial statements the consumption of physical assets in the process of providing a service or a product. Generally accepted accounting principles require the recording of depreciation provisions to be systematic and rational. To be systematic and rational, depreciation should, to the extent possible, match either the consumption of the facilities or the revenues generated by the facilities. Accounting theory requires the matching of expenses with either consumption or revenues to ensure that financial statements reflect the results of operations and changes in financial position as accurately as possible. The matching principle is often referred to as the cause and effect principle; thus, both the cause and the effect are required to be recognized for financial accounting purposes. This study was conducted in a manner consistent with the matching principle of accounting.

Because utility revenues are determined through regulation, asset consumption is not automatically reflected in revenues. Therefore, the consumption of utility assets must be measured directly by conducting a book depreciation study to accurately determine its mortality characteristics.

Matching is also an essential element of basic regulatory philosophy and has become known as "intergenerational customer equity." Intergenerational equity means the costs are borne by the generation of customers that caused them to be incurred, not by some earlier or later generation. This matching is required to ensure that charges to customers reflect the actual costs of providing service.

DEPRECIATION DEFINITIONS

The Uniform System of Accounts prescribed for gas utilities by the Federal Energy Regulatory Commission followed by the Company states that:

> "Depreciation" as applied to depreciable gas plant, means 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 given consideration 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 mutual resources.
>
> "Service value" means the difference between original cost and net salvage value of gas plant.
>
> "Net salvage value" means the salvage value of property retired less the cost of removal.
>
> "Salvage value" means the amount received for the property retired less any expenses incurred in connection with the sale or in preparing the property for sale, or, if retained, the amount at which the material is chargeable to materials and supplies, or other appropriate account.
>
> "Cost of removal" means the cost of demolishing, dismantling, tearing down or otherwise removing gas plant, including the cost of transportation and handling incidental thereto.

As is clear from the wording of the salvage value and cost of removal definitions, it is the salvage that will actually be received and the cost of removal that will actually be incurred, both measured at the price level at the time of receipt or incurrence, that is required to be recognized in the depreciation rates of the Company.

These definitions are consistent with the purpose of depreciation, and the study reported here was conducted in a manner consistent with both.

ACCOMPLISHMENT OF ACCOUNTING AND REGULATORY PRINCIPLES

Utility depreciation accounting is a group concept. Inherent in this concept is the assumption that all property is fully depreciated at the time of retirement, regardless of age, and there is no attempt to record the depreciation applicable to individual components of the groups. The depreciation rates are based on the recognition that each depreciable property group has an average service life. However, very little of the property is "average." The group concept carries with it recognition that most property will be retired at an age either less than or greater than the average service life. The study recognized the existence of this variation through the identification of Iowa-type retirement dispersion patterns for all property groups.

The depreciation study required to determine the applicable mortality characteristics is independent from the calculation of the depreciation rates. The resulting mortality characteristics can be used to calculate either average life group ("ALG") or equal life group ("ELG") rates, both with either the whole life technique or the remaining life technique. Any set of mortality characteristics that is suitable for calculating ALG rates is just as suitable for calculating ELG rates. Conversely, any set that is not suitable for ELG is not suitable for ALG either. ALG and ELG are straight-line procedures that reflect life measured by time, with ALG utilizing average life, and ELG utilizing actual life. For ALG, all property in the group is assumed to have a life equal to the average of the group. ELG recognizes that, in reality, only a small portion of the group retires at an age equal to the average service life. For the average to exist, about half of the investment in an asset group will be retired at ages less than average life, a small amount at average life and the rest at ages greater than average life. It is the use of this dispersion in the rate calculation that causes ELG rates to better match cost recovery with the use of and benefit from property. Thus, the ELG procedure best accomplishes the purpose of book depreciation accounting by ensuring that the recording of depreciation provisions matches the actual consumption of the physical assets. Since ELG matches the recording of consumption with the actual consumption, customers will pay the actual costs incurred to serve them. For this reason, ELG rates are recommended.

A detailed discussion of the Equal Life Group Procedure is included in the Appendix to this report.

THE BOOK DEPRECIATION STUDY

Implementation of a policy toward book depreciation that recognizes the purpose of depreciation accounting requires the determination of the mortality characteristics that are applicable to surviving property. The purpose of the depreciation study reported here was to accurately measure those mortality characteristics and to use the characteristics to determine appropriate rates for accrual of depreciation expenses.

The major effort of the study was the determination of the appropriate mortality characteristics. The remainder of this report describes how those characteristics were determined, describes how the mortality characteristics were used to calculate the depreciation rates and presents the results of the rate calculations.

The study consisted of the following steps:

Step One was a Life Analysis consisting of determination of historical retirement experience and an evaluation of the applicability of that experience to surviving property.

Step Two was a Salvage and Cost of Removal Analysis consisting of a study of salvage value and cost of removal experience, and an evaluation of the applicability of that experience to surviving property.

Step Three consisted of the determination of average service lives, retirement dispersion patterns identified by Iowa-type curves and the net salvage factors applicable to surviving property.

Step Four was the determination of the depreciation rate applicable to each depreciable property group, recognizing the results of the work in Steps One through Three, and a comparison with the existing rates.

LIFE ANALYSIS

The Life Analysis for the property concerns the determination of average service lives and Iowa type retirement dispersion patterns. An analysis of historical retirement activity, suitably tempered by informed judgment as to the future applicability of such activity to surviving property, formed the basis for determination of average service lives and retirement dispersion patterns. Retirement experience through September 30, 2002 was analyzed using the actuarial method of Life Analysis. The actuarial method could be used because the vintage of retired and surviving property is known.

In order to recognize trends in life characteristics and to ensure that the valuable information in the curves is available to the analyst, actual survivor curves were calculated and plotted by computer using several different periods of retirement experience. The periods (year bands) of retirement experience analyzed were (1) the past five years, (2) the past 10 years (3) and the full extent of available history. The average service lives and retirement dispersion patterns indicated by these actual survivor curves were identified by visually fitting Iowa-type standard curves to each of the actual curves and plotting the results. This visual approach ensures that the data contained in the actual survivor curves, and input data, and the trends are available to the analyst, and that the analyst does not allow computer calculations to be the sole determinant of study results.

SALVAGE AND COST OF REMOVAL ANALYSIS

Salvage and cost of removal experience from 1993 through 2002 was the basis for determining the net salvage factors used. The analysis was done in a manner that allows selection of separate salvage and cost of removal factors for most depreciable property groups. The analysis consisted of calculating the experienced salvage and cost of removal factors for each property group by dividing salvage and cost of removal amounts by the original cost of the retired property. Factors are expressed as percentages, and were calculated for annual, rolling and shrinking bands of retirement experience. Due to limited activity in the update period, no change was made to the net salvage factors developed in the prior study.

EVALUATION OF ACTUAL EXPERIENCE

Life Analysis and Salvage and Cost of Removal Analysis involve the measurement of what has occurred in the past. History is often a misleading indication of the future. There are many kinds of events that can cause history to be misleading, among them significant changes contemplated in the underlying accounting procedures and/or changes in other management practices, such as maintenance procedures. It is the evaluation phase of a depreciation study that identifies if history is a good indication of the future. Blind acceptance of history often results in selecting mortality characteristics to use for calculating depreciation rates that will provide recovery over a time period longer than productive life.

For each property group, the analysis processes involved only historical retirement experience. Since the depreciation rates will be applied to surviving property, the historical mortality experience indicated by the Life and the Salvage and Cost of Removal Analyses was evaluated to ensure that the mortality characteristics used to calculate the rates are applicable to surviving property. The evaluation is required to ensure the validity of the recommended depreciation rates.

The evaluation process requires knowledge of the type of property surviving, the type of property retired, the reasons for changing life, dispersion, salvage and cost of removal, and the effect of present and future Company plans on the property mortality characteristics. The evaluation included discussions with Company accounting, engineering and operating personnel, determination of the type of property recorded in a number of accounts and special analyses of retirements to identify the type of property retired and reasons for retirement.

CALCULATION OF DEPRECIATION RATES

A straight-line remaining life rate for each depreciable property group was calculated using the following formula:

$$\text{Rate} = \frac{\text{Plant Balance - Net Salvage - Book Reserve}}{\text{Average Remaining Life}}$$

Formula numerator elements in percent of depreciable balance and the denominator in years produce a rate in percent. This formula illustrates that a remaining life rate recognizes the book reserve position. The depreciable balances and book reserves were taken from accounting records, and the net salvage factors were determined by the study.

The remaining lives for each property group are a function of the age distribution of surviving plant and the selected average service life and Iowa dispersion pattern.

General Office

The rate increased from 9.06% to 16.49%, primarily because of a mix of shorter average service lives and recognition of reserve position.

RESERVE COMPARISON

Because remaining life rates are recommended, a comparison of the accumulated provision for depreciation and the calculated theoretical reserve as of September 30, 2002 is not meaningful, and no comparison is presented. This is because the only way a reserve difference can exist is through the use of whole life rates.

RECOMMENDATIONS

Our recommendations for your future actions in regard to book depreciation are as follows:

1. The annual depreciation rates shown in Column 6 of Schedule 1 and the mortality characteristics shown in columns 6, 7 and 10 of Schedule 2 are applicable to existing property and are recommended for implementation at such time as their effect can be incorporated into service rates.

2. Because of variation of life and net salvage experience with time, a depreciation study should be made during 2007 based on retirement experience through September 30, 2006. Exact timing of the study should be coordinated with a retail rate case to ensure timely implementation of revised depreciation rates.

ATMOS ENERGY CORPORATION - GENERAL OFFICE (DIV. 2)
Book Depreciation Study as of September 30, 2002
Comparison of Depreciation Rates and Annual Amounts

SCHEDULE 1

[1] Account Number	[2] Description	[3] 9/30/02 Balance $	[4] Existing Rates %	[5] Annual Amount $	[6] Study Rates %	[7] Annual Amount $	[8] Increase or (Decrease) $
	GENERAL PLANT						
390.09	Improvements to Leased Premises	8,897,125	7.43	661,056	12.26	1,090,788	429,731
391.00	Office Furniture and Equipment (Gnl)	9,532,135	4.89	466,121	3.29	313,607	(152,514)
391.03	Office Furniture and Equipment (Other)	1,160,987	2.22	25,774	1.17	13,584	(12,190)
397.00	Communication Equipment	9,428,825	7.12	671,332	11.64	1,097,515	426,183
398.00	Miscellaneous Equipment	662,671	5.36	35,519	20.86	138,233	102,714
399.00	Other Tangible Property	224,866	15.75	35,416	23.99	53,945	18,529
399.01	Servers Hardware	8,279,271	14.29	1,183,108	28.15	2,330,615	1,147,507
399.02	Servers Software	6,320,551	14.29	903,207	29.95	1,893,005	989,798
399.03	Network Hardware	211,839	14.29	30,272	29.09	61,624	31,352
399.06	PC Hardware	4,486,960	16.83	755,155	47.16	2,116,050	1,360,895
399.07	PC Software	1,835,852	17.73	325,497	26.52	486,868	161,371
399.08	Application Software	76,809,983	8.22	6,313,781	17.02	13,073,059	6,759,279
399.09	Mainframe System Software	2,588,228	22.16	573,551	6.21	160,729	(412,822)
399.24	General Startup Cost	23,172,326	8.33	1,930,255	10.81	2,504,928	574,674
	Total Depreciable General Plant	153,611,619	9.06	13,910,045	16.49	25,334,551	11,424,506
	Unrecorded Retirements	16,632,482					
	Fully Depreciated	2,366,785					
	Total General Office Facilities	172,610,886					

ATMOS ENERGY CORPORATION - GENERAL OFFICE (DIV. 2)
Book Depreciation Study as of September 30, 2002
Comparison of Mortality Characteristics

SCHEDULE 2

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
		EXISTING PARAMETERS			STUDY PARAMETERS				
Account Number	Description	ASL yrs.	Iowa Curve	Net Salvage %	ASL	Iowa Curve	Gross Salvage %	Cost of Removal %	Net Salvage %
	GENERAL PLANT								
390.09	Improvements to Leased Premises	10.0	SQ	0	10.0	SQ	0	0	0
391.00	Office Furniture and Equipment (Gnl)	20.0	L1	5	30.0	R2	0	0	0
391.03	Office Furniture and Equipment (Other)	20.0	L1	5	15.0	R2.5	0	0	0
397.00	Communication Equipment	10.0	L3	0	10.0	L3	0	0	0
398.00	Miscellaneous Equipment	15.0	R2	0	10.0	S6	5	0	5
399.00	Other Tangible Property	5.0	SQ	0	5.0	SQ	0	0	0
399.01	Servers Hardware	7.0	SQ	0	5.0	SQ	0	0	0
399.02	Servers Software	7.0	SQ	0	5.0	SQ	0	0	0
399.03	Network Hardware	7.0	SQ	0	5.0	SQ	0	0	0
399.06	PC Hardware	5.0	R4	0	4.0	SQ	0	0	0
399.07	PC Software	5.0	R4	0	4.0	SQ	0	0	0
399.08	Application Software	10.0	R4	0	8.0	S1.5	0	0	0
399.09	Mainframe System Software	5.0	R4	0	10.0	S1.5	0	0	0
399.24	General Startup Cost	12.0	SQ	0	10.0	SQ	0	0	0

CALCULATION OF EQUAL LIFE GROUP DEPRECIATION RATES

It is the group concept of depreciation that leads to the existence of the ELG procedure of calculating depreciation rates. This concept has been an integral part of utility depreciation accounting practices for many years. Under the group concept, there is no attempt to keep track of the depreciation applicable to individual items of property. This is not surprising, in view of the millions of items making up a utility system. Any item retired is assumed to be fully depreciated, no matter when retirements occur. The group of property would have some average life. "Average" is the result of an arithmetic calculation, and there is no assurance that any of the property in the group is "average."

The term "average service life" used in the context of book depreciation is well known, and its use in the measurement of the mortality characteristics of property carries with it the concept of retirement dispersion. If every item were average, thereby having exactly the same life, there would be no dispersion. The concept of retirement dispersion recognizes that some items in a group live to an age less than the average service life and other items live longer than the average. Retirement dispersion is often identified by standard patterns.

The Iowa-type dispersion patterns that are widely used by electric and gas utilities were devised empirically about 60 years ago to provide a set of standard definitions of retirement dispersion patterns. Figure 1 shows the dispersion patterns for three of these curves. The L series indicates the mode is to the Left of average service life, the R series to the Right, and the S series at average service life, and therefore, Symmetrical. There is also an O series, which has the mode at the Origin, thereby identifying a retirement pattern that has the maximum percentage of original installations retired during the year of placement.

The subscripts on Figure 1 indicate the range of dispersion, with the high number (4) indicating a narrow dispersion pattern, and the low number (1) indicating a wide dispersion pattern. For example, the R1 curve shown on the Figure indicates retirements start immediately and some of the property will last twice as long as the average service life. The dispersion patterns translate to survivor curves, which are the most widely recognized form of the Iowa curves. Other families of patterns exist, but are not as widely used as the Iowa type.

The methods of calculating depreciation rates are categorized as straight-line and non-straight-line.

Non-straight-line methods can be accelerated or deferred. There are three basic procedures for calculating straight-line book depreciation rates:

Units-of-Production

Average Life Group (ALG)

Equal Life Group (ELG)

Each of these procedures can be calculated using either the whole life or the remaining life technique.

Productive life may be identified by (a) a life span or (b) a pattern of production or usage. If production or usage is the suitable criterion, depreciation should be straight-line over life measured by time. Units-of-Production is straight-line over production or usage, while the others are straight-line over life measured by time. ALG is straight-line over the average life of the group, while ELG is straight-line over the actual life of the group.

The formulas for the whole life and remaining life techniques are shown on Table 1. For the ELG calculation procedure, Formulas 1 and 3 are applied to the individual equal life components of the property group. For the ALG calculation, the formulas are applied to the property group itself. Formula 2 is applied to the property group for either ELG or ALG. Use of the units (percent and years) in the formulas results in rates as a percent of the depreciable plant balance. The depreciable plant balance is the surviving balance at the time the rate is calculated, and is expressed as a percentage (always 100) of itself. Salvage and reserves are expressed as a percent of the depreciable plant balance. For example, a property group having a 35-year average service life and negative 5% salvage would have an ALG whole life rate of (100 + 5)/35, or 3.00%.

The first term of Formula 2 is identical to Formula 1 for the whole life rate. The second term of Formula 2 illustrates that the difference between a remaining life rate and whole life rate is the allocation of the difference between the book and calculated theoretical reserves over the remaining life by a remaining life rate.

The widely used ALG procedure of depreciation rate calculation does not recognize the existence of retirement dispersion in the calculation. The difference between the ALG and ELG procedures is the recognition of the existence of retirement dispersion in the ELG rate calculation. ELG is a rate calculation procedure, nothing more. The data required to make the ELG calculation are average service life, retirement dispersion, net salvage and the age distribution of the property. The depreciation study required to determine the applicable mortality characteristics is independent from the calculation of the depreciation rates. The resulting mortality characteristics can be used to calculate either ALG or ELG rates, both with either the whole life technique or the remaining life technique. Any set of mortality characteristics that is suitable for calculating ALG rates is just as suitable for calculating ELG rates. Conversely, any set that is not suitable for ELG is not suitable for ALG either.

The ELG procedure calculates the depreciation rates based on the expected life of each equal life component of the property rather than the average life of all components. As discussed earlier, "average" is the result of a calculation and there may not be any "average" property. When curves are used to define retirement dispersion, the average service life and the retirement dispersion pattern define the equal life groups and the expected life applicable to each group.

When retirement dispersion does not exist, the ELG rate is identical to the ALG rate. When dispersion exists, the ELG rate for recently installed property is higher than the ALG rate, and for old property it is lower.

A Simple Illustration ELG

This illustration provides a framework for visualizing the ELG methodology. Table 2 assumes 20% of the $5,000 investment is retired at the end of each year following placement. The retirement frequencies are shown on Line 7. As shown in Columns 2 through 6, this means $1,000 of investment is retired each year, with the retirement at Age 1 being recovered in its entirety during Year One, at Age 2 in Years One and Two, etc. The depreciation rate applicable to each equal life group is shown on Line 8. The annual provision in dollars for Year One shown in Column 7 is made up of the Age 1 annual amounts shown on Line 1, Columns 2 through 6. As shown on the Table, the annual provision for Age 2 is equal to the annual provision for Age 1 less the amount collected during Year One applicable to the group retired during Year One. Thus, the annual provisions can be thought of as a matrix, with the provision for any given year being produced by a portion of the matrix.

The depreciation rates in Column 9 are determined by dividing the annual provisions in Column 7 by the survivors in Column 8. The rate formula shown on Table 2 can also be used to calculate the rates and is used on the Table to illustrate the working of the matrix by calculating the depreciation rates for Year One and Year Three. For Year One, the numerator and denominator both consist of five terms. Each year, the left-hand term of both numerator and denominator drop off. It should be noted that the reverse summation of retirement ratios (starting with Column 6 and moving left on Line 7) is equal to the survivor ratio at the beginning of the period shown in Column 10.

The formula can illustrate how the matrix can be thought of in terms of a depreciation rate. If the multiplier of 100 is incorporated in each element of the numerator of the formula, such as (100 x 0.2)/2, it can be seen that 100/2 is a rate and the retirement frequency (0.2) is a weighting factor. This particular rate (50%) is the one shown for Age 2 property on Line 8, Column 3.

It can be seen that the only data required for the ELG rate calculation are the retirement frequencies for each year. These frequencies are defined by the average service life and the shape of the dispersion pattern.

A Real Illustration of ELG

The depreciation analyst deals with much larger groups of property than those appearing on Table 2. Table 3 contains an ELG rate calculation for an actual depreciable property group. The retirement frequencies shown in Column 4 are defined by the 38-year average service life and the L5 Iowa-type dispersion pattern. The ALG rate without salvage for this property is 2.632% (100%/38 years), while the ELG rate varies from 2.704% at age 0.5 years to 1.471% at the age just prior to the last retirement, 67.5 years.

The rate listed in Column 5 at each age is the weighted summation of individual rates applicable to that portion of the surviving property the retirement frequencies in Column 4 indicate will be retired in each following year. This combination of average service life and dispersion pattern means that the first retirement will be from the age 18.5 year property during the following year at an age of 19 years; therefore, it will require a rate of 5.263% (100%/19 years). (This example does not have any surviving balance at age 18.5.) The last retirement will be from age 67.5 year property; consequently, it will require a rate of 1.471% (100%/68 years). The vintage composite rate shown in Column 5 at age 0.5 years is the weighted summation of rates varying from 5.263% to 1.471%.

Since this example is for a narrow dispersion pattern, the first retirement occurs at age 19 years and the vintage composite rate remains at 2.704% at age 19.5 years, because the first retirement drops the 5.263% rate from the summation.

A wider dispersion pattern would result in a wider range of vintage composite rates than defined by the L5 curve (2.704% to 1.471%).

All that are necessary for calculating the depreciation rates applicable to each age of property are the retirement frequencies. These frequencies are defined by the average service life and the retirement dispersion pattern. The determination of average service life requires the determination of the dispersion pattern, since without dispersion there would be no "average."

Depending on the dispersion pattern, the number of retirement frequencies making up the complete Iowa curve can be up to about 4.4 times the number of years of average service life. Thus, for an account whose number of retirement frequencies is three times the average service life and whose average service life is 30 years, the rate applicable to the Age 1 property will be made up of the weighted summation of 89 components, etc. Thus, the rate calculation process is complex, but certainly not complicated. It is this complexity that makes the rate calculations much more practical using a computer.

RETIREMENT DISPERSION DEFINED

BY IOWA TYPE CURVES

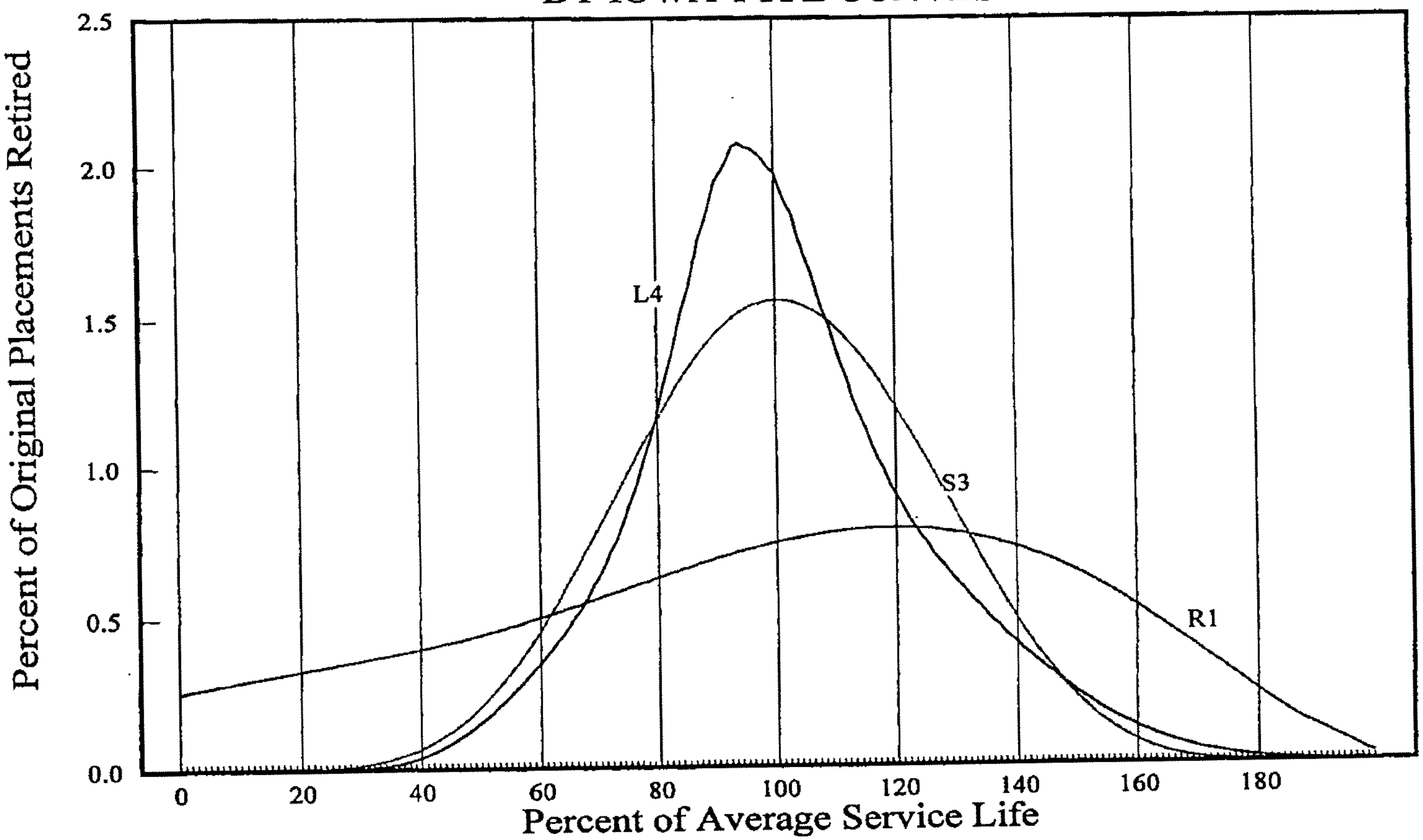

TABLE 1

DEPRECIATION RATE CALCULATION PROCEDURES

Whole Life

$$\text{Rate (\%)} = \frac{PB - S}{ASL} \qquad \text{Formula 1}$$

Remaining Life

$$\text{Rate (\%)} = \frac{PB - S}{ASL} - \frac{BR - CT}{ARL} \qquad \text{Formula 2}$$

$$\text{Rate (\%)} = \frac{PB - FS - BR}{ASL} \qquad \text{Formula 3}$$

Where

PB	is Depreciable Balance, %
AS	is Average Net Salvage, %
FS	is Future Net Salvage, %
ASL	is Average Service Life, years
BR	is Depreciation Reserve, %
CTR	is Calculated Theoretical Reserve, %
ARL	is Average Remaining Life, year

TABLE 2

DEVELOPMENT OF EQUAL LIFE GROUP CAPITAL RECOVERY RATE

Line	(1) Age Years	(2) Group 1 $	(3) Group 2 $	(4) Group 3 $	(5) Group 4 $	(6) Group 5 $	(7) Annual Provision $	(8) Beginning Survivors $	(9) Rate %	(10) Survivor Factor
1	1	1,000.00	500.00	333.33	250.00	200.00	2,283.33	5,000.00	45.67	1.00
2	2		500.00	333.33	250.00	200.00	1,283.33	4,000.00	32.08	0.80
3	3			333.33	250.00	200.00	783.33	3,000.00	26.11	0.60
4	4				250.00	200.00	450.00	2,000.00	22.50	0.40
5	5					200.00	200.00	1,000.00	20.00	0.20
6	Retirements	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00				
7	Frequency	0.20	0.20	0.20	0.20	0.20				
8	Rate	100%	50%	33.33%	25%	20%				

$$\text{Rate, \%} = \frac{\dfrac{\text{Retirements Frequencies}}{\text{Age at Retirement}}}{\text{Reverse of Retirement Frequencies}} \times 100$$

$$\text{Year One Rate} = \frac{\dfrac{0.2}{1} + \dfrac{0.2}{2} + \dfrac{0.2}{3} + \dfrac{0.2}{4} + \dfrac{0.2}{5}}{0.2 + 0.2 + 0.2 + 0.2 + 0.2} \times 100 = 45.67\%$$

$$\text{Year Three Rate} = \frac{\dfrac{0.2}{3} + \dfrac{0.2}{4} + \dfrac{0.2}{5}}{0.2 + 0.2 + 0.2} \times 100 = 26.11\%$$

TABLE 3

DETERMINATION OF DEPRECIATION RATES BY ELG PROCEDURES

[1] Age Years	[2] Year	[3] Vintage Balance $	[4] Retirement Frequency ASL 38 Curve L5	[5] Rate	[6] Amount $
0.5	1993	4,244,285	0.0000	0.02704	114,758.36
1.5	1992	800,784	0.0000	0.02704	21,651.86
2.5	1991	60,016	0.0000	0.02704	1,622.73
3.5	1990	43,455,063	0.0000	0.02704	1,174,952.00
4.5	1989	81,456	0.0000	0.02704	2,202.43
5.5	1988	172,463	0.0000	0.02704	4,663.11
6.5	1987	2,098,991	0.0000	0.02704	56,753.20
7.5	1986	2,685,949	0.0000	0.02704	72,623.55
9.5	1984	1,642,443	0.0000	0.02704	44,408.90
10.5	1983	222,602	0.0000	0.02704	6,018.78
11.5	1982	85,661	0.0000	0.02704	2,316.13
12.5	1981	4,985	0.0000	0.02704	134.79
13.5	1980	72,942	0.0000	0.02704	1,972.23
14.5	1979	219,163	0.0000	0.02704	5,925.80
15.5	1978	120,665	0.0000	0.02704	3,262.58
16.5	1977	37,042	0.0000	0.02704	1,001.55
17.5	1976	339,236	0.0000	0.02704	9,172.21
19.5	1974	336,723	0.0001	0.02703	9,101.41
20.5	1973	10,375,359	0.0004	0.02702	280,292.86
21.5	1972	4,481,906	0.0009	0.02699	120,963.25
22.5	1971	5,923,340	0.0018	0.02695	159,618.98
23.5	1970	78,848	0.0030	0.02689	2,119.97
24.5	1969	305,178	0.0047	0.02681	8,180.42
25.5	1968	10,312,586	0.0069	0.02670	275,375.94
26.5	1967	2,754,067	0.0094	0.02658	73,203.24
27.5	1966	9,558,786	0.0123	0.02644	252,715.77
29.5	1964	5,556,083	0.0194	0.02610	144,995.54
30.5	1963	23,383	0.0242	0.02589	605.42
31.5	1962	3,313,564	0.0305	0.02566	85,012.50
32.5	1961	32,271	0.0386	0.02538	819.15
33.5	1960	151,658	0.0482	0.02507	3,802.24
34.5	1959	171,483	0.0583	0.02472	4,238.70
35.5	1958	167,116	0.0674	0.02433	4,065.35
36.5	1957	70,420	0.0740	0.02390	1,683.22
37.5	1956	1,792,312	0.0768	0.02345	42,036.33
39.5	1954	2,270,555	0.0701	0.02252	51,131.79
40.5	1953	187	0.0622	0.02206	4.13
41.5	1952	20,185	0.0531	0.02161	436.14
42.5	1951	12,860	0.0442	0.02118	272.40
43.5	1950	706	0.0362	0.02078	14.67
44.5	1949	2,652	0.0296	0.02041	54.13
45.5	1948	6,422	0.0245	0.02006	128.81
46.5	1947	19,573	0.0205	0.01972	386.07
47.5	1946	323,058	0.0173	0.01940	6,268.69
49.5	1944	2,285,041	0.0123	0.01879	42,943.47
50.5	1943	15,614	0.0103	0.01850	288.86
51.5	1942	620,752	0.0085	0.01821	11,306.36
53.5	1940	684,610	0.0055	0.01766	12,090.28
54.5	1939	47,173	0.0043	0.01740	820.76
55.5	1938	22,725	0.0033	0.01714	389.52
56.5	1937	560	0.0025	0.01689	9.46
57.5	1936	722	0.0019	0.01664	12.02
59.5	1934	3,065	0.0005	0.01573	48.21
61.5	1932	944,400	0.0005	0.01573	14,853.98
67.5	1926	2	0.0000	0.01471	0.03
Totals		119,029,691			3,133,730.27
				SALVAGE (%) =	-5.0
				AFTER SALVAGE =	3,290,417
				ANNUAL DEPRECIATION RATE =	2.76

SCHEDULE DSR-4

ATMOS ENERGY CORPORATION
GENERAL OFFICE - SHARED SERVICES
COMPARISON OF THE EFFECT OF VARIOUS DEPRECIATION PARAMETERS

[1] FUNCTION	[2] 9/20/2002 BALANCE $	[3] EXISTING RATE %	[4] ANNUAL AMOUNT $	[5] STUDY RATE %	[6] ANNUAL AMOUNT $	[7] INCREASE OR (DECREASE) $	[8] CHANGE IN ASL $	[9] CHANGE IN NET SALV. $	[10] CHANGE IN PROCEDURE $	[11] RESERVE POSITION $	[12] INTER-RELATIONS $
GENERAL PLANT	153,611,619	9.06	13,910,045	16.49	25,334,551	11,424,506	3,092,723	19,757	226,607	6,043,076	2,042,343